



THEORY OF UPBRINGING AND THE DEVELOPMENT OF ABSTRACT THINKING AND LOGICAL COGNITION IN THE CONTEXT OF INTELLECTUAL UPBRINGING DURING MIDDLE CHILDHOOD

Dr. Avi Abner*

Burgas State University "Prof. Dr. Assen Zlatarov", Republic of Bulgaria

Corresponding Author: Dr. Avi Abner (Burgas State University "Prof. Dr. Assen Zlatarov", Republic of Bulgaria)

Article History: Received: 08/07/2025., Accepted: 28/10/2025., Published: 06/11/2025

Abstract: Intellectual upbringing in primary education is a leading factor in the development of logical thinking, cognitive independence and the capacity for critical engagement with information in the contemporary social environment. It cultivates the ability to evaluate the truthfulness of knowledge and to substantiate one's choices, which is a crucial prerequisite for successful adaptation and active citizenship in later stages of life. This article presents the authorial pedagogical model "SIMLA" developed by Dr. Abner, which systematises intellectual development into five consecutive stages: sensory-active, imagery-based, mental-symbolic, argumentation and reflection, and real-life application. The model draws on contemporary concepts of cognitive development and proposes a comprehensive approach for fostering thinking strategies through structured educational activity. The practical component of the study was implemented with the support of art pedagogue expert Teodora Dimitrova, whose professional contribution ensured optimal conditions for the application of the model through active interaction and creative scaffolding of cognitive processes. Forty students took part in the experiment, divided into a control and an experimental group. A pre- and post-test assessment measured the development of logical reasoning, cognitive control and argumentation skills. The results indicated a statistically significant improvement in the experimental group, demonstrating the effectiveness of the model in establishing sustainable cognitive competencies. The research confirmed that intellectual upbringing must be intentionally and strategically organised in order to become an essential element of the educational process in primary school. The SIMLA model offers a compelling pedagogical mechanism for the advancement of logical coherence, self-regulation and the ability to think on a reasoned basis - qualities indispensable for every individual in modern society.

Keywords: Intellectual upbringing, Logical thinking, Abstract reasoning, Primary education, Cognitive development, Metacognition, Educational experiment, Mental arithmetic, Reflective thinking, Argumentation skills.

Cite this article: Abner, A. (2025). THEORY OF UPBRINGING AND THE DEVELOPMENT OF ABSTRACT THINKING AND LOGICAL COGNITION IN THE CONTEXT OF INTELLECTUAL UPBRINGING DURING MIDDLE CHILDHOOD. *MRS Journal of Multidisciplinary Research and Studies*, 2(11),13-17.

Introduction

In a context of accelerated technological change and informational overload, the ability to think logically, to evaluate the truthfulness of statements and to make reasoned decisions becomes a key orientation point for human development. At primary school age pupils enter a stage in which the foundations of mental independence and of a scientific cognitive attitude towards the world are established, preparing the individual for critical participation in society. Intellectual upbringing does not consist in the acquisition of facts alone. It develops the capacity to operate with meanings, to compare ideas and to understand the causal logic of phenomena [1]. Unfortunately, contemporary family life increasingly offers limited time and attention for nurturing such capacities. Parents often rely on the school to provide the full spectrum of educational influences, while the home environment remains restricted mainly to emotional support or technical assistance with learning tasks. Research demonstrates that when the family does not promote dialogue related to reasoning,

justification and argumentation, noticeable deficits emerge in cognitive development and in the self-regulation of thinking [2]. This creates a risk that pupils become dependent on external guidance and experience difficulties when making independent decisions. School therefore becomes the principal bearer of the intellectual culture of society. The teacher is the one who organises the process in a way that ensures knowledge is both presented and mastered as a mode of deliberate mental action. When the educational environment encourages learners to ask questions, to seek evidence and to justify their choices, a personal readiness is formed for navigating a complex and contradictory informational world [3]. Recent findings indicate that technology-supported mathematics learning strengthens children's capacity for abstraction by engaging executive functions and metacognitive control processes. David Bednorz and Bruhn Svenja, demonstrate that primary pupils who actively monitor their own learning benefit more from digital environments, which supports the aims of intellectual upbringing by promoting reasoning, evaluation and

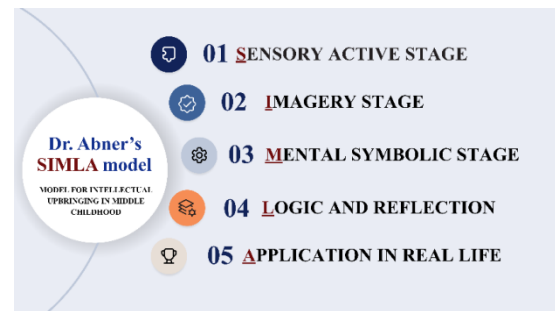


justification in mathematical tasks [4]. This necessity requires systematic support for intellectual development from the earliest years of formal education. Primary schooling is a crucial period in which the foundations of logical thinking, executive functions and cognitive control are being laid. These are indicators which, according to Mullis and Martin, determine future academic achievements across all school subjects [5]. The absence of purposeful intellectual upbringing during this period may lead to persistent limitations in abstraction, planning and argumentation in later stages of education. For this reason pedagogical science clearly assigns to the school the responsibility to shape intellectually independent individuals. The formation of a culture of thinking that recognises truth, rationality and logical order is not merely an educational objective. It is a social mission of contemporary schooling. In this context there is a growing need for pedagogical models and approaches which integrate knowledge, cognitive activity and upbringing into a unified intellectual development of the personality.

Exposition:

Intellectual upbringing constitutes the core of development in middle childhood because, during this period, the pupil moves beyond immediate perception and enters the world of logical relations and symbolic representation. Piaget describes this transition as the establishment of logical operations on concrete categories, forming the basis for later formal reasoning. Consequently, deficiencies in intellectual upbringing at this age often remain invisible at first but subsequently emerge as difficulties in argumentation, planning and self-regulation in the learning process [6]. At this stage the educational role of the family is of primary importance. Parental support creates a context in which the child learns to ask questions, to seek justification and to explain the reasons behind personal choices. When meaningful conversations are encouraged at home and situations involving reflection on choice are provided, the family becomes the first school of logic and abstraction. Research conducted by the American Psychological Association indicates that a metacognitive language environment in the family is statistically associated with stronger working memory and cognitive control in primary school [7]. Effective intellectual upbringing begins at the kitchen table and not only in the classroom. The school then serves as the third educational environment that structures and refines logical operations. Vygotsky reminds us that higher forms of thinking emerge through interaction and that the quality of pedagogical communication determines whether abstraction will be acquired as a functional cognitive tool or will remain a foreign structure that the child cannot meaningfully apply [8]. This understanding assigns a moral dimension to intellectual upbringing because it develops a personal capacity to reason freely and responsibly within society. The Bulgarian pedagogical tradition rightly defines upbringing as a unity of knowledge and value. When logical thinking is developed without attention to meaning, there is a risk of divergence between intelligence and wisdom. Intellectual upbringing therefore must guide pupils to question the validity of arguments, to examine the human consequences of ideas and to understand how these ideas integrate into the life of the community. In this regard Dr. Avi Abner proposes his own model, grounded in both classical and contemporary academic literature. He refers to it as the “Model for developing abstract and logical structures through intellectual upbringing”. Its central aim is to educate pupils to perceive the common beyond the different and to uncover the grounds on which opinions are formed.

Figure 1. Conceptual model



Source: The model developed by Dr. Avi Abner. All rights reserved

Stage 1: SENSORY ACTIVE STAGE:

At the initial stage the pupil engages in a real and tangible learning situation. Physical learning materials, which can be touched, rearranged, moved and examined, provide direct experiential access to numerical relationships. Through concrete manipulation the child literally “feels” the structure of quantity. The understanding that five exceeds three does not arise from abstract symbols alone but from the lived experience of magnitude. This first stage strengthens the link between sensory experience and logical understanding, forming a stable foundation for later abstraction. The child learns to recognise quantity before encountering the number as a symbolic representation. At this early moment the family can play a pivotal role. Conversations about numbers in the home environment, small tasks involving ordering and categorisation and encouragement of curiosity towards quantities support the intellectual inquisitiveness that underpins later cognitive growth. Sensory and action based learning creates a natural cognitive basis for logical thinking. This finding is supported by research from Blaga Dimova, who argues that constructive play enriches children’s representations of the surrounding world, develops sensory standards, inventiveness and thinking and supports problem solving and the development of concentration [9]. It is through experimentation with and exploration of real objects that the child begins to organise cognitive activity in a logical manner, establishing the fundamental ground for the emergence of abstraction.

Stage 2: IMAGERY STAGE

After the initial mastery of moving the beads, a systematic understanding of the patterns begins. The child starts to see which beads represent units and which represent tens, why regrouping is performed and what this transfer signifies. Concepts such as place value, order, comparison and grouping emerge. This stage transforms actions into logical thought. The pupil understands why the result is what it is, and this understanding cannot be imposed externally. It is born from the child’s own exploration, supported by careful guidance from the teacher, who poses meaningful questions and directs attention to the hidden rules within numerical relationships.

Stage 3: MENTAL-SYMBOLIC

This is the moment when the true transformation of thinking occurs. Gradually the abacus ceases to be necessary as a physical object, because its image appears in the imagination. The child begins to “see” the beads in the mind and to move them through the power of thought. This is the stage in which concrete action becomes pure abstraction. There is a transition to symbols as well as to oral and written solving, where the abacus exists within

the intellect. According to Bruner, this process is fundamental to cognitive development in middle childhood and represents the core of intellectual upbringing, because the pupil begins to rely on their own mental resources [10]. After mastering the internal symbolic model, the pupil starts to apply abstraction in different cognitive activities. This finds convincing support in Valeva's thesis, which emphasises that meaningful learning takes place when mental operations are transferred from one activity to another. According to her, writing cannot be separated from what has been achieved through the careful study of texts in reading lessons, because it is within this process that knowledge, skills, feelings and experiences are formed, which awaken internal aspirations and cognitive interest in pupils. Valeva concludes that conditions are created in the consciousness of young learners for a balanced emotional and cognitive attitude toward the topic they are about to develop, as well as for the development of their abstract thinking [11]. This scientific conclusion demonstrates that the intellectual upbringing incorporated in Dr. Abner's „SIMLA“ model has the potential to enhance logical operations in calculation and to enrich cognitive strategies in the field of language development and creative self-expression. Research on executive functions in digital mathematics environments suggests that visualisation and symbolic manipulation performed simultaneously can accelerate the internalisation of cognitive operations. A recent systematic review confirms that thoughtfully integrated educational technologies can enhance working memory, cognitive flexibility and inhibition, all of which are essential for mental modelling in primary education [12].

Stage 4: LOGIC AND REFLECTION

At this stage it is no longer sufficient simply to provide the correct answer. The child is encouraged to explain what has been done, how the reasoning has unfolded and why the chosen strategy is the most appropriate one. This establishes a culture of argumentation. The pupil practises formulating and defending solutions, engaging in self-assessment and recognising logical errors.

Stage 5: APPLICATION IN REAL LIFE

In the final stage mathematics ceases to function merely as academic content. The pupil uses logical skills to plan time, evaluate situations and choose the most rational course of action. Abstract thinking begins to operate as a practical tool in everyday life. The child gains confidence in the ability to deal with challenges and make decisions. This is the point at which intellectual upbringing reveals itself as education in responsibility and rationality. Parents become witnesses to maturity in thinking, while teachers observe the transformation of knowledge into character.

Figure 2. . Implementation of the „SIMLA“ model in a real educational setting



Source: Visual materials are original. All rights reserved

Students actively interact with numerical representations on learning materials (Sensory-Active stage), gradually forming internal images of quantitative relationships (Imagery stage), solving arithmetic tasks mentally with the support of digital tools (Mental-Symbolic stage) and explaining their strategies during collaborative work (Argumentation and Reflection stage).

Figure 3. Mental-Symbolic Cognitive processing during „SIMLA“-based learning tasks



Source: Visual materials are original. All rights reserved

Students independently solve arithmetic problems using digital tools that support the internalisation of numerical structures and the development of abstract reasoning. The observed activities illustrate the Mental-Symbolic stage of Dr. Abner's "SIMLA" model, where thinking becomes internalised and guided by logical operations rather than physical action. These five components build a coherent educational structure through which abstract thinking is formed as an ability for regulated and reasoned action. They create conditions for pupils to understand why a solution has value. At this point intellectual upbringing fulfils its deepest function. It shapes the character of thinking. The development of abstract thought is preparation for life in a society that requires citizens who are capable of thinking rather than merely repeating. Therefore intellectual upbringing must be a responsibility of the family, a culture of the school and a value of society as a whole. The pre-test and post-test were administered using an identical instrument based on a five point scale, which ensures direct comparability of the data across time. Internal consistency of the scale demonstrated stable reliability, with Cronbach's α equal to 0.81 at the pre test and 0.84 at the post test, confirming the accuracy of the measurement at both stages of the study.

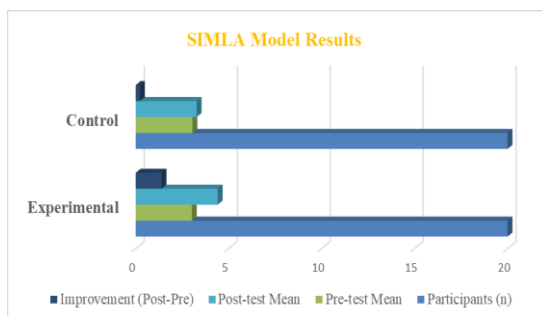
Results

A total of forty pupils in middle childhood participated in the pedagogical experiment, equally distributed into an experimental and a control group. The experimental group received instruction based on Dr. Abner's SIMLA model for intellectual upbringing, while the control group continued to study arithmetic through the traditional approach without the structured cognitive development components embedded in the model. A pre test and post test assessment were administered to evaluate logical reasoning, argumentation, cognitive control and self regulation during problem solving. Both tests used an identical five point scale. The pre test results confirmed that the two groups started from comparable levels of cognitive development. The mean score of the experimental group was 3.02, while the control group achieved 3.05, which indicates no meaningful difference at baseline. In the post test, however, a clear distinction emerged. The

mean score of the experimental group increased to 4.41, whereas the control group reached 3.28. The absolute improvement of the experimental group was 1.39 points, compared to only 0.23 points in the control group. When calculated as a normalised gain, the progress of the experimental group reached approximately 0.70, while that of the control group was approximately 0.12. These results demonstrate a considerably stronger developmental progression under the SIMLA model during the intervention period.

Qualitative observations complement the quantitative findings. Pupils in the experimental group displayed more consistent application of mental calculation strategies and provided clearer justification of their chosen solutions. During oral interviews many pupils not only solved the arithmetic tasks correctly but also articulated the reasoning behind their answers, which illustrates the growth of reflective cognitive processes. Teacher observations further indicated increased confidence, sustained attention and a more composed approach to challenging tasks. These behavioural characteristics align with the numerical tendencies in the results and support the interpretation that the implementation of the model encourages the formation of abstract reasoning and metacognitive skills. Internal reliability of the measurement instrument confirmed the stability of the assessment. Cronbach's α was 0.81 at the pre test and 0.84 at the post test, indicating consistently high internal consistency of the items included in the scale. This strengthens the validity of the comparison across the two measurement points and confirms that the observed differences reflect actual cognitive development rather than instability of the tool. Taken together, the outcomes indicate that the SIMLA model supports a structured and meaningful development of logical and argumentative abilities in middle childhood. The greater progress of the experimental group corresponds to the theoretical logic embedded in the stages of the model, according to which the transition from concrete to symbolic actions and then to argumentation forms a coherent trajectory of intellectual growth. The findings therefore provide empirical support that intellectual upbringing, when systematically organised, contributes not only to improved calculation performance but also to the cultivation of reasoning as a conscious cognitive activity in the educational process.

Figure 4. Results



Source: Designed and developed by Dr. Avi Abner. All rights reserved

These results are in line with controlled experimental studies on mental abacus instruction, which show substantial gains in arithmetic processing linked to improvements in visuospatial working memory. Barner and colleagues found that children receiving structured visuospatial arithmetic instruction improved their calculation performance and also demonstrated stronger

cognitive control during reasoning processes [13]. Taken together, these findings indicate that intellectual upbringing must be purposefully designed for a contemporary educational ecosystem in which decision making relies on evidence and reasoned judgement. By systematically transforming arithmetic knowledge into conscious mental action, the SIMLA model cultivates learners who confidently apply logical strategies beyond the classroom context. Its implementation strengthens the educational mission of forming individuals who are capable of discerning the validity of information and acting with cognitive integrity in society.

Conclusion

The study demonstrates that intellectual upbringing is not a passive process of absorbing knowledge but a dynamic mechanism for developing the ability to establish truth through rational operations. As Prof. Siyka Chavdarova emphasises, the pursuit of truth lies at the heart of intellectual upbringing and gives genuine value to the knowledge acquired by the learner. In this context the „SIMLA“ model represents a pedagogical structure which not only introduces cognitive content but transforms it into an instrument of mental autonomy and sustainable learning [14]. The experimental data indicate that the gradual progression through the stages of the model facilitates the reorganisation of mental activity from reactive to reasoned and from dependent to self regulated. This outcome fully corresponds with Bruner's perspective of cognitive development as an internal modelling of reality through signs and symbols [10]. A similar position is articulated by Goswami, who stresses that effective intellectual upbringing cannot be reduced to the accumulation of facts but must be defined by the extent to which knowledge becomes operational within the learner's thinking [1]. The positive results observed in the experimental group suggest that the „SIMLA“ model strengthens executive functions and logical coherence, which Diamond identifies as critical predictors of both academic and social success. Mastery of these mechanisms confirms that intellectual upbringing through the model provides access to higher levels of mental competence, where the truthfulness of knowledge is evaluated through argumentation, evidence and logical consistency [7]. „SIMLA“ shapes thinking as both a cognitive and ethical force. It fosters an attitude towards truth as a necessary condition for rational participation in the community, in line with Vygotsky's conviction that the intellectual function of education is inseparable from social maturation [8]. In this respect the model proves that intellectual upbringing fulfils both cognitive and civic missions. Taken together, these studies emphasise that intellectual upbringing must evolve within a digitally enriched educational ecosystem that shapes how children reason, verify information and make decisions. In this context the „SIMLA“ model aligns with contemporary evidence by transforming knowledge into a disciplined cognitive tool for rational participation in modern society. It forms individuals who master a culture of argumentation, respect rational order and assume responsibility for the credibility of their beliefs. Therefore the implementation of the „SIMLA“ model in educational practice provides an opportunity to develop pupils who are academically confident, logically consistent and socially oriented, capable of distinguishing the true from the incorrect and applying their knowledge in real life contexts. This contribution reinforces intellectual upbringing as a guarantee of education with perspective, directed towards future citizens who think, verify and act rationally.

References

- [1] U. Goswami, *Cognitive Development and Cognitive Neuroscience: The Learning Brain*, London: Routledge press. ISBN-13: 978-1138923911, 2019.
- [2] P. Howard-Jones, *The science of learning: A guide for teachers*, Open University Press. ISBN: 978-0335249635, 2022.
- [3] Hattie, J., Zierer, K, *Visible Learning Insights*, London: Routledge press. ISBN: 9781138549692., 2019.
- [4] Bednorz, D., Bruhn, S, "Influence of primary students' self-regulated learning profiles on their rating of a technology-enhanced learning environment for mathematics," *Frontiers in Psychology* 14, pp. 1-11. <https://doi.org/10.3389/fpsyg.2023.1074371>, 2023.
- [5] Mullis, I., Martin, M., et al, *International Results in Mathematics and Science*, Boston College: TIMSS & PIRLS International Study Center. ISBN-978-1-889938-54-7, 2020.
- [6] Piaget, J., Inhelder, B., et al, *Growth of Logical Thinking: From Childhood to Adolescence*, London: Routledge & Kegan Paul PLC. ISBN-13: 978-0710019509., 1958.
- [7] A. Diamond, "Executive Functions," *Annual Review of Psychology*, 64, pp. 135-168, 2013.
- [8] Vygotsky, L., Cole, M., John-Steiner, V., et al, *Mind in Society: The Development of Higher Psychological Processes*, Harvard University Press. ISBN-13:978-0674576292., 1978.
- [9] B. Dimova, "Broadening competences of children in preschool age in constructive play," *KNOWLEDGE - International Journal* , 69(2), pp. 485-490, 2025.
- [10] J. Bruner, *Toward a Theory of Instruction*, Harvard University Press. ISBN-13: 978-0674897007, 1966.
- [11] T. Valeva, "The creative connection between reading and writing in the initial stage of primary education," *KNOWLEDGE - International Journal* , 72(2), p. 257–260, 2025.
- [12] F. Gunnars, "A Systematic Review of Special Educational Interventions for Student Attention: Executive Function and Digital Technology in Primary School," *Journal of Special Education Technology*, 39(2), pp. 264-276. <https://doi.org/10.1177/0162643423119>, 2023.
- [13] Barner, D., Alvarez, G., Sullivan, J., et al , "Learning Mathematics in a Visuospatial Format: A Randomized, Controlled Trial of Mental Abacus Instruction," *Child Development*. 87(4), pp. 985-1311. <https://doi.org/10.1111/cdev.12515>, 2016.
- [14] Chavdarova-Kostova, S., Delibaltova, V., Gospodinov, B, *Pedagogika: Treto dopalmeno i preraboteno izdanie*, Sofia: UI ” Sv. Kliment Ohridski”. ISBN: 978-954-074-328-8., 2018.