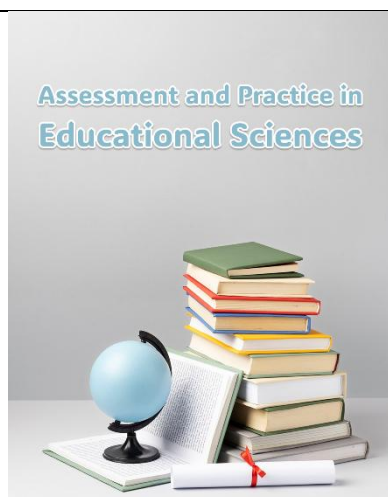




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Article type:
Original Research

Article history:
Received 13 July 2025
Revised 30 October 2025
Accepted 04 November 2025
Published online 01 January 2026

How to cite this article:

Al-Janabi, D., Mahmoudi, M.T., Al-Isawi, M., & Saadatmand, Z. (2026). Development and Elaboration of a Model for Teaching Arabic Grammar Concepts Based on Simultaneous Thinking (A Grounded Theory Study with Delphi Validation). *Assessment and Practice in Educational Sciences*, 4(1), 1-19. <https://doi.org/10.61838/japes.144>

Development and Elaboration of a Model for Teaching Arabic Grammar Concepts Based on Simultaneous Thinking (A Grounded Theory Study with Delphi Validation)

ABSTRACT

The purpose of this study was to design and elaborate a model of “teaching grammatical concepts based on simultaneous thinking” for middle school students in Iraq. The study employed a mixed exploratory design. In the qualitative phase, grounded theory was applied using the systematic approach of Strauss and Corbin. The qualitative population consisted of experts in Arabic language teaching, curriculum design, and educational psychology. Through purposeful and snowball sampling, 18 experts were interviewed until theoretical saturation was achieved (from May to November 2023). To validate the identified components and indicators, the Delphi technique was implemented in two rounds with 30 experts. The consensus criteria were defined as a mean score above 4 and a standard deviation below 1. The Kendall’s coefficient of concordance was calculated as $W = 0.85$, indicating a high level of agreement among experts. In the qualitative analysis, 266 open codes were extracted and organized into axial categories. The core phenomenon, “teaching grammatical concepts based on simultaneous thinking,” was explained within a paradigmatic model consisting of four clusters: causal conditions, contextual conditions, intervening conditions, strategies, and consequences. The Delphi results confirmed the content and face validity of the model’s components. In conclusion, the proposed model provides an applicable and contextually grounded framework for redesigning Arabic grammar instruction at the middle school level and can contribute to enhancing linguistic skills and developing higher-order thinking among students.

Keywords: Simultaneous thinking; Arabic grammar; Grounded theory; Delphi technique; Middle school.

Introduction

Grammar teaching has long been recognized as a cornerstone of linguistic competence and communicative proficiency. Within both first and second language learning contexts, mastery of grammar represents a cognitive bridge linking form, meaning, and function—facilitating the learner’s ability to construct coherent expressions and comprehend complex textual or spoken inputs (1). However, the traditional approach to grammar instruction, often characterized by rote memorization, mechanical drills, and fragmented rule presentation, has increasingly been criticized for producing superficial understanding and limited transferability to communicative use (2). These conventional methods tend to treat grammar as a static set of prescriptive rules rather than as an evolving cognitive system that learners must internalize and apply dynamically in authentic language use (3).

Recent pedagogical discourse emphasizes the necessity of transforming grammar teaching from a teacher-centered, rule-based exercise into a constructivist, learner-centered process that promotes cognitive engagement and metalinguistic awareness. Constructivism, as highlighted in contemporary instructional models, regards learning as the active construction of knowledge through interaction, reflection, and contextual problem solving (3). In grammar learning, this implies that learners must not only know the rules but also understand how grammatical structures function within meaning-making systems. This orientation aligns with the concept of *simultaneous thinking*, which entails the concurrent processing of multiple dimensions of language—form, meaning, and use—during learning and application (4).

Simultaneous thinking-based learning frameworks are increasingly relevant in the modern educational landscape, where integrative and cross-disciplinary cognitive skills are valued. Research in computational thinking, for example, illustrates that learning effectiveness is enhanced when students engage in multidimensional reasoning—analyzing patterns, relationships, and systems simultaneously (5). Similar cognitive principles can be applied to language learning, where grammar is understood not as an isolated body of knowledge but as a dynamic network that interacts with cognition, culture, and communication (6). According to (7), such multidimensional learning experiences strengthen students’ problem-solving abilities and higher-order thinking, suggesting that grammar instruction should likewise integrate analytical, creative, and reflective processes.

At the same time, the cognitive complexity of grammar acquisition, particularly in languages with intricate morphological and syntactic systems such as Arabic, presents additional pedagogical challenges. Arabic grammar is distinguished by its multilayered inflectional structure, root-based morphology, and numerous syntactic variations that often intimidate learners (8). Studies show that the abstract nature of Arabic grammatical concepts, combined with inconsistencies in instructional design, has contributed to persistent learner difficulties in applying grammar communicatively (9). The complexity of this linguistic system underscores the need for teaching models that integrate conceptual understanding with contextualized practice and cognitive engagement (10).

From a theoretical perspective, the integration of grammar teaching with simultaneous thinking processes aligns with broader developments in educational psychology and cognitive linguistics. Grammar is now seen as a cognitive system that evolves through networked associations rather than isolated rule accumulation (1). Learners construct these networks by connecting grammatical forms to semantic and pragmatic contexts, requiring cognitive flexibility and pattern recognition. This understanding resonates with the theory of *mediated learning experience*, which argues that internalization occurs through guided interaction, scaffolding, and cognitive mediation (6). Teachers thus act as facilitators who help learners perceive grammatical patterns as interconnected, meaningful systems rather than discrete facts.

Empirical evidence supports the effectiveness of multidimensional instructional approaches in promoting grammar learning outcomes. Studies using constructivist frameworks have demonstrated that learner-centered and conceptually integrated

methods foster deeper comprehension and longer retention of grammar rules (3). Similarly, research on problem-oriented and digital learning environments shows that students' computational and linguistic thinking skills improve significantly when learning involves active problem solving and reflective analysis (4, 7). These findings reveal the potential of cross-cognitive instructional models, wherein learners process grammar rules simultaneously with meaning construction, critical reasoning, and communicative use.

In recent years, the notion of *simultaneous learning* has gained traction beyond language education. In fields such as mathematics and science, it has been used to describe instructional designs that foster concurrent development of distinct but interrelated cognitive domains (11, 12). Applying this concept to grammar education, particularly in Arabic, suggests a promising pathway for addressing the gap between grammatical theory and application. Learners who can simultaneously analyze grammatical structures and their communicative functions demonstrate stronger metalinguistic awareness, adaptability, and transfer of learning across contexts (13).

Moreover, advances in educational technology have introduced new affordances for implementing simultaneous thinking in grammar instruction. Digital storytelling and computer-assisted language learning platforms provide interactive, multimodal experiences that encourage learners to process linguistic information visually, auditorily, and semantically at once (14). Artificial intelligence (AI)-driven tools, for instance, can dynamically adapt to students' grammatical errors, promoting personalized feedback and adaptive learning trajectories (15). These technological environments support higher cognitive engagement by enabling students to connect structural understanding with real-world language performance (16).

However, despite such innovations, grammar teaching in many educational systems—especially within Arabic language curricula—remains predominantly traditional. Instruction often relies on rule memorization, linear presentation of content, and teacher-led explanation, leading to passive learning and limited contextual application (8). Comparative analyses reveal significant disparities in Arabic grammar instruction across Middle Eastern countries, where curricular design frequently lacks integration between linguistic form, functional meaning, and cognitive development (9, 17). As a result, students demonstrate weaknesses not only in grammatical accuracy but also in broader language performance, including comprehension and expression.

The pedagogical reform required, therefore, involves more than introducing new materials or technologies; it requires a conceptual shift toward holistic instructional design grounded in the principles of simultaneous thinking. Such a shift entails integrating causal, contextual, and mediating factors that influence learning outcomes. According to cognitive-constructivist perspectives, effective grammar instruction must consider learners' prior knowledge, learning styles, motivational factors, and sociocultural contexts (3, 18). Teachers play a crucial role in orchestrating these elements, designing multidimensional learning experiences that balance explicit instruction with inductive exploration and authentic language use.

Further, the relationship between grammar, thinking, and communication suggests that language learning should not be confined to mechanical drills but should cultivate metacognitive and critical reasoning skills (5). Studies demonstrate that learners exposed to integrated learning environments—where analytical, reflective, and creative processes operate concurrently—exhibit stronger long-term retention and transfer of grammatical knowledge (2, 7). Moreover, such environments align with the goals of twenty-first-century education, which prioritize higher-order thinking, problem solving, and interdisciplinary cognition (19).

Educational reforms in grammar instruction also mirror broader transformations in how learning itself is conceptualized in the digital age. Traditional schooling structures, as (15) argues, must evolve beyond static “grammar of schooling” paradigms toward dynamic, learner-driven systems that integrate technological mediation and cognitive flexibility. Likewise, Arabic language education should embrace flexible pedagogical models that merge linguistic analysis, digital interactivity, and

metacognitive reflection (16, 17). Integrating these innovations with the theoretical foundation of simultaneous thinking offers a sustainable approach for achieving both linguistic proficiency and cognitive empowerment.

In parallel, the cultural and cognitive dimensions of grammar learning must be recognized as mutually reinforcing. Studies in comparative linguistics highlight how Arabic grammar, with its intricate syntactic and morphological systems, reflects not only linguistic rules but also deeper cognitive and cultural logics (10). Therefore, grammar instruction designed around simultaneous thinking should seek to harmonize cognitive structure with cultural context, fostering holistic understanding and appreciation of language as both a system and a lived experience (9).

To operationalize such an integrative model, it is essential to identify the causal conditions (such as learner cognition, instructional challenges, and methodological limitations), contextual enablers (teacher competence, infrastructure, and organizational culture), and mediating factors (individual and environmental influences) that shape grammar learning outcomes (3, 18). Through strategic instructional, learning, and assessment interventions—such as conceptual visualization, collaborative problem-solving, and multidimensional evaluation—teachers can cultivate students' ability to process grammatical concepts simultaneously and meaningfully (4, 7).

Ultimately, a pedagogical framework for teaching grammatical concepts based on simultaneous thinking aims to bridge the long-standing divide between knowledge and application. By integrating multiple cognitive dimensions—analytical, creative, and reflective—it promotes a deeper, more transferable understanding of grammar as a functional system. This synthesis aligns with global educational trends emphasizing interconnected learning, cognitive adaptability, and holistic linguistic competence (5, 11, 12).

The aim of this study is to design and validate a model for teaching grammatical concepts based on simultaneous thinking to enhance middle school students' linguistic proficiency, cognitive flexibility, and higher-order reasoning skills.

Methods and Materials

In this study, to formulate a model for teaching grammatical concepts based on simultaneous thinking, a grounded theory approach with the systematic design of Strauss and Corbin was employed within an exploratory mixed-method framework. This approach was selected for its ability to identify and explain the internal logic of a phenomenon through field data and to organize it into components of the core phenomenon, causal conditions, contextual conditions, intervening conditions, strategies, and consequences. The qualitative phase served as the driving force in extracting the elements of the model, and its findings provided the basis for subsequent validation stages.

The qualitative population consisted of experts and specialists in the fields of Arabic language education, curriculum design, and educational psychology who were familiar with the principles of simultaneous thinking. The inclusion criteria included holding at least a master's degree in relevant disciplines, a minimum of ten years of teaching or research experience in Arabic language education, familiarity with learning theories (with an emphasis on simultaneous thinking), and willingness to participate and share expertise. In total, 18 experts (faculty members, experienced teachers, and curriculum specialists) were interviewed.

Sampling was conducted purposefully using the snowball technique. After identifying several initial experts, they were asked to introduce other qualified participants. The data collection process continued until no new data emerged in the final interviews, and theoretical saturation was achieved. This point was reached after interviewing 18 participants.

The primary data collection instrument was a semi-structured interview, developed based on the research literature and study objectives. The main axes of the interview covered the identification of causal, contextual, and intervening conditions; instructional, learning, and assessment strategies; and the consequences of implementing the model. The interviews were

conducted over a seven-month period (from May to November 2023), with 11 in-person and 7 online interviews held through communication tools. Each session lasted between 45 and 90 minutes (with an average of approximately 65 minutes). With informed consent, all conversations were audio-recorded, transcribed verbatim, and returned to participants for confirmation (member checking). Alongside the interviews, relevant documents (textbooks and teacher guides for middle school, lesson plans, and sample exams) were collected, and field notes were recorded to facilitate data triangulation.

Data analysis followed the systematic approach of Strauss and Corbin in three stages: open coding, axial coding, and selective coding. During open coding, interview transcripts were read line by line, and initial concepts were extracted. Similar concepts were grouped into subcategories. Then, through axial coding, subcategories were organized under main categories, and their relationships with the elements of the paradigmatic model (core phenomenon, causal conditions, context, intervening conditions, strategies, and consequences) were explained. In the selective coding phase, the coherence and internal logic of the finalized model were consolidated, forming a unified explanatory narrative of the phenomenon. The MAXQDA 2020 software was used for data management and code tracking. To ensure analytical rigor, the constant comparison method was applied across instances and categories.

To ensure the trustworthiness of the data, the Lincoln and Guba framework was employed. For credibility, prolonged engagement in the field, participant validation, and peer debriefing with two qualitative research specialists were implemented. Transferability was established through thick description of the context, participants, and data collection/analysis processes. Dependability was reinforced by meticulous documentation of procedures and process auditing by an external expert. Confirmability was ensured by maintaining an audit trail and recording all analytical decisions. Additionally, inter-coder reliability was tested using a second coder for three interviews, and the Holsti coefficient was calculated. The obtained agreement coefficients were 0.86, 0.88, and 0.86, with a mean of 0.87, exceeding the acceptable threshold of 0.70. Data triangulation, relying on three sources—interviews, documents, and field notes/observations—enhanced the convergence of evidence and robustness of categories.

Findings and Results

This section presents the results of the qualitative data analysis derived from 18 semi-structured interviews with experts in Arabic language teaching, curriculum design, and educational psychology. The analysis followed the grounded theory approach in three stages: *open coding*, *axial coding*, and *selective coding* (Table 1). According to the data, a total of 266 open codes were extracted, which were then organized into higher-level categories and ultimately integrated into a comprehensive paradigmatic model.

Line-by-line reading of the transcripts led to the identification of 266 open codes. These codes reflected a range of field-based realities, including:

- Inherent challenges in teaching Arabic grammar: the complexity and variety of structures, numerous exceptions, abstractness of concepts, rule interference, and the gap between theoretical and applied knowledge.
- Limitations of traditional approaches: emphasis on memorization, memory-based assessments, linear and non-integrated instruction, and neglect of individual differences.
- Potentials of “simultaneous thinking” in grammar teaching: multidimensional processing, linking form–meaning–function, understanding horizontal and vertical relationships, and fostering systemic thinking.
- Learners’ needs: meaningful learning, active engagement, multisensory experiences, and continuous feedback.
- Implementation contexts: teachers’ professional competencies (subject knowledge, interactional skills, activity design), infrastructure and technology, and an innovation-supportive organizational culture.

- Proposed strategies: conceptual and visual modeling, mind mapping, collaborative learning, simultaneous aspect analysis, inductive reasoning from examples, and authentic, multidimensional assessments.
- Expected outcomes: deep comprehension of concepts, better recall and accurate rule application, learning transfer, enhanced critical and creative thinking, and improvement of the four language skills and attitudes.

Table 1. Open, Axial, and Selective Coding

Row	Open Coding	Axial Coding	Selective Coding
1	Inherent complexity of Arabic grammar rules	Inherent complexity of grammatical concepts	Challenges in teaching grammatical concepts
2	Diversity of Arabic grammatical structures		
3	Presence of exceptions in grammar rules		
4	Difficulty in understanding relationships among grammatical concepts		
5	Abstractness of grammatical concepts	Abstractness of grammar rules	
6	Lack of direct connection with students' everyday experiences		
7	Need for a high level of abstract thinking		
8	Difficulty in visualizing grammatical concepts		
9	Multiplicity of grammatical rules in Arabic	Multiplicity and diversity of grammatical rules	
10	Extensive diversity in grammatical structures		
11	Breadth of grammatical topics		
12	Interference among grammatical rules		
13	Difficulty in applying rules in real situations	Difficulty in the practical application of rules	
14	Gap between theoretical knowledge and practical application		
15	Inability to identify appropriate contexts for rule application		
16	Insufficient practice for the practical application of rules		
17	Emphasis on memorizing rules without understanding meaning	Emphasis on memorization of rules	Limitations of traditional methods
18	Memory-based assessment		
19	Rapid forgetting of memorized rules		
20	Lack of deep conceptual understanding		
21	Separate teaching of grammar rules	Lack of attention to relationships among concepts	
22	Failure to establish links among different concepts		
23	Lack of a systemic perspective in instruction		
24	Neglect of conceptual prerequisites		
25	Linear, step-by-step instruction	Linear and non-integrated teaching	
26	Lack of integration in presenting concepts		
27	Artificial segmentation of grammatical topics		
28	Absence of a holistic view of the grammatical system		
29	Standardized teaching for all students	Lack of attention to individual differences	
30	Neglect of different learning styles		
31	Inattention to students' different learning speeds		
32	Lack of flexibility in teaching methods		
33	Ability to process multiple aspects of a concept simultaneously	Multidimensional processing capability	Capacities of simultaneous thinking
34	Possibility of analyzing structure and meaning simultaneously		
35	Simultaneous attention to various aspects of a grammatical structure		
36	Simultaneous understanding of horizontal and vertical relationships among concepts		
37	Ability to see relationships among different concepts	Ability to establish relationships among concepts	
38	Networked understanding of concepts rather than isolated items		
39	Creating links between prior and new knowledge		
40	Identifying patterns and general rules from specific examples		
41	Flexibility in changing perspectives	Cognitive flexibility	

42	Ability to change strategies when facing challenges		
43	Adaptation to different learning approaches		
44	Ability to review and revise viewpoints		
45	Understanding the grammatical system as a coherent whole	Strengthening systems thinking	
46	Attention to interactions among components of the grammatical system		
47	Understanding the effect of a change in one component on the whole system		
48	Ability to see macro-patterns in the grammatical system		
49	Need for meaningful understanding of grammatical concepts	Need for meaningful understanding	Students' cognitive needs
50	Necessity of connecting concepts with real experiences		
51	Importance of understanding the practical application of rules		
52	Need to see relationships among different concepts		
53	Necessity of active participation in the learning process	Need for active learning	
54	Need for interaction with content and peers		
55	Importance of discovering and inferring rules		
56	Need for practice and practical application		
57	Importance of multisensory engagement in learning	Need for multisensory learning experiences	
58	Need to use images and diagrams		
59	Importance of hands-on and kinesthetic activities		
60	Necessity of using diverse media		
61	Need for continuous feedback in the learning process	Need for continuous feedback	
62	Importance of awareness of progress and mistakes		
63	Necessity of guidance and coaching throughout learning		
64	Need for timely reinforcement and correction		
65	Mastery of Arabic grammatical concepts and rules	Specialized grammatical knowledge	Teachers' professional competencies
66	Awareness of relationships among grammatical concepts		
67	Ability to diagnose and correct students' errors		
68	Applied and practical knowledge of grammar		
69	Understanding the concept and principles of simultaneous thinking	Familiarity with the theory of simultaneous thinking	
70	Awareness of applications of simultaneous thinking in education		
71	Ability to design activities based on simultaneous thinking		
72	Familiarity with assessment methods for simultaneous thinking		
73	Ability to facilitate group discussions	Interactive teaching skills	
74	Questioning skills and guiding students' thinking		
75	Ability to create a collaborative learning environment		
76	Skill in providing constructive feedback		
77	Ability to design multidimensional learning activities	Ability to design appropriate learning activities	
78	Skill in preparing appropriate instructional materials		
79	Ability to organize content in an integrated manner		
80	Skill in designing authentic and meaningful assignments		

81	Availability of textbooks aligned with simultaneous thinking	Appropriate resources and materials	Educational infrastructure
82	Access to supplementary and auxiliary resources		
83	Availability of conceptual diagrams and models		
84	Access to educational software and applications		
85	Classroom space suitable for group work	Flexible physical space	
86	Possibility of diverse desk and chair arrangements		
87	Sufficient space for hands-on activities		
88	Possibility of using walls to display work		
89	Access to smart boards and projectors	Educational technologies and equipment	
90	Ability to use computers and the internet		
91	Access to visualization tools		
92	Availability of suitable audio-visual equipment		
93	Multidimensional and comprehensive assessment	Appropriate assessment system	
94	Attention to the learning process alongside outcomes		
95	Use of diverse assessment methods		
96	Possibility of self-assessment and peer assessment		
97	Acceptance of innovative teaching methods	Acceptance of educational innovations	Organizational culture
98	Welcoming change and continuous improvement		
99	Valuing creativity and innovation		
100	Flexibility toward new approaches		
101	Managerial support for changing instructional methods	Managerial support for change	
102	Provision of necessary resources and facilities		
103	Encouragement of teacher innovation		
104	Creating a safe space for experimenting with new methods		
105	Cooperation and exchange of experience among teachers	Teacher collaboration	
106	Formation of professional learning communities		
107	Participation in designing and implementing programs		
108	Mutual support and backing		
109	Informing parents about instructional goals and methods	Communication with parents and community	
110	Engaging parents in the instructional process		
111	Connecting with the community and using local resources		
112	Responsiveness to community needs and expectations		
113	Differences in students' learning styles	Students' learning styles	Individual factors
114	Diversity in multiple intelligences		
115	Differences in information-processing speed		
116	Variety in sensory preferences (visual, auditory, kinesthetic)		
117	Interest and motivation toward learning Arabic	Students' motivation and attitudes	
118	Attitudes toward the difficulty of Arabic grammar		
119	Self-efficacy in language learning		
120	Goal-setting and perseverance in learning		
121	Prior experiences in learning Arabic	Prior learning experiences	
122	Success or failure in prior learning		
123	Familiarity with different instructional methods		
124	Established learning beliefs and habits		
125	Baseline knowledge of Arabic vocabulary	Baseline linguistic knowledge	
126	Familiarity with basic Arabic structures		
127	Ability to read and comprehend simple texts		
128	Basic writing skills		

129	Macro-level educational policies	Educational policies	Environmental factors
130	Educational laws and regulations		
131	Centralized and inflexible curriculum	Curriculum	
132	Misalignment of content with students' needs		
133	Mismatch between content volume and instructional time		
134	Lack of coherence in presenting grammatical concepts		
135	Negative societal attitudes regarding the difficulty of Arabic	Societal culture and attitudes	
136	Misconceptions about learning grammar		
137	Differential valuation of Arabic in society		
138	Media influence on attitudes toward learning Arabic		
139	Limited instructional hours for Arabic	Time constraints	
140	Compressed curriculum		
141	Insufficient time for practice and application		
142	Disproportion between time and content volume		
143	Using concept maps to display relationships among concepts	Concept-based instruction	Instructional strategies
144	Designing visual templates to understand grammatical structures		
145	Using organizing frameworks to integrate concepts		
146	Presenting mental models to understand relationships among concepts		
147	Drawing mind maps to organize grammatical concepts	Use of mind maps	
148	Using tree diagrams to show grammatical structures		
149	Creating interactive concept maps by students		
150	Using mind maps to compare similar structures		
151	Forming small groups to examine grammatical concepts	Collaborative learning	
152	Using group discussions to discover rules		
153	Students' collaboration in solving grammatical problems		
154	Peer teaching to reinforce conceptual understanding		
155	Using colors to distinguish grammatical components	Use of visualization techniques	
156	Graphical representation of grammatical structures		
157	Using animation to show grammatical changes		
158	Designing visual charts to compare structures		
159	Simultaneous examination of structure, meaning, and use	Simultaneous analysis of multiple aspects	Learning strategies
160	Concurrent attention to linguistic form and content		
161	Analysis of interrelationships among grammatical elements		
162	Simultaneous understanding of multiple levels of linguistic analysis		
163	Comparing similar and different structures	Comparison and differentiation	
164	Identifying subtle differences among grammatical structures		
165	Comparing different uses of the same grammatical structure		
166	Identifying shared patterns across different structures		
167	Deriving rules by examining examples	Rule inference from examples	
168	Extracting grammatical patterns from texts		
169	Students' self-formulation of rules		
170	Testing grammatical hypotheses with new examples		

171	Using grammar rules in writing	Application of rules in real contexts	
172	Employing grammatical structures in conversations		
173	Practicing rule application in communicative situations		
174	Solving real-world problems using grammatical knowledge		
175	Multilateral evaluation of grammatical skills	Multidimensional assessment	Assessment strategies
176	Simultaneous assessment of knowledge, understanding, and application		
177	Evaluation of the ability to analyze and synthesize concepts		
178	Assessment of higher-order thinking skills		
179	Designing authentic projects for evaluation	Use of authentic tasks	
180	Assessment through writing practical texts		
181	Measuring the ability to apply rules in real contexts		
182	Performance-based assessment		
183	Encouraging students to assess their own and peers' progress	Self-assessment and peer assessment	
184	Use of self-assessment checklists		
185	Peer assessment with defined criteria		
186	Reflection on the learning process and mistakes		
187	Providing precise and detailed feedback	Constructive feedback	
188	Focusing on strengths and areas for improvement		
189	Offering specific strategies for advancement		
190	Timely and continuous feedback		
191	Deep understanding of grammatical concepts instead of surface memorization	Deeper understanding of concepts	Improvement in learning grammatical concepts
192	Ability to analyze and interpret grammatical structures		
193	Understanding relationships among different grammatical concepts		
194	Ability to explain the logic of grammatical rules		
195	Long-term retention of rules	Better recall of rules	
196	Reduced forgetting of grammatical rules		
197	Faster retrieval of grammatical information		
198	Recall of rules in applied contexts		
199	Correct use of rules in writing	More accurate application of rules	
200	Proper use of grammatical structures in speech		
201	Reduction of grammatical errors in language use		
202	Choosing appropriate structures to convey meaning		
203	Application of grammatical knowledge in new contexts	Transfer of learning	
204	Generalization of rules to similar cases		
205	Using grammatical knowledge in learning other languages		
206	Applying grammatical principles to comprehend complex texts		
207	Ability to analyze and evaluate linguistic structures	Critical thinking	Development of thinking skills
208	Judging the correctness and accuracy of language use		
209	Ability to detect and correct errors		
210	Evaluation of linguistic arguments		
211	Production of new linguistic structures	Creative thinking	
212	Combining different rules to express ideas		
213	Creating texts with diverse structures		
214	Innovation in the application of grammar rules		
215	Ability to solve complex grammatical problems	Problem-solving	

216	Effective strategies for analyzing grammatical problems		
217	Selecting appropriate solutions for linguistic challenges		
218	Evaluating solutions and choosing the best option		
219	Inferring general rules from specific examples	Deductive reasoning	
220	Applying general principles to specific cases		
221	Ability to generalize rules to new cases		
222	Extracting regular patterns from linguistic data		
223	Improving reading speed and accuracy in Arabic texts	Reading skill	Improvement of language skills
224	Increasing comprehension of Arabic texts		
225	Ability to analyze sentence structure within a text		
226	Identifying grammatical roles within a text		
227	Correct application of grammar in writing	Writing skill	
228	Variety in the use of grammatical structures		
229	Reduction of grammatical errors in writing		
230	Ability to write coherent and structured texts		
231	Correct use of grammatical structures in speaking	Speaking skill	
232	Greater fluency in Arabic conversations		
233	Reduced pauses and hesitation in using grammatical structures		
234	More precise expression using appropriate structures		
235	Better comprehension of Arabic speech	Listening skill	
236	Identification of grammatical structures in speech		
237	Understanding relationships among sentence elements in speech		
238	Ability to follow complex speech		
239	Increased interest in learning Arabic	Interest in learning the language	Development of a positive attitude
240	Enjoyment in discovering linguistic rules		
241	Enthusiasm for reading Arabic texts		
242	Willingness to continue learning Arabic		
243	Confidence in one's ability to use the language	Linguistic self-confidence	
244	Reduced anxiety in using Arabic		
245	Confidence in the correctness of grammatical usage		
246	Willingness to use complex structures		
247	Belief in the ability to successfully learn grammar	Self-efficacy	
248	Confidence in overcoming learning challenges		
249	Sense of control over the learning process		
250	Belief in the impact of effort on learning success		
251	Intrinsic interest in learning Arabic	Intrinsic motivation	
252	Enjoyment of the process of learning grammar rules		
253	Willingness to learn beyond course requirements		
254	Perseverance in facing learning difficulties		
255	Integrating instruction of related concepts	Integration of teaching grammatical concepts	Teaching grammatical concepts based on simultaneous thinking
256	Simultaneous presentation of interrelated concepts		
257	Avoidance of artificial segmentation of topics		
258	Establishing connections among different grammatical concepts		
259	Simultaneous attention to form, meaning, and use	Simultaneous processing of multiple grammatical aspects	

260	Simultaneous analysis of different aspects of a structure	
261	Attention to horizontal and vertical relationships among concepts	
262	Simultaneous understanding of the whole and parts of the grammatical system	
263	Identifying reciprocal relationships among grammatical elements	Understanding reciprocal relationships among grammatical elements
264	Understanding the impact of a change in one element on other elements	
265	Recognizing interdependencies in the grammatical system	
266	Attention to interactions among different levels of linguistic analysis	

In the axial step, thematically related open codes were grouped under main categories and organized according to Strauss and Corbin's paradigmatic model. The outcome comprised six conceptual clusters:

1. Core Phenomenon: "Teaching Grammatical Concepts Based on Simultaneous Thinking"

Emphasizes integrating instruction of concepts, the concurrent processing of grammatical aspects, and understanding the reciprocal relationships among elements.

2. Causal Conditions

- a) Challenges in teaching grammatical concepts (complexity and abstractness of rules, multiplicity/interference of rules, difficulty of application)
- b) Limitations of traditional methods (memorization-oriented, linear instruction, disregard for differences)
- c) Capacities of simultaneous thinking (multidimensional processing, linking concepts, cognitive flexibility, systems thinking)
- d) Learners' cognitive needs (meaning-making, active learning, multisensory experiences, continuous feedback)

3. Contextual Conditions

- Teachers' professional competencies (specialized grammatical knowledge, familiarity with simultaneous thinking, interactive teaching skills, activity design)
- Educational infrastructure (resources and materials, flexible physical space, technology, and assessment system)
- Organizational culture (acceptance of innovation, managerial support, peer collaboration, linkage with parents/community).

4. Intervening Conditions

Individual factors (learning styles, motivation and attitudes, prior experiences, baseline linguistic level) and environmental factors (policies, curriculum, societal culture and attitudes, time constraints).

5. Strategies

- Instructional strategies: conceptual modeling/visualization, mind maps, collaborative learning;
- Learning strategies: simultaneous analysis, comparison and discrimination, inference from examples, application in real-world contexts;
- Assessment strategies: multidimensional and performance-based evaluation, authentic tasks, self-/peer-assessment, constructive feedback.

6. Consequences

- Improved learning of grammatical concepts (deep understanding, better recall, precise application, transfer)
- Development of thinking skills (critical, creative, problem-solving, deductive reasoning)

- Enhancement of language skills (reading, writing, speaking, listening)
- Development of a positive attitude (interest, linguistic self-confidence, self-efficacy, intrinsic motivation).

In the selective stage, the main categories were linked as components of a coherent system centered on the core phenomenon. The explanatory narrative of the model is as follows: the inherent challenges of Arabic grammar and the limitations of traditional methods, along with learners' cognitive needs, trigger the issue of changing the instructional approach. In the presence of appropriate contexts (teacher competence, infrastructure, organizational culture) and with consideration of intervening conditions (individual/environmental), implementing strategies based on simultaneous thinking—from designing conceptual models and collaborative activities to simultaneous analysis and authentic assessment—paves the way to the consequences: deep understanding, precise and transferable rule application, enhanced thinking and language skills, and improved attitudes and motivation. Thus, simultaneous thinking functions as a mechanism that integrates form–meaning–use in grammar instruction and reduces the gap between theoretical knowledge and practical application. The configuration of these relationships is presented as a paradigmatic model in Figure 1.

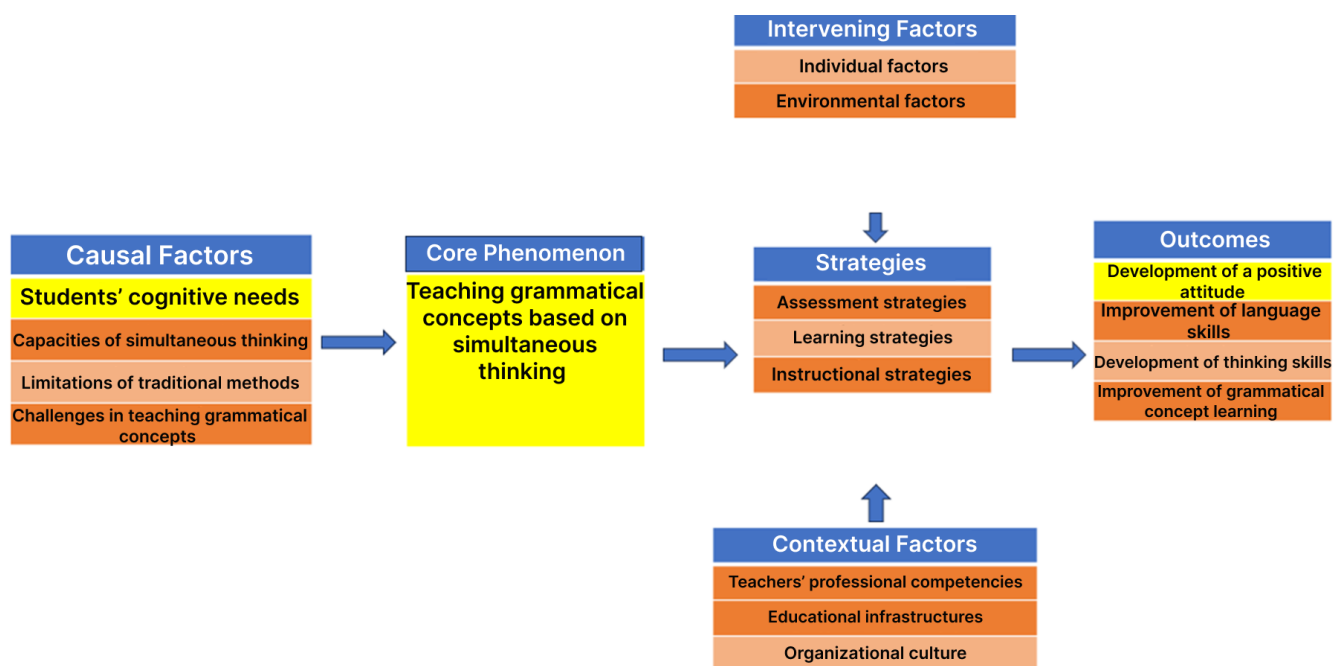


Figure 1. The paradigmatic model of teaching grammatical concepts based on simultaneous thinking among middle school students

In this study, Delphi validation was conducted to finalize the components and indicators of the “teaching grammatical concepts based on simultaneous thinking” model after the qualitative phase. To this end, a questionnaire was developed based on the extracted paradigmatic model and administered in two rounds to 30 experts (the 18 qualitative participants plus 12 additional experts under the same criteria). Experts indicated their level of agreement with each component/indicator on a five-point Likert scale and also provided qualitative revision suggestions. The consensus criterion was a mean score of 4 or higher accompanied by a standard deviation of less than 1; items that did not meet the threshold were rewritten, merged, or removed. To assess overall agreement, Kendall's coefficient of concordance was calculated, and, in parallel, content analysis of experts' qualitative views aided in more precise redrafting of statements. The second round focused on the revised items, and upon achieving stable consensus, the Delphi process concluded. The outcome was expert confirmation of the model's structure and relationships, reduced conceptual overlap, clarified category boundaries, and a finalized, operational list of indicators for use in the quantitative stages (survey and structural equation modeling).

Discussion and Conclusion

The findings of the present study, which aimed to design and validate a model for teaching grammatical concepts based on *simultaneous thinking*, revealed a comprehensive and multidimensional framework capable of addressing the long-standing challenges of grammar instruction, particularly within Arabic language education. Through qualitative analysis and Delphi validation, the model integrated six conceptual dimensions: causal factors, contextual conditions, intervening conditions, strategies, outcomes, and the central phenomenon of “teaching grammatical concepts through simultaneous thinking.” Each of these dimensions interacted dynamically to create a coherent pedagogical system emphasizing cognitive integration, active learning, and contextualized understanding.

The analysis highlighted that the causal factors—namely the complexity of grammatical structures, the abstractness of linguistic concepts, and the limitations of traditional instruction—constitute primary barriers to effective grammar learning. These findings echo the concerns raised by (8) and (9), who found that Arabic grammar instruction in many educational settings remains predominantly rule-based and memorization-oriented, causing students to struggle with applying grammar communicatively. Similarly, (2) reported that students’ grammatical problem-solving difficulties stem from the decontextualized nature of instructional practices, which separate grammar from meaning and usage. The present model responds directly to these issues by embedding grammatical learning in multidimensional cognitive engagement—linking form, meaning, and application concurrently.

A key contribution of this study is its emphasis on the role of *simultaneous thinking* as a pedagogical and cognitive mechanism that allows learners to process multiple linguistic dimensions at once. The model posits that learners acquire grammar more effectively when they are encouraged to observe, analyze, and apply grammatical patterns while simultaneously reflecting on meaning and communicative intent. This finding aligns with (4), who demonstrated that simultaneous learning processes—particularly those integrating computational and linguistic thinking—enhance both cognitive flexibility and language acquisition. Likewise, (5) argued that simultaneous cognitive engagement strengthens learners’ capacity to identify patterns and relationships across conceptual domains, thereby reinforcing higher-order reasoning.

Furthermore, the findings underscore that the *contextual conditions*—teacher competencies, educational infrastructure, and organizational culture—significantly shape the success of simultaneous thinking-based instruction. Participants emphasized that teachers must possess not only specialized grammatical knowledge but also metacognitive and interactive teaching skills to design multidimensional learning experiences. This finding aligns with the constructivist orientation discussed by (3), who demonstrated that grammar instruction grounded in constructivism requires teachers to act as facilitators of cognitive discovery rather than transmitters of prescriptive rules. Similarly, (6) emphasized that mediated learning environments, where teachers guide students’ internalization of grammatical concepts through dialogic interaction and scaffolding, result in deeper conceptual understanding and longer retention.

The results of this study also revealed that *intervening conditions*, such as individual learning styles, motivation, prior knowledge, and environmental factors (e.g., curriculum rigidity or societal attitudes toward Arabic), influence the model’s effectiveness. This reinforces (18), who found that grammatical proficiency is shaped by both internal learner factors and external educational contexts. Additionally, (9) highlighted disparities in Arabic grammar curricula across Middle Eastern systems, noting that institutional and policy constraints often hinder innovation. In the current study, participants observed that learners with higher intrinsic motivation and cognitive adaptability benefited more from the simultaneous thinking approach, supporting (13), who concluded that technology-integrated, self-directed learning environments foster critical and reflective language learning behavior.

The *strategic dimensions* of the model—comprising instructional, learning, and assessment strategies—represent its operational core. Instructional strategies included conceptual modeling, visual mapping, and collaborative learning, all of which encouraged active cognitive engagement. Learning strategies, such as comparative analysis, inference from examples, and simultaneous examination of structure and meaning, facilitated inductive understanding of grammatical systems. Assessment strategies emphasized authentic and multidimensional evaluation through performance-based tasks and reflective self-assessment. These components collectively align with (7), who demonstrated that problem-oriented learning models enhance students' computational and analytical thinking by requiring them to engage in structured yet flexible reasoning processes. Similarly, (14) found that digital storytelling activities, which integrate multiple cognitive and expressive modes, enhance learners' grammatical and narrative competence by engaging linguistic, visual, and conceptual dimensions concurrently.

The *outcomes* of the model further support the growing body of evidence suggesting that integrated, reflective, and context-based grammar instruction enhances both linguistic proficiency and higher-order cognitive skills. Participants reported improvements in students' grammatical comprehension, long-term recall, accuracy of application, and transfer of learning. These findings resonate with (1), who conceptualized grammar as a cognitive network wherein understanding evolves through pattern recognition and systemic connection-building. Moreover, improvements in critical, creative, and problem-solving skills observed in this study parallel (11) and (12), who confirmed that simultaneous engagement in multiple cognitive operations fosters both conceptual depth and adaptive reasoning. In essence, the present model appears to activate learners' ability to see grammar not merely as a set of isolated rules but as a living system interwoven with communication and thought.

Another noteworthy finding concerns the development of learners' *positive attitudes* and self-efficacy toward language learning. Participants reported that students became more motivated, confident, and willing to experiment with complex grammatical structures. This attitudinal transformation supports (16), who highlighted the motivational impact of technology and modern instructional methodologies in Arabic learning, and (15), who argued that artificial intelligence and adaptive pedagogies can reform traditional schooling by fostering learner autonomy and engagement. Furthermore, the observed increase in linguistic confidence corresponds with (10), who emphasized that comparative and applied grammar teaching methods, when linked to meaningful communication, reduce anxiety and promote self-assured usage.

The triangulated results from interviews, document analysis, and Delphi validation collectively affirm the internal coherence, relevance, and contextual adaptability of the proposed model. Experts agreed that the model's structure—anchored in the causal–contextual–strategic–outcome sequence—provides an effective pedagogical roadmap for transforming grammar instruction. Importantly, the high consensus index achieved (Kendall's $W = 0.85$) demonstrates strong expert agreement, suggesting that the framework captures essential components necessary for operationalizing simultaneous thinking in grammar education. This aligns with findings by (19), who underscored that system-based modeling in educational design ensures internal alignment among variables and facilitates meaningful implementation.

The present study's conceptualization of grammar instruction as a *systemic and interactive learning model* extends prior research by linking simultaneous thinking to linguistic, cognitive, and motivational outcomes. While earlier models have addressed aspects of cognitive engagement or metalinguistic awareness, few have articulated a fully integrated paradigm that situates grammar learning within an ecological framework of learner cognition, teacher competence, and contextual supports. The current findings thus substantiate the proposition that meaningful grammar instruction must transcend disciplinary boundaries—connecting cognitive science, language pedagogy, and digital learning theories (5, 15). Moreover, by validating the model through expert consensus, this study provides empirical evidence that pedagogical innovation grounded in simultaneous thinking can respond effectively to the persistent gap between grammatical theory and communicative practice.

In sum, the findings reinforce a growing international consensus that grammar instruction must evolve from linear rule transmission toward multidimensional, learner-centered models of reasoning and understanding. The proposed model situates grammar as both a cognitive construct and a communicative tool, integrating explicit instruction with exploratory, reflective, and contextualized learning. Through this framework, grammar teaching becomes an avenue for cultivating metacognition, linguistic creativity, and academic resilience. As such, the study contributes to the theoretical and practical discourse on reimagining grammar pedagogy in the 21st-century classroom, particularly within the Arabic language context where systemic reform remains both challenging and essential (8, 9, 17).

Although the study yielded significant theoretical and practical insights, several limitations must be acknowledged. First, the qualitative nature of data collection—particularly the reliance on expert interviews and Delphi rounds—means that the findings primarily reflect professional perspectives rather than large-scale empirical testing in classroom contexts. Future application across different educational settings may reveal variations in implementation fidelity. Second, while the model was designed with the Arabic language in mind, its generalizability to other linguistic systems, such as English or Persian, requires further validation. Third, the research depended on self-reported expert data, which, although rich, may contain subjective biases. Additionally, technological and institutional disparities among participating schools limited the uniformity of contextual conditions. Finally, the absence of longitudinal follow-up restricts understanding of how sustained exposure to simultaneous thinking-based instruction affects long-term grammar mastery and language proficiency.

Future research should empirically test the effectiveness of the proposed model through experimental and longitudinal designs that measure changes in learners' grammatical accuracy, comprehension, and transfer skills over time. Comparative studies could explore how the simultaneous thinking approach performs relative to other innovative grammar teaching frameworks, such as task-based, cognitive apprenticeship, or blended learning models. Further, quantitative modeling using structural equation analysis could help identify mediating variables—such as cognitive load, metalinguistic awareness, and motivation—that influence learning outcomes. Research might also expand into cross-linguistic comparisons, examining how simultaneous thinking operates across typologically diverse languages. Additionally, integrating neurocognitive or eye-tracking methodologies could provide deeper insight into how learners process grammatical information simultaneously at the perceptual and cognitive levels.

For practical implementation, educators should undergo targeted professional development that enhances their understanding of simultaneous thinking principles and equips them to design cognitively rich grammar lessons. Teacher training programs should emphasize integrating visualization tools, collaborative activities, and real-world problem-solving tasks into grammar instruction. Curriculum designers are encouraged to embed flexibility and interdisciplinarity within grammar syllabi, ensuring alignment with learners' cognitive and emotional needs. Schools should also invest in digital infrastructure that supports interactive learning environments, enabling teachers to combine traditional instruction with technology-enhanced, reflective practice. Finally, policymakers should promote a culture of innovation and continuous improvement in language education, encouraging experimentation with pedagogical models that foster both linguistic precision and cognitive agility.

Acknowledgments

We would like to express our appreciation and gratitude to all those who helped us carrying out this study.

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.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

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