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Teachers' Readiness and Needs for Ethnomathematics-Based Collaborative Problem-Based Learning

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ABSTRACT

This study aimed to analyze early childhood teachers' readiness and needs for implementing Ethnomathematics-Based Collaborative Problem-Based Learning (CPBL-E) as a foundation for developing an instructional model to foster children's critical thinking skills. The study employed a quantitative descriptive survey design as a preliminary phase of a research and development project. Participants consisted of 123 early childhood education teachers selected through purposive sampling. Data were collected using the Collaborative Problem-Based Learning based on Ethnomathematics (CPBLE) questionnaire, which examined five dimensions: planning ethnomathematics-based CPBL activities, collaborative CPBL implementation, understanding and utilization of ethnomathematics, stimulation and assessment of children's critical thinking skills, and implementation needs and institutional support. Data were analyzed

using descriptive statistics, including means and standard deviations. The findings revealed that understanding and utilization of ethnomathematics obtained the highest score (M = 2.37, SD = 0.28), whereas collaborative CPBL implementation received the lowest score (M = 2.06, SD = 0.15). These results indicate that teachers possess a relatively strong conceptual understanding of ethnomathematics and critical thinking but continue to face challenges in implementing collaborative problem-based learning practices in classrooms. The findings highlight the need for a structured CPBL-E model to support meaningful, culturally responsive, and developmentally appropriate learning experiences in early childhood education.

Introduction

The increasing complexity of twenty-first-century society requires educational systems to move beyond the transmission of factual knowledge toward the development of higher-order competencies, including critical thinking, problem-solving, collaboration, communication, and creativity (OECD, 2023; UNESCO, 2021) . Early childhood education (ECE) is strategically important because the foundations of cognitive, social, and learning dispositions are established during the early years (UNICEF, 2019) . Within this context, learning experiences should provide young children with opportunities to question, explore, compare, reason, communicate, and solve meaningful problems rather than merely reproduce predetermined

answers.

Critical thinking is therefore an important developmental target in early childhood. It can be expressed through children's questioning, reasoning, comparison, classification, prediction, evaluation, and problem-solving in meaningful contexts (Facione, 1990; O'Reilly et al., 2022). Research in Indonesian early childhood settings also indicates that teachers have an important role in creating learning situations that stimulate children's critical-thinking processes (Cahyani Kusuma et al., 2023; Rohita et al., 2023). However, the development of critical thinking requires pedagogical approaches that move beyond teacher-directed activities and provide children with opportunities to investigate problems and construct meaning through active engagement.

Problem-Based Learning (PBL) offers one such approach because it organizes learning around meaningful problems that require investigation, reasoning, and solution generation (Barrows & Tamblyn, 1980; Hmelo-Silver, 2004a). Empirical evidence has demonstrated its potential in early childhood education. (Sulistyawati, 2025) , for example, reported positive effects of PBL on young children's creative thinking in an Indonesian early childhood context. Nevertheless, PBL cannot simply be transferred from older learners to preschool classrooms; it needs to be adapted to children's developmental characteristics, including play, concrete experience, exploration, and teacher scaffolding.

Collaboration provides an important complementary dimension to

problem-based learning. Collaborative learning enables learners to exchange ideas, negotiate meaning, justify their thinking, and construct solutions together. Evidence from early childhood research shows that collaborative learning can support children's cognitive, communicative, and social development (Fridberg et al., 2018a; Salminen-Saari et al., 2021). Amriani dan Halifah, (2024) further found a positive effect of collaborative learning on interpersonal intelligence among young children. These findings suggest that collaboration is relevant to ECE, but they also highlight the importance of intentional teacher facilitation rather than treating collaboration simply as children working in groups.

Ethnomathematics offers another complementary perspective by connecting mathematical ideas with cultural practices and children's lived experiences. D'Ambrosio, (1985) conceptualized ethnomathematics as mathematics embedded in cultural contexts, while Rosa dan Orey, (2011, 2016) emphasized the cultural and social dimensions of mathematical knowledge. Research also indicates that connecting mathematics with cultural contexts can support meaningful mathematical reasoning and critical-thinking development (Martyanti, 2018). In early childhood settings, familiar cultural objects, patterns, games, crafts, local architecture, music, and community practices can provide concrete contexts for children to explore mathematical relationships. (R. , & A. E. P. Romdoni, 2025) , for example, documented mathematical concepts such as numbers and patterns in the traditional angklung context for PAUD learning.

Recent empirical studies provide evidence for the potential of integrating ethnomathematics with problem-based learning and critical thinking. Annisa et al., (2023) examined a problem-based learning approach with an ethnomathematical nuance and reported improvement in elementary students' critical thinking. (Syahnia et al., 2024) similarly found that an ethnomathematics-based PBL model increased students' critical thinking in mathematics learning. Suryawan, (2023) demonstrated the relevance of ethnomathematically contextualized controversial problems within a problem-based multimodal approach for developing critical thinking. Diana and Kusuma, (2025) further developed ethnomathematics-integrated PBL learning tools, indicating that the integration can be translated into structured instructional resources.

Although these studies provide important evidence, most have focused on learning outcomes among elementary or older learners, or have examined PBL, collaboration, and ethnomathematics as separate or partially integrated approaches. Less attention has been given to the conditions that teachers need before an integrated model can be implemented in ECE. This distinction is important because the effectiveness of an instructional model depends not only on its conceptual design but also on teachers' ability to plan, facilitate, and assess the learning processes it requires. A needs assessment is therefore necessary before a new model is developed and tested.

The relevance of this issue is also reflected in recent publications in

Ceria: Jurnal Program Studi Pendidikan Anak Usia Dini. Maulinda et al., (2025) examined the implementation of Project-Based Learning for children's cognitive development, while Ananingrum, (2025) and (Kartikasari et al., 2026) reported development-oriented approaches for strengthening critical thinking in early childhood. These studies demonstrate continuing interest in innovative, developmentally appropriate learning approaches in the ECE context. However, they do not specifically address teachers' readiness and institutional needs for implementing an integrated collaborative problem-based learning approach grounded in ethnomathematics.

The state of the art therefore indicates a knowledge–practice gap. Existing empirical evidence supports PBL, collaborative learning, ethnomathematics, and critical-thinking development, but the evidence base provides less information about how ready ECE teachers are to integrate these components into one coherent instructional framework. In particular, there is a need to identify teachers' readiness in planning and implementing collaborative problem-based activities, their understanding and use of ethnomathematics, their capacity to stimulate and assess children's critical thinking, and the institutional support required for implementation.

To address this gap, this study focuses on Collaborative Problem-Based Learning based on Ethnomathematics (CPBL-E) as a proposed instructional framework for ECE. The model is conceptually grounded in constructivist and sociocultural perspectives that emphasize active

knowledge construction, interaction, exploration, and contextualized learning (Bruner, 1960; Vygotsky et al., 1978) . The study does not claim that CPBL-E has already been proven effective. Instead, it positions teacher readiness and implementation needs as the empirical foundation for the subsequent development, validation, pilot testing, and effectiveness evaluation of the model.

Accordingly, this study aims to examine early childhood teachers' readiness, current practices, and needs regarding the implementation of CPBL-E. The findings are expected to provide an empirical basis for developing a culturally responsive and developmentally appropriate instructional model that integrates collaboration, problem-solving, ethnomathematics, and critical-thinking stimulation. The contribution of the study lies not in claiming the effectiveness of a completed CPBL-E intervention, but in identifying the implementation conditions that should inform the design of such a model.

Methods

This study employed a quantitative descriptive survey design as a preliminary needs assessment within the initial phase of a research and development (R&D) project aimed at developing a Collaborative Problem-Based Learning based on Ethnomathematics (CPBL-E) model for early childhood education. A needs assessment provides empirical information about existing conditions, challenges, and stakeholder requirements before an instructional innovation is designed and tested (Gall, 2003) . The survey therefore focused on teachers' readiness,

current practices, and perceived needs related to CPBL-E implementation.

The participants were 123 early childhood education teachers in Indonesia. Participants were selected through purposive sampling because they met criteria relevant to the study, including actively teaching young children and having direct responsibility for planning and implementing classroom learning activities. Purposive sampling is appropriate when respondents are selected because they possess characteristics or experience directly related to the phenomenon being investigated (Creswell, 2012) .

Data were collected using the Collaborative Problem-Based Learning based on Ethnomathematics (CPBLE) questionnaire developed by the researchers. The instrument was constructed from the theoretical foundations of Problem-Based Learning (Barrows & Tamblyn, 1980; Hmelo-Silver, 2004) , ethnomathematics (D'Ambrosio, 1985; Rosa & Orey, 2016) , collaborative learning and sociocultural learning (Vygotsky et al., 1978) , and critical thinking in early childhood (Facione, 1990; O'Reilly et al., 2022) . The questionnaire consisted of 51 items organized into five dimensions: (1) Planning Ethnomathematics-Based Collaborative Problem-Based Learning, (2) Collaborative CPBL Implementation, (3) Understanding and Utilization of Ethnomathematics, (4) Stimulation and Assessment of Children's Critical Thinking, and (5) Implementation Needs and Institutional Support.

All items were measured using a four-point Likert scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree). A four-point scale was used to reduce neutral responses and encourage respondents to indicate a clear position on each statement (Joshi et al., 2015) . Before data collection, the questionnaire was reviewed by experts in early childhood education, instructional design, and ethnomathematics to assess content relevance and clarity.

The survey was administered online. Participation was voluntary, and respondents were informed about the purpose of the study before completing the questionnaire. Anonymity, confidentiality, and informed consent were maintained throughout data collection in accordance with the Ethical Guidelines for Educational Research (British Educational Research Association, 2024) .

Data were analyzed using descriptive statistics, including means and standard deviations, to describe teacher responses across the five dimensions of the CPBLE instrument. The analysis was intended to identify relative strengths, areas of lower readiness, and implementation-support needs. The results were interpreted as evidence of current readiness and needs, rather than as evidence of the effectiveness of the proposed CPBL-E model. The findings subsequently served as a basis for the conceptualization and development of the model.

The results of this preliminary study provide the empirical foundation for subsequent R&D stages, including model design, expert

validation, pilot testing, and effectiveness evaluation. The purpose of the present study is therefore diagnostic and developmental: to identify the conditions that should inform the design of CPBL-E before its effectiveness is tested.

Result and Discussions

The purpose of this preliminary study was to examine early childhood teachers' readiness, current practices, and implementation needs regarding Collaborative Problem-Based Learning based on Ethnomathematics (CPBL-E). Data were collected from 123 early childhood teachers through the CPBLE questionnaire, which measured five dimensions: planning ethnomathematics-based CPBL, collaborative implementation practices, understanding and utilization of ethnomathematics, stimulation and assessment of critical thinking, and implementation needs and institutional support. The descriptive results are presented in Table 1.

The findings show that the highest mean score was obtained for Understanding and Utilization of Ethnomathematics (M = 2.37, SD = 0.28), followed by Planning Ethnomathematics-Based CPBL (M = 2.23, SD = 0.17), Stimulation and Assessment of Critical Thinking (M = 2.13, SD = 0.14), Needs and Institutional Support (M = 2.12, SD = 0.14), and Collaborative CPBL Implementation (M = 2.06, SD = 0.15). The pattern indicates that conceptual familiarity with ethnomathematics was relatively stronger than readiness to implement collaborative problem-based practices.

The highest score, in Understanding and Utilization of Ethnomathematics (M=2.37, SD=0.28), indicates that ethnomathematics is a comparatively accessible component for the participating teachers. This finding is consistent with the broader view that mathematics can be connected to cultural practices and everyday experiences (D'Ambrosio, 1985; Rosa & Orey, 2011, 2016) . Evidence from Indonesian contexts also demonstrates that cultural resources can provide meaningful mathematical contexts for children (Romdoni, 2025). The result is therefore relevant for CPBL-E because cultural contexts may provide familiar and concrete starting points for problem situations in early childhood classrooms.

Planning Ethnomathematics-Based CPBL obtained the second-highest mean (M = 2.23, SD = 0.17). The result indicates a stronger level of readiness for planning than for actual collaborative implementation, but it also points to the need for practical guidance. Designing developmentally appropriate problem situations requires teachers to identify meaningful problems, organize inquiry, provide appropriate scaffolding, and connect activities with children's experiences (Barrows & Tamblyn, 1980; Hmelo-Silver, 2004) . The challenge becomes more complex when teachers must simultaneously integrate cultural resources and collaborative processes. The findings of Diana and Kusuma, (2025)) illustrate the value of structured learning tools when ethnomathematics and PBL are integrated.

Table 1. Teachers' Readiness toward the Implementation of Collaborative

Problem-Based Learning Based on Ethnomathematics (N = 123)

Dimension	Mean	SD
Understanding and Utilization of Ethnomathematics	2.37	0.28
Planning Ethnomathematics-Based CPBL	2.23	0.17
Stimulation and Assessment of Critical Thinking	2.13	0.14
Needs and Institutional Support	2.12	0.14
Collaborative CPBL Implementation	2.06	0.15

Stimulation and Assessment of Critical Thinking (M = 2.13, SD = 0.14) and Needs and Institutional Support (M = 2.12, SD = 0.14) showed similar levels. The results suggest that critical-thinking development is recognized as an important component, but teachers need practical strategies for stimulating and documenting children's reasoning processes. Critical thinking in early childhood is expressed through observable behaviors such as questioning, comparison, prediction, explanation, and problem-solving rather than through conventional tests (Facione, 1990; O'Reilly et al., 2022) . This requires teachers to use authentic observation and systematic documentation. Rohita et al., (2023) similarly highlighted the importance of contextual learning experiences in examining children's critical-thinking abilities.

The Needs and Institutional Support score (M = 2.12, SD = 0.14) indicates that model development should not focus solely on classroom procedures. Teachers also need practical instructional resources, professional learning opportunities, mentoring, and institutional conditions that support implementation. This implication is consistent with the developmental orientation of recent ECE studies published in

Ceria, including work on Project-Based Learning and innovative approaches to critical-thinking development (Ananingrum, 2025; Kartikasari et al., 2026; Maulinda et al., 2025) .

The lowest score was observed in Collaborative CPBL Implementation (M = 2.06, SD = 0.15). This is the most important finding for the proposed model because it indicates that practical implementation is weaker than conceptual understanding. Collaboration requires more than placing children in groups; it involves interaction, shared attention, negotiation of meaning, explanation of ideas, and collective problem-solving (Fridberg et al., 2018; Salminen-Saari et al., 2021). Amriani and Halifah, (2024) also demonstrate the relevance of collaborative learning in early childhood, but the present results indicate that teachers require additional structure to translate collaborative principles into CPBL practice.

The combined pattern across the five dimensions reveals a conceptual–implementation gap. Teachers appear relatively more ready to understand and use ethnomathematics than to implement collaborative problem-based learning. This finding is important because it changes the development priority: the proposed CPBL-E model should not merely provide additional theoretical information about ethnomathematics or critical thinking. It should provide concrete instructional procedures, examples of culturally situated problems, collaboration structures, teacher facilitation guidance, and assessment strategies.

The empirical studies reviewed in the Introduction provide a complementary explanation for this finding. PBL has demonstrated potential for developing higher-order thinking in early childhood (Sulistyawati, 2025), while ethnomathematics-based PBL has shown promise for critical-thinking development among older learners (Annisa et al., 2023; Suryawan, 2023; Syahnia et al., 2024). Collaborative learning has also demonstrated relevance in ECE (Amriani & Halifah, 2024). However, these studies do not eliminate the need to establish teachers' readiness before an integrated model is implemented. The present study therefore contributes evidence at the pre-development stage.

From a model-development perspective, the findings justify the next stages of CPBL-E development. The model should be designed around the identified implementation gap, particularly the relatively low score for collaborative CPBL implementation. Its components should include clear learning phases, developmentally appropriate problem scenarios, culturally relevant mathematical contexts, collaborative interaction structures, teacher scaffolding, and authentic assessment of critical-thinking processes. The present study does not establish the effectiveness of these components; their validity and effectiveness must be examined in subsequent R&D stages.

Overall, the results indicate that early childhood teachers have a comparatively stronger conceptual readiness in ethnomathematics than practical readiness for collaborative problem-based implementation.

This gap supports the need for a structured CPBL-E model that is culturally responsive, developmentally appropriate, and feasible for classroom use. The central implication is that model development should be guided by actual teacher readiness and implementation needs rather than by theoretical integration alone.

Conclusion

This study examined early childhood teachers' readiness and needs regarding the implementation of Collaborative Problem-Based Learning based on Ethnomathematics (CPBL-E). The findings show that Understanding and Utilization of Ethnomathematics obtained the highest mean score (M = 2.37, SD = 0.28), whereas Collaborative CPBL Implementation obtained the lowest (M = 2.06, SD = 0.15). The overall pattern indicates a gap between teachers' conceptual readiness and their practical readiness to implement collaborative problem-based learning. The findings therefore support the need to develop a structured, culturally responsive, and developmentally appropriate CPBL-E model that provides practical guidance for planning, facilitation, collaboration, and assessment. Because this study represents a preliminary needs assessment, the validity and effectiveness of the proposed model should be examined in subsequent R&D stages.

References

Amriani, S. R., & Halifah, S. (2024). Pengaruh Model Pembelajaran Kolaboratif terhadap Kecerdasan Interpersonal Anak Usia Dini. *Lectura: Jurnal Pendidikan Anak Usia Dini*, *7*(2), 24–37. https://doi.org/10.31849/paud-lectura.v%vi%i.19868

Ananingrum, L. , A. K. R. , S. D. G. L. , & N. M. A. (2025). *The Development of POPBUL (Pop-Up Badminton) to Improve Critical Thinking in Children Aged 5-6 Years*. https://doi.org/10.31000/ceria.v15i1.14397

Annisa, S., Zaenuri, Z., Kustiono, K., & Guntur, M. (2023). *Penerapan Quizizz Bernuansa Etnomatematika Melalui Problem Based Learning Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa*. https://doi.org/10.24036/jippsd.v7i1

Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education.*

British Educational Research Association. (2024). *Ethical Guidelines for Educational Research*. www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2024

Bruner, J. S. (1960). *The Process of Education*.

Cahyani Kusuma, T., Boeriswati, E., & Supena, A. (2023). Peran Guru dalam Meningkatkan Berpikir Kritis Anak Usia Dini. *Aulad: Journal on Early Childhood*, *6*(3), 413–420. https://doi.org/10.31004/aulad.v6i3.563

Creswell. (2012). *Educational Research*.

D'Ambrosio, U. (1985). Ethnomathematics and Its Place in the History and Pedagogy of Mathematics. *For the Learning of Mathematics*, *5*(February 1985), 44-48 (in 'Classics').

Diana, R. F., & Kusuma, P. S. B. (2025). Development of PBL Integrated Ethnomathematics Learning Tools to Develop Mathematical Problem-Solving Skills in Elementary School. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *13*(3), 649–661. https://doi.org/10.33394/j-ps.v13i3.15868

Facione. (1990). *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*.

Fridberg, M., Thulin, S., & Redfors, A. (2018a). Preschool children's Collaborative Science Learning Scaffolded by Tablets. *Research in Science Education*, *48*(5), 1007–1026. https://doi.org/10.1007/s11165-016-9596-9

Fridberg, M., Thulin, S., & Redfors, A. (2018b). Preschool children's Collaborative Science Learning Scaffolded by Tablets. *Research in Science Education*, *48*(5), 1007–1026. https://doi.org/10.1007/s11165-

016-9596-9

Gall, Gall & Borg (2003*). Educational Research_ An Introduction (7th Edition)*. (n.d.).

Hmelo-Silver, C. E. (2004a). Problem-Based Learning: What and How Do Students Learn? In *Educational Psychology Review* (Vol. 16, Number 3). https://doi.org/10.1023/B:EDPR.0000034022.16470.f3

Hmelo-Silver, C. E. (2004b). Problem-Based Learning: What and How Do Students Learn? In *Educational Psychology Review* (Vol. 16, Number 3).

Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, *7*(4), 396–403. https://doi.org/10.9734/bjast/2015/14975

Kartikasari, A. P., Ningrum, M. A., Adhe, K. R., & Safitri, D. G. L. (2026). Development of Monopoly Mitigation Game (MOMI) to Improve Critical Thinking Skills of Early Childhood. *Ceria: Journal of the Childhood Education Study Program*, *15*(1), 61–73. https://doi.org/10.31000/ceria.v15i1.14295

Martyanti, A. (2018). *Etnomatematika: Menumbuhkan Kemampuan Berpikir Kritis Melalui Budaya Dan Matematika* (Vol. 1, Number 1). https://jurnal.ustjogja.ac.id/index.php/indomath

Maulinda, T., Khosiah, S., & Sultan Ageng Tirtayasa, U. (2025). Analysis of Project Based Learning Implementation In Improving the Cognitive Abilities of Children Aged 5-6 Years at TK Roudhoh Serang-Banten. Ceria: Jurnal Program Studi Pendidikan Anak Usia Dini. *Ceria: Journal of the Childhood Education Study Program*, *14*(2), 438–448. https://doi.org/10.31000/ceria.v14i2.13960

O'Reilly, C., Devitt, A., & Hayes, N. (2022). Critical thinking in the preschool classroom - A systematic literature review. *Thinking Skills and Creativity*, *46*. https://doi.org/10.1016/j.tsc.2022.101110

OECD. (2023). *PISA 2022 Results (Volume I)*. OECD Publishing. https://doi.org/10.1787/53f23881-en

Rohita, R., Yetti, E., & Sumadi, T. (2023). Kemampuan Berpikir Kritis Anak: Analisis pada Pengenalan Budaya Lebak dalam Pembelajaran di TK. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *7*(6), 6566–6578. https://doi.org/10.31004/obsesi.v7i6.5326

Romdoni, E. F. (2025). Etnomatematika dalam Alat Musik Tradisional Angklung: Pembelajaran Inovatif Mengenal Konsep Bilangan dan Pola di PAUD. *9*(2). https://doi.org/https://doi.org/10.24853/yby.9.2.192-207

Rosa, M., & Orey, D. (2011). Ethnomathematics: the cultural aspects of mathematics. *Revista Latinoamericana de Etnomatemática*, *4*(2), 32–54. http://www.revista.etnomatematica.org/index.php/RLE/article/view/32

Rosa, M., & Orey, D. C. (2016). *State of the Art in Ethnomathematics* (pp. 11–37). https://doi.org/10.1007/978-3-319-30120-4_3

Salminen-Saari, J. F. A., Garcia Moreno-Esteva, E., Haataja, E., Toivanen, M., Hannula, M. S., & Laine, A. (2021). Phases of collaborative mathematical problem solving and joint attention: a case study utilizing mobile gaze tracking. *ZDM - Mathematics Education*, *53*(4), 771–784. https://doi.org/10.1007/s11858-021-01280-z

Sulistyawati, W. (2025). Enhancing Young Learners' Creative Thinking through Problem-Based Learning: An Indonesian Early Childhood Education Context. *Journal of Education Technology and Inovation*, *8*(2), 29–48. https://doi.org/10.31537/jeti.v8i2.2764

Suryawan, I. P. P. , J. P. , P. I. G. N. , H. I. G. N. Y. , & P. P. E. W. (2023). *Ethnomathematically Controversial Problem-Based Multimodal Approach in Terms of Students' Critical Thinking Ability*.

Syahnia, S. M., Haenilah, E. Y., Perdana, R., & Caswita, C. (2024). Ethnomathematics-based Problem Based Learning (PBL) Model to Increase Students' Critical Thinking in Mathematics Learning. *Lectura : Jurnal Pendidikan*, *15*(2), 571–581. https://doi.org/10.31849/lectura.v15i2.20985

UNESCO. (2021). *Reimagining our futures together: a new social contract for education*. UNESCO. https://doi.org/10.54675/ASRB4722

UNICEF. (2019). *A WORLD TO LEARN : Prioritizing quality early childhood*.

Vygotsky, L. S., Cole, M., John-Steiner, V., Scribner, S., & Souberman, E. (1978). *Mind in Society The Development of Higher Psychological Processes*.