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The Jigsaw Strategy in Differentiated Teaching: A Case Study

Tsatsou-Nikolouli Sofia
University of Thessaly, Greece

Corresponding Author: **Tsatsou-Nikolouli Sofia**

Abstract
In today's schools, the diverse interests, needs, and learning styles of students make it essential to adjust the pace, level and type of teaching. Therefore, teachers need to use techniques that promote the differentiation of teaching content, learning outcomes and assessment, in order to enhance the active engagement of all students and ensure effective learning outcomes. In particular, the Jigsaw strategy, within the framework of cooperative group teaching, encourages all members of each group to collaborate in order to achieve a common goal. This strategy promotes active listening, participation in group activities, interaction and the sharing of knowledge and information among classmates. This study reflects the views of 54 primary school teachers from the 11th Primary Education Department of Eastern Thessaloniki in Greece, who participated in a three-hour experiential seminar workshop on differentiated teaching using the Jigsaw strategy. The teachers applied this strategy in the context of the history lesson. After processing various historical sources with the use of laptops, they were asked to utilize the material in order to better understand historical concepts and events and subsequently answer a set of related questions. Following the experiential workshop, the 54 teachers completed a structured ad hoc questionnaire, developed after a review of the relevant literature, in order to evaluate the effectiveness of the Jigsaw strategy. According to the teachers' responses to the twelve questionnaire items, the Jigsaw technique can motivate students, support their interests and learning preferences, foster critical and creative thinking skills, and provide meaningful opportunities for both independent and collaborative work.

Keywords: Jigsaw, Differentiated Instruction, Collaborative Learning

Introduction

The modern educational reality is characterised by intense diversity in terms of learning needs, interests, prior knowledge and learning profiles of students. For this reason, it is necessary to re-examine all traditional teaching practices and adopt pedagogical approaches that ensure the active participation of all students in the learning process (Darling-Hammond *et al*., 2020) [7]. As a continuation of the above, differentiated instruction is a pedagogical approach that aims to adapt learning content, process, product and assessment to the needs and interests of students, thereby enhancing their engagement, autonomy and ultimately their success (Hall *et al*., 2003) [12]. Moreover, any differentiation in learning contributes to reducing inequalities among children and thus promotes a more inclusive school (Ainscow, 2020) [1].

It is, of course, very important to emphasize that collaborative learning strategies play an effective role in the successful implementation of differentiated teaching, as they enhance interaction between children, the construction of knowledge through group activities and the creation of learning experiences that facilitate the cognitive and experiential engagement of all students (Gillies, 2016) [11]. Among these collaborative learning strategies, the Jigsaw method (Aronson *et al*., 1978) [3] is considered one of the most effective, not only because of its structured form but also because of its ability to enhance the sense of responsibility and interdependence among students. It should be noted that various studies have shown that the use of the Jigsaw strategy is associated with high levels of empathy, better understanding of complex concepts, development of communication, collaboration skills and improved learning outcomes (Doymus, 2007; Slavin, 2015; Johnson & Johnson, 2016) [9, 28, 18].

Despite the interest that has developed internationally in the implementation of various collaborative strategies in the teaching of history in primary school, the use of the Jigsaw strategy in this particular subject has not been sufficiently studied, especially in today's Greek schools. After all, teaching history requires the analysis of sources, the understanding of different

perspectives, the critical examination of information and the synthesis of historical data, processes that are, in other words, facilitated by collaborative teaching and learning methods (Wineburg, 2001; Counsell, 2011) [39, 6]. However, teachers often find it difficult to systematically use such strategies, either because of their lack of training or because of limited teaching time (Ioannidou-Koutselini & Patsalidou, 2014) [16]. From the above, therefore, it can be concluded that studying educators' own perceptions regarding the use of the Jigsaw strategy in promoting differentiated instruction is particularly important, as it can highlight both the benefits and the difficulties of its implementation in the real school environment.

This study reflects the views of 54 primary school teachers from the 11th region of Eastern Thessaloniki in Greece, who participated in a three-hour experiential seminar on differentiated teaching, using the Jigsaw strategy in history teaching. Their perceptions are examined in terms of the extent to which this strategy can enhance student motivation, respond to their learning preferences, cultivate critical and creative thinking and strengthen collaboration skills. The findings can contribute significantly to the discussion on the integration of collaborative strategies in history teaching, such as the Jigsaw strategy and offer guidance for training, lesson planning and pedagogical interventions at national and international levels.

Theoretical Framework

Differentiated Instruction

Differentiated instruction is one of the most effective contemporary pedagogical approaches aimed at dealing with the increasing heterogeneity of students in the classroom. According to Tomlinson (2001a, 2014 [34]), differentiation is not a set of techniques but a teaching philosophy based on the assumption that students differ in terms of their level of maturity, interests, learning styles and experiences, so teaching should be adapted to all of the above rather than remaining the same for all students. This philosophy is based on the assumption that all students can learn but not necessarily in the same way, at the same time or with the same means. As a result of all this, teachers must organize learning activities in a way that differentiates the content, process, product and learning environment so that they respond to the individual needs of each student (Tomlinson & Imbeau, 2011) [35].

It is important to add that the basic principle of differentiated instruction is that every child has the right to access all the resources and opportunities they need to succeed, regardless of their abilities, which enhances their learning participation and at the same time reduces any inequalities in their academic performance (Santangelo & Tomlinson, 2009) [26]. Furthermore, differentiated instruction is in line with Universal Design for Learning, which proposes multiple forms of presentation, participation and expression in a way that benefits individuals with different learning styles (Meyer *et al*., 2013) [23]. In practice, the above requires the use of progressive activities, a variety of learning products, multiple sources and alternative forms of assessment (Arslan, 2017) [4], elements that are also reflected in the statements in the questionnaire of this study, such as the varying levels of difficulty of the activities, the variety of sources and the adaptation of the questions to the students' abilities.

It would be remiss not to emphasize that differentiated instruction is directly linked to the principles of inquiry-based and student-centered learning, as it emphasizes active student participation, the cultivation of self-regulation skills and the formation of learning motivations (Subban, 2006, Heacox, 2012) [30, 14]. In other words, cooperative learning combined with structured strategies, such as Jigsaw, seem to function as practical tools that support the implementation of differentiation, as they clearly organize collaboration, distribute roles within groups and offer opportunities for content, process and product differentiation (Stradling & Saunders, 1993) [29].

Collaborative Learning

Collaborative learning is based on Vygotsky's theory of the social construction of knowledge, which emphasizes the value of positive interdependence and common effort in constructing meaning (Vygotsky, 1978) [36]. More specifically, collaborative learning is a pedagogical approach in which students work in small, heterogeneous groups to achieve common learning goals through systematic interaction and co-construction of knowledge. In contrast to simple forms of group work, collaborative learning requires a clear structure, defined roles and active participation of all members in order to avoid passive involvement or unequal distribution of work (Cohen, 1986) [5]. Alternatively, we could say that the emphasis shifts from competition to interdependence, as in the context of group collaborative learning, the success of the group depends on the contribution of each student/member.

One of the benefits of collaborative learning is that it enhances students' cognitive development, as the exchange of opinions, negotiating meaning and generally verbalizing thoughts in the context of dialogue among group members enhances deeper understanding of concepts (Webb, 2010) [37]. At the same time, it contributes to the development of various social and emotional skills, such as communication, empathy and conflict resolution, which are particularly important in today's multicultural school environments (Roseth *et al*., 2008) [24]. Furthermore, collaborative learning has been linked to increased learning motivation and more positive attitudes towards school, as students experience a sense of belonging and active participation in the learning process (Kagan & Kagan, 2015) [20]. From the above, it appears that collaborative learning is considered a fundamental component of all contemporary, inclusive and differentiated teaching approaches.

The Jigsaw Strategy

The Jigsaw strategy is a structured form of collaborative learning, in which knowledge is deliberately shared among students so that they can understand and learn more broadly through their interdependence and cooperation (Hedeen, 2003) [15]. In this way, each student takes on a specific cognitive role and becomes responsible for both their own learning and for the learning of the members of their group, which enhances active participation and a sense of personal contribution (Perkins & Saris, 2001) [22]. More specifically, the implementation framework is as follows:

The learning materials to be studied are divided into sections and the students are divided into heterogeneous groups, the "Base Groups." The members of each group are equal in number to the sections of the material.

- Each student takes on a different section of the material, which they must study thoroughly so that, as an "expert," they can teach it to other students in the next stage.
- After completing the study of the material, new groups are created, the "Expert Groups," which are made up of the "experts" on the same content from each "Base Group." These groups share the results of their study and prepare the final presentation of their content to the rest of the students.
- Students return to their original groups, the "Base Groups," where each member of the group presents their content to the rest of the group.
- The process is completed with the evaluation of the learning outcome, which may vary in terms of form (e.g., oral or written text, etc.), in terms of typology (e.g., test or interactive game, etc.) or in terms of the final product (e.g., presentation, poster, etc.) (Aronson & Patnoe, 2011) [2].

At this point, it is worth noting that many studies have shown that the Jigsaw strategy contributes not only to improving academic performance, but also to developing a variety of social and communication skills, such as empathy, responsibility, and effective listening, skills that are particularly important in learning environments that seek to promote diversity and inclusion (Gillies, 2016) [11]. Moreover, the existence of two groups, "specialists" and "base," creates conditions for deeper processing of information, as students are required to organize, interpret and rephrase knowledge in order to communicate it to others (Doymus, 2007) [9]. It seems, therefore, from the above that the Jigsaw strategy is particularly suitable for differentiated teaching, as on the one hand it facilitates the adaptation of content and the learning process to the needs and abilities of all students, while on the other hand it maintains the collaborative nature of learning with all its benefits for teachers and learners.

The effectiveness of the Jigsaw strategy has been extensively studied at all levels of education, with research findings converging on its positive impact on both the learning process and students' social skills. More specifically, in primary education, it appears that the implementation of Jigsaw contributes to improving students' academic performance, cooperation and creative thinking, especially in science courses (Efriliani & Hastuti, 2025) [10]. At the same time, it appears that the strategy enhances students' interest in the classroom, improves their understanding of the material and helps them retain knowledge, often to a greater extent in relation to traditional teaching approaches (Züleyha & Seçil, 2023) [40]. In higher education, Jigsaw has been linked to the development of communication skills, active participation and a sense of academic inclusion among students, even in cognitively demanding fields such as medical education (Moin *et al*., 2024) [21]. Overall, reviews of the relevant literature confirm that Jigsaw works effectively as an inclusive and differentiated teaching strategy that can promote positive interdependence, individual responsibility and collaborative knowledge construction (Saint Fleur *et al*., 2016) [25].

The Jigsaw strategy in the context of differentiated history teaching

In history course, the Jigsaw strategy can be used in the context of differentiated teaching, assigning students different historical dimensions to explore, such as the causes and consequences of historical events, key figures, chronological sequence and multiple perspectives. In fact, the use of laptops can enhance the entire learning process, as it facilitates children's access to a variety of historical sources, textual, visual, cartographic and audiovisual sources, adapted to the level and needs of the students. In this way, differentiation is achieved not only in terms of content but also in terms of the learning process itself, while the existence of "Base Groups" and "Special Groups" promotes the exchange of knowledge and thus enhances the collaborative construction of historical knowledge and understanding.

The successful implementation of the Jigsaw strategy in history lesson requires appropriately targeted pedagogical planning that takes into account the particularities of historical knowledge. More specifically, it is important to divide historical content into distinct but interrelated sections, such as the causes and consequences of various historical events, historical figures, the chronological order of historical events and different perspectives on these events, so that the coherence of the historical narrative can be maintained. At the same time, the correct selection of historical sources, such as textual, visual or cartographic sources, is particularly important in order to respond to the cognitive level of all students and facilitate the understanding of historical concepts and events.

It is worth noting that the formation of heterogeneous "Base Groups" in the initial stage of implementing the Jigsaw strategy enhances the exchange of views among students and promotes the development of their historical thinking through collaboration. At all stages of the strategy's implementation, the teacher's role remains primarily guiding, emphasizing the creation of questions for historical reflection but also the synthesis of information that will arise from all the "Base Groups" into a unified interpretive approach. Not to mention that, at the end of the process, the teacher should give enough time for discussion and reflection so that students can move from simply reproducing information to a deeper historical understanding.

Research Framework

Purpose of the Study

The purpose of this study is to examine the effectiveness of using the Jigsaw strategy in the context of differentiated instruction in elementary schools in Thessaloniki, Greece. Specifically, it attempts to record teachers' views on whether it promotes active student participation, supports their interests and develops their critical and creative thinking.

Implementation Framework

The strategy was implemented as part of a three-hour experiential seminar workshop in primary schools of the 11th Department of Primary Education of Eastern Thessaloniki in Greece. Teachers had the opportunity to implement the Jigsaw strategy in history lesson by processing and analyzing various historical sources, using laptops to answer specific historical questions and collaborate within their groups.

Sample and Participants

Fifty-four teachers participated in the study. They were invited by the Education Advisor, along with other teachers

from the schools under his responsibility, to participate in an experiential workshop on the use of the Jigsaw method in the context of differentiated instruction. The participants came from different primary schools and had experience in teaching history and in using cooperative teaching methods.

Data Collection

After completing the experiential seminar workshop, teachers completed a questionnaire assessing the effectiveness of the Jigsaw strategy they used in the workshop. This was a structured, ad hoc questionnaire, which was created after careful study of the relevant literature (Tomlinson 2001a, 2001b, 2014 [34]) on the characteristics and dimensions of differentiated instruction.

More specifically, the questionnaire included twelve questions, the answers to which were given on a four-point Likert scale (not at all, a little, quite a lot, very much). The questions were as follows:

The strategy I used in the workshop can:

1. effectively motivate students, taking into account their individual differences
2. support the preferences and interests of all children
3. promote further exploration of various topics
4. develop critical and creative thinking in all children
5. include activities of varying difficulty
6. adapt questions to each child's level
7. introduce a form of assessment adapted to the abilities of all children
8. speed up or slow down the pace of teaching, depending on how children are learning the new learning material
9. enable the teacher to get to know their students better
10. encourage children to work independently
11. encourage children to work in groups
12. include a variety of sources and media

Research Procedure

The study was conducted in the context of a three-hour experiential seminar workshop, during which teachers implemented the Jigsaw strategy in their history lesson. Specifically, participants were organized into "Base Groups" and worked on different historical sources, which they analyzed and discussed, answering specific questions posed by the workshop facilitator. Then, through the creation of "Expert Groups," the members of each group worked together to synthesize the information and achieve common learning goals. After the workshop, the teachers were asked to complete a questionnaire, evaluating the effectiveness of the Jigsaw strategy in terms of its contribution to differentiated instruction.

Results

The data analysis was based on the responses of fifty-four teachers to the twelve questions in the questionnaire. The responses were depicted on a four-point rating scale. Table 1 presents the responses to the twelve questions in the questionnaire. It should be noted that only the responses "Very much" and "Quite a lot" are reported, as the other fields on the scale were selected by a very small number of educators.

Table 1: Questionnaire responses for all questions

A/A	**Jigsaw strategy**	
Questions	**Quite a lot**	**Very much**
1.	26	28
2.	31	23
3.	23	31
4.	29	25
5.	40	11
6.	31	20
7.	31	21
8.	40	14
9.	27	24
10.	25	25
11.	14	40
12.	12	42

For further analysis, the mean, standard deviation and percentages of positive ratings (Quite a lot/Very much and Very much) were calculated for each question (Table 2).

Table 2: Descriptive statistics of teachers' responses to the Jigsaw strategy questionnaire (means, standard deviations, and percentages of positive ratings)

Question	**M**	**SD**	**Quite a lot/ Very much (%)**	**Very much (%)**
1	3,52	0,50	100%	51,9%
2	3,43	0,50	100%	42,6%
3	3,57	0,50	100%	57,4%
4	3,46	0,50	100%	46,3%
5	3,15	0,49	94,4%	20,4%
6	3,31	0,58	94,4%	37,0%
7	3,35	0,55	96,3%	38,9%
8	3,26	0,44	100%	25,9%
9	3,39	0,60	94,4%	44,4%
10	3,39	0,63	92,6%	46,3%
11	3,74	0,44	100%	74,1%
12	3,78	0,42	100%	77,8%

Note: Percentages refer to the combined responses "Quite a lot" and "Very much".

The results show that the Jigsaw strategy was generally rated higher on questions related to group work and the use of a variety of sources/media. In contrast, questions about activities of increasing difficulty and adjusting the pace of teaching were more focused on the "Quite a lot" category, indicating a lower percentage of effectiveness in its use.

The table above shows the distribution of teachers' responses to the twelve questions in the questionnaire in the categories "Quite a lot" and "Very much." As the data indicate, all questions received a substantial number of responses in the two highest categories, reflecting teachers' overall positive attitude towards the Jigsaw strategy.

In questions one to four, which relate to the active participation and engagement of students in the learning process, the majority of responses fall within the two highest categories. This suggests that teachers consider the Jigsaw strategy particularly effective in motivating students and promoting their involvement.

Similarly, in questions five to eight, which pertain to differentiated instruction and its responsiveness to students' learning needs, most teachers selected "Quite a lot," indicating that the strategy contributes significantly to

differentiated instruction, though it may not fully address all aspects in every case.

Teachers' responses to questions nine and ten show their positive perception of the Jigsaw strategy's contribution both to the teacher's deeper understanding of their students and to fostering independent work among the children.

A particularly high positive rating is observed in questions eleven and twelve, where the majority of participants selected "Very much" (74–78%). This highlights the strong appreciation of the strategy's role in promoting group work and using a variety of resources and media, confirming teachers' intention to implement it in school practice.

Discussion

This study examines the views of 54 primary school teachers on the effectiveness of the Jigsaw strategy within the context of differentiated instruction. The findings highlight the Jigsaw strategy as a pedagogical tool that supports active learning, collaboration and differentiation. The discussion is organized into four thematic areas, integrating both the theoretical background and the empirical data collected

1. The Jigsaw strategy and active participation of students

Teachers rated the Jigsaw strategy positively in promoting student engagement, with 100% of participants selecting either "Quite a lot" or "Very much" for questions related to active participation (Q1–Q4), and 42–57% choosing "Very much." These findings indicate that the strategy effectively motivates students to contribute actively within their groups.

The structured collaborative nature of Jigsaw requires each student to assume responsibility for a piece of information and to communicate it to peers, fostering meaningful knowledge processing, accountability and a sense of belonging (Aronson & Patnoe, 2011; Johnson & Johnson, 2009) [2, 17]. This empirical evidence aligns with previous research demonstrating that systematic and structured collaborative strategies lead to higher levels of participation compared to traditional teacher-centered approaches (Gillies, 2016) [11].

2. Jigsaw's contribution to differentiated instruction

Jigsaw also appears to facilitate differentiated instruction. Teachers reported positive perceptions regarding the strategy's ability to address students' diverse learning needs, interests and readiness levels. For questions Q5–Q8, 94–100% of participants selected "Quite a lot" or "Very much," although the proportion of "Very much" responses ranged from 20–38%, suggesting that while Jigsaw contributes significantly to differentiation, it may not fully meet all differentiation requirements in every context.

The strategy allows for the assignment of different roles, levels of difficulty and sources and the rotation between "Expert Groups" and "Base Groups" encourages interaction and peer support. These features are consistent with Tomlinson's (2001a, 2001b) principles of differentiation and with studies highlighting collaborative strategies as bridges between differentiation theory and classroom practice (Santangelo & Tomlinson, 2012) [27].

3. Development of collaborative, social, and cognitive skills

The Jigsaw strategy promotes the development of collaboration, communication and critical thinking. Teachers' responses to questions Q9–Q10, with 92–94% selecting the two highest categories, indicate that Jigsaw supports both independent learning and the teacher's understanding of students' abilities. Importantly, approximately 44–46% of the participants selected the highest response category ("Very much"), reflecting a strong and confident endorsement of the strategy's contribution in these areas.

Through the exchange of information, students argue, negotiate meanings and synthesize different perspectives, thereby enhancing higher-order cognitive skills and metacognitive awareness (Hattie, 2012) [13]. Social skills such as active listening, respect for others and collective responsibility are also reinforced. These findings are consistent with previous research emphasizing that structured collaborative practices cultivate both social and cognitive competencies (Johnson *et al*., 2014) [19].

4. The role of the teacher and conditions for successful implementation

Questions Q11–Q12 showed the highest positive ratings, with 74–78% of teachers selecting "Very much," highlighting the strategy's role in group work and the use of varied resources. These results underscore the critical role of the teacher in orchestrating Jigsaw effectively. Teachers must provide clear guidance, coordination and continuous support, ensuring equitable participation and a safe learning environment (Webb *et al*., 2014) [38].

The study demonstrates that the successful implementation of Jigsaw requires teachers' ongoing professional development and training. It contributes empirical evidence that structured collaborative strategies can be effectively applied in heterogeneous classrooms and emphasizes the need for further research on teacher preparation for differentiated collaborative instruction (Darling-Hammond *et al*., 2017) [8].

Overall, the findings confirm that the Jigsaw strategy is perceived by teachers as an effective pedagogical tool that promotes active participation, differentiation and the development of collaborative, social and cognitive skills. The integration of empirical data from the Greek educational context strengthens the evidence base for its practical application and underscores the importance of teacher guidance and professional development.

Recommendations

Based on the findings of this study, several recommendations can be made for the use of the Jigsaw strategy in differentiated instruction, not only in history lessons in primary education but also in other subject areas.

Firstly, the Jigsaw strategy appears to be highly effective in enhancing students' active participation. In this study, 100% of teachers rated the strategy as either "Quite a lot" or "Very much" effective in promoting engagement, with 42–57% selecting "Very much." History is often perceived as a theoretical and demanding subject due to the memorization it requires. However, working with historical sources in small groups and taking on specific roles encourages students to become actively involved in exploring content, thereby increasing both participation and interest.

Secondly, the strategy facilitates differentiated learning. By distributing different sources, roles and levels of difficulty, students can work according to their abilities and interests while remaining connected to the common learning objectives. Teachers' responses (Q5–Q8) indicate that 94–

100% perceive Jigsaw as supporting differentiation, although 20–38% rated it "Very much," suggesting room for further optimization in addressing all differentiation needs. This flexibility allows teachers to accommodate heterogeneous student populations and adapt instruction to individual readiness levels.

Thirdly, the Jigsaw strategy significantly contributes to the development of collaborative, social and cognitive skills. Teachers' ratings (Q9–Q10) show that 92–94% recognize the strategy's role in fostering independent work and understanding students' abilities. Through exchanging information, students negotiate meanings, synthesize perspectives and critically evaluate content, thereby enhancing higher-order cognitive and metacognitive skills. In addition, social skills such as active listening, respect for differing opinions and collective responsibility are reinforced. These competencies are essential for modern education and are particularly relevant in history lessons, where students must synthesize information from multiple sources and interpret historical events collaboratively.

Finally, the strategy has important implications for teacher professional development. The findings indicate that experiential implementation of Jigsaw in seminar workshops improves teachers' understanding and facilitates transfer to classroom practice. Systematic training can help teachers integrate the strategy consistently and effectively, ensuring that it is not used as a stand-alone technique but as an integral part of a differentiated, student-centered curriculum.

In conclusion, the Jigsaw strategy is a versatile pedagogical tool that promotes active participation, differentiation and the development of collaborative, social and cognitive skills. Its structured implementation, combined with appropriate teacher guidance and professional development, can enhance learning outcomes across subjects and support the practical application of differentiated instruction in primary education.

Limitations of the Study

Despite the positive assessment of the Jigsaw strategy, this study presents certain limitations that should be taken into account when interpreting the results. The first limitation relates to the size and type of the sample, which consists of fifty-four teachers from a specific geographical area (primary schools in Thessaloniki, Greece). In other words, this means that the findings cannot be generalized to a wider population of teachers without further research.

The second limitation relates to the fact that the data are based exclusively on the self-reports of the teachers who participated in the workshop. The absence of direct observation of teaching practice or data collection from the students themselves limits the possibility of triangulating the results.

The third limitation relates to the context in which the strategy was applied, as Jigsaw was applied exclusively in the history lesson. Therefore, it is not possible to make reliable conclusions about its effectiveness in other educational subjects without comparative studies.

Finally, the research reflects the short-term perceptions of teachers after their participation in the experiential workshop and does not examine the long-term impact of the strategy on the learning process.

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