

From body to language: the 4Ps-R model as an embodied framework for regulatory readiness in early L2 pedagogy

Claudia Capaci¹, Gabriella Ferrara¹ and Giuseppe Battaglia¹ *¹

¹ Department of Psychology, Educational Science and Human Movement (SPPEFF), University of Palermo (Italy); claudia.capaci@unipa.it; gabriella.ferrara@unipa.it; giuseppe.battaglia@unipa.it;

* Correspondence: claudia.capaci@unipa.it;

Abstract: Second language (L2) teaching in primary education often relies on instructional frameworks such as Presentation–Practice–Production (PPP), which implicitly assume that young learners already possess the cognitive and self-regulatory capacities required to process linguistic input effectively. However, developmental and neuroscientific research highlights substantial variability in executive functions, including attentional control and working memory, thereby challenging this assumption. This article proposes the 4Ps-R model (Preparation, Presentation, Practice, and Production) as a theoretical extension of PPP. The model introduces an explicit preparation phase grounded in regulatory embodiment and structured uses of rhythm, posture, and attentional scaffolding, aimed at establishing the necessary conditions for language processing. It distinguishes between representational embodiment, in which the body supports semantic encoding, and regulatory embodiment, in which bodily activity stabilizes the attentional and executive conditions that precede learning. Learner readiness is therefore reconceptualized not as a fixed prerequisite, but as a pedagogically constructed state. The 4Ps-R model currently informs the didactic intervention developed within the ongoing mixed-method pilot study *Lingua e movimento nella scuola primaria*, which explores the integration of L2 learning and ballet training in primary education. The article discusses the theoretical foundations of the model and its implications for instructional design, teacher education, and future empirical research in early L2 pedagogy.

Keywords: embodied cognition; regulatory readiness; second language (L2) teaching; primary education; executive functions.



Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The Presentation–Practice–Production (PPP) framework occupies a distinctive position within contemporary language pedagogy. Despite longstanding criticism concerning its behaviourist heritage, linear sequencing, and limited capacity to sustain

¹ This article is the result of the joint scientific work of all three authors, who collaboratively developed its conceptual framework and discussed its theoretical implications. Claudia Capaci drafted Sections 2, 4 and 5. Gabriella Ferrara drafted Section 1 and 3, Giuseppe Battaglia drafted Sections 6 and 7.

authentic communication (Richards & Rodgers, 2014; Harmer, 2007), it continues to shape instructional practice in a wide range of educational contexts and remains particularly influential in the early stages of foreign language teaching (Bui & Newton, 2021; Gregson, 2023). PPP structures learning through a progression from presentation to guided practice and production, offering teachers a coherent way of organizing classroom instruction. Yet the apparent simplicity of this sequence conceals an assumption that is rarely made explicit. The presentation of linguistic content presupposes the availability of attentional resources, working-memory capacity, inhibitory control, and emotional regulation sufficient to sustain engagement with instructional input. In effect, the model begins at the point where successful participation is already expected, while devoting comparatively little attention to the conditions that make such participation possible.

This assumption becomes increasingly problematic when considered in light of developmental research. Executive functions undergo substantial transformation throughout childhood and display considerable variability even among learners of the same age (Diamond, 2013; Blair & Raver, 2015; Doebel, 2020). Attentional control, working memory, and self-regulation cannot therefore be regarded as stable resources equally available to all learners. What appears pedagogically self-evident from the perspective of curricular planning becomes far less straightforward when viewed through the lens of neurodevelopment.

Under these conditions, differences in participation, persistence, and learning outcomes may not depend exclusively on aptitude or motivation. They may also reflect unequal access to the regulatory resources upon which engagement with linguistic input depends. Early language instruction therefore raises not only the question of sequencing linguistic content, but also of making it cognitively and affectively accessible.

This shift in perspective underpins the 4Ps-R model (Preparation, Presentation, Practice and Production for Regulatory Readiness) extends the traditional PPP sequence through the introduction of a preparation phase grounded in regulatory embodiment. The model treats readiness as a condition that can be pedagogically supported, not a prerequisite located within the learner. Rhythm, posture, and attentional organization are consequently repositioned from ancillary classroom practices to constitutive elements of instructional architecture. In doing so, the model relocates the starting point of instruction itself, directing attention not only to the sequencing of content but also to the construction of the conditions under which learning becomes possible.

2. The readiness gap in PPP-based instruction

The enduring success of the PPP framework derives largely from its representational logic. By organizing instruction around a progression from presentation to controlled practice and subsequent production, the model offers a coherent structure through which linguistic knowledge can be progressively introduced, rehearsed, and consolidated. This sequence reflects a long-standing assumption within language pedagogy: that learning proceeds through repeated encounters with linguistic forms whose gradual internalization ultimately enables communicative use (Richards & Rodgers, 2014).

At the same time, the effectiveness of this sequence depends upon a condition that remains largely implicit within the framework itself. Presentation presupposes

that learners can sustain attention to relevant linguistic features; practice assumes that newly encountered information can be maintained and manipulated within working memory; production requires that such information can subsequently be retrieved and deployed in increasingly autonomous ways. The successful progression from one phase to the next therefore relies upon a set of regulatory capacities that are not explicitly addressed within the model's architecture.

This observation acquires particular relevance in the context of early language learning: if engagement with instructional input depends upon attentional, mnemonic, and self-regulatory resources whose availability cannot be taken for granted, then difficulties in learning cannot be explained solely by reference to the quality of instruction or the characteristics of the learner. They may also reflect a mismatch between the regulatory demands embedded within instructional sequences and the developmental resources available to those expected to engage with them.

The central limitation of PPP lies less in its sequencing of linguistic content than in its treatment of readiness as an implicit starting condition. The framework provides a detailed account of how language should be presented, practiced, and produced, yet offers comparatively little guidance concerning how learners might be brought into a state in which these processes can be effectively sustained. The issue, therefore, is not whether representation remains important to learning, but whether representation alone is sufficient to account for the conditions under which learning becomes possible.

3. Executive functions and the problem of learner readiness

Executive functions, including attentional control, working memory, and cognitive flexibility, play a crucial role in language learning because they support engagement with instructional input and the coordination of comprehension and production (Diamond, 2013).

More important is their developmental trajectory.: executive functions emerge gradually and remain subject to considerable interindividual variability throughout childhood

(Blair & Raver, 2015; Doebel, 2020). Learners of the same chronological age may differ substantially in their capacity to sustain attention, manage distraction, retain information, or regulate emotional responses to challenging tasks.

These findings complicate the notion of readiness implicit within many instructional models. If the cognitive resources required to engage with linguistic input are themselves unevenly distributed and developmentally dynamic, then readiness cannot be treated as a stable prerequisite that precedes instruction. Rather, it emerges as a relational condition situated at the intersection of learner characteristics, task demands, and contextual supports.

This perspective carries important implications for language pedagogy. Variability in learning outcomes is often interpreted through the lenses of aptitude, motivation, or effort. While these factors undoubtedly matter, an exclusive focus on learner attributes risks obscuring the regulatory demands embedded within instructional activities themselves. The ability to benefit from linguistic input depends not only on what is taught, but also on the extent to which the learning environment supports the attentional and self-regulatory processes upon which engagement depends.

Viewed in this light, developmental variability is not merely a source of individual differences; it becomes a pedagogical challenge. The question is no longer whether

learners possess the resources required for successful participation, but how instructional design might contribute to establishing and stabilizing those resources. It is precisely at this point that embodied approaches acquire particular relevance, insofar as they offer a means of addressing readiness not as a fixed learner characteristic, but as a condition that can be actively supported through educational practice.

4. Embodiment and regulatory readiness

Embodied cognition conceptualizes learning as emerging from the interaction of brain, body, and environment (Shapiro, 2019). Within language education, this perspective has stimulated growing interest in movement and sensorimotor engagement as supports for language learning (Macedonia, 2019; Oppici et al., 2023). The embodied perspective is also supported by neuroscientific evidence highlighting functional links between language and action systems (Pulvermüller, 2005).

Much of this work has focused on the role of bodily activity in supporting the representation of meaning. Gestures associated with lexical items, physical enactment of actions, and movement-based learning tasks contribute to the formation of multimodal memory traces that strengthen the connection between linguistic forms and conceptual content (Macedonia & Klimesch, 2014; Tellier, 2008). In these cases, the body functions primarily as a representational resource, extending and enriching processes of semantic encoding and retrieval.

While this perspective has generated valuable insights, it does not fully address the problem developed in the preceding sections. The question raised by developmental variability concerns not only how meaning is represented, but also how learners are brought into a state in which meaningful engagement with instructional content becomes possible. From this perspective, bodily activity assumes a different pedagogical significance. Beyond supporting the representation of linguistic content, it may contribute to the regulation of the attentional, affective, and executive conditions upon which learning depends.

This second function may be described as regulatory embodiment. Rather than facilitating the encoding of specific linguistic meanings, regulatory embodiment operates upon the conditions that precede learning itself. Movement, rhythm, posture, and structured bodily routines have been shown to influence arousal, attentional allocation, emotional regulation, and behavioral organization (Jusslin et al., 2022). Rhythmic activity, for example, can support temporal predictability and attentional synchronization (Thaut et al., 2015), while highly structured movement sequences may provide learners with a sense of stability and orientation that facilitates engagement with subsequent cognitive tasks (Immordino-Yang & Damasio, 2008).

Although analytically distinct, representational and regulatory embodiment frequently coexist in educational practice. The former supports meaning-making, whereas the latter supports the conditions that make learning possible.

It is within this second dimension that the theoretical rationale of the 4Ps-R model is situated. If readiness is understood as a dynamic and context-sensitive condition rather than a fixed learner attribute, then embodied activity can no longer be regarded merely as a strategy for enriching language instruction. It becomes a potential means through which the regulatory foundations of learning are deliberately and systematically supported.

5. The 4Ps-R model

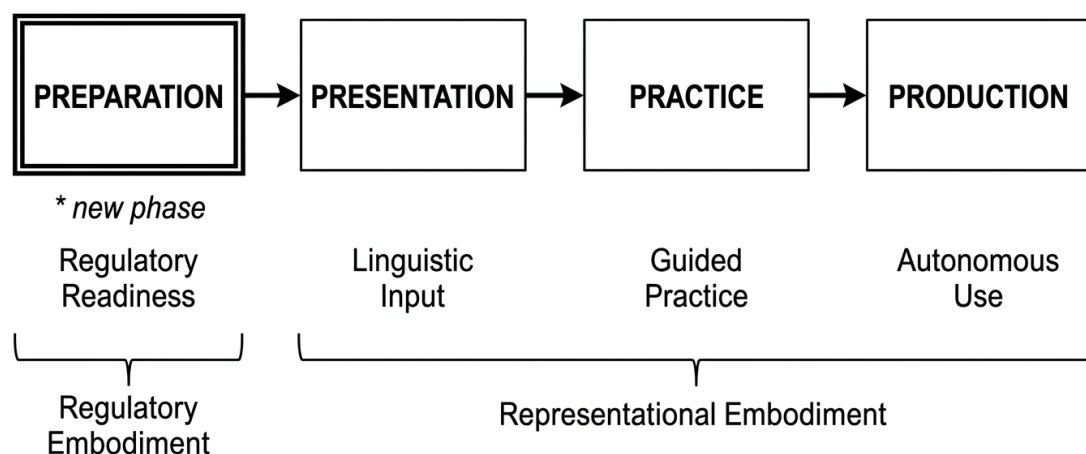
The theoretical considerations developed thus far converge on a common conclusion: if engagement with linguistic input depends upon regulatory capacities that are developmentally variable and context-sensitive, then instructional design cannot limit itself to the organization of linguistic content. It must also address the conditions that enable learners to access, sustain, and benefit from learning experiences. The 4Ps-R model emerges from this premise as an extension of the traditional Presentation–Practice–Production sequence (Richards & Rodgers, 2014; Harmer, 2007), through the introduction of an explicit Preparation phase that precedes Presentation, Practice, and Production and is specifically oriented towards the construction of regulatory readiness. Positioned before language instruction, Preparation organizes attentional, affective, and behavioral resources.

The addition of a preparation phase does not replace the pedagogical logic of PPP but repositions its point of departure. Whereas the traditional framework begins with the presentation of linguistic material, the 4Ps-R model recognizes that the effectiveness of such presentation depends upon the prior organization of attentional, affective, and behavioral resources. Preparation supports learners in entering a state conducive to language processing and participation.

Regulatory readiness is conceived not as a fixed learner characteristic but as a dynamic condition emerging from the interaction of individual resources, task demands, and environmental affordances. The purpose of preparation is consequently not to teach language directly, but to support the regulatory conditions upon which linguistic learning depends. To this end, the model draws upon forms of regulatory embodiment capable of promoting attentional orientation, emotional regulation, and behavioral organization. Rhythm, posture, and structured attentional scaffolds are particularly relevant because they provide learners with temporal predictability, bodily stability, and orienting cues that facilitate engagement with subsequent instructional activities.

Once such conditions have been established, instruction proceeds through the familiar phases of presentation, practice, and production. The difference lies less in the nature of these phases than in the conditions under which they are enacted. The principal contribution of the 4Ps-R model therefore resides not in the addition of a further instructional stage, but in a reconceptualization of where instruction begins. Rather than assuming readiness as a prerequisite, the model positions it as a legitimate target of pedagogical action. The model currently informs the ongoing mixed-method pilot study *Lingua e movimento nella scuola primaria*, a quasi-experimental study in which two intact third-grade classes were randomly allocated to experimental and control conditions.

Figure 1. The 4Ps-R model: Integration of regulatory and representational embodiment within the PPP instructional sequence.



Classic PPP: Presentation → Practice → Production

6. Discussion

The introduction of regulatory readiness as an explicit object of pedagogical design carries implications that extend beyond the specific context of early language education. If learning depends not only on the quality of instructional content but also on the regulatory conditions that support engagement with that content, then the design of educational experiences can no longer be confined to the sequencing of knowledge and skills. Greater attention should be devoted to how attentional, affective, and behavioral resources are mobilized and sustained in learning environments.

From this perspective, embodied practices acquire a status that differs from their more familiar role as strategies for enriching instruction or increasing learner motivation. Their pedagogical value resides not exclusively in their capacity to represent meaning, but also in their potential contribution to the regulation of those processes that enable participation and learning. This shift invites a reconsideration of how movement, rhythm, posture, and classroom routines are conceptualized within educational practice, positioning them not as peripheral activities but as elements that may contribute to the construction of learning conditions themselves.

The 4Ps-R model suggests that developmental variability should not be understood solely as a source of individual difference, but also as a challenge for instructional design. Rather than asking whether learners possess the resources required for successful participation, pedagogy may be called upon to consider how such resources can be supported, stabilized, and cultivated within educational contexts. In this sense,

the construction of readiness becomes not a preliminary concern external to teaching, but an integral dimension of teaching itself.

7. Conclusion

The widespread adoption of the Presentation–Practice–Production framework reflects the enduring pedagogical value of its representational architecture. Yet the effectiveness of any instructional sequence ultimately depends upon conditions that remain largely external to the framework itself. In early language education, where attentional control, self-regulation, and working memory are still developing, the assumption that learners arrive equally prepared to engage with linguistic input becomes increasingly difficult to sustain.

The perspective developed in this article has sought to relocate this issue from the margins of instructional practice to the center of pedagogical reflection. What is at stake is not simply the organization of linguistic content, but the construction of the conditions that make engagement with such content possible. From this standpoint, readiness cannot be reduced to an individual attribute that precedes instruction; it emerges within the dynamic relationship between learner, task, body, and environment. The introduction of a Preparation phase prior to Presentation, Practice, and Production responds to this challenge by recognizing the pedagogical significance of regulatory embodiment. Rhythm, posture, and attentional organization are understood not merely as supports for learning, but as resources through which the conditions of learning may be shaped. The distinction between representational and regulatory embodiment is intended to clarify this shift, directing attention beyond the role of the body in supporting meaning towards its contribution to the organization of the regulatory foundations upon which learning depends.

The significance of the 4Ps-R model extends beyond early second language instruction: it invites a reconsideration of the relationship between development and pedagogy. If learning is understood as an emergent process arising from the interaction of cognitive, affective, bodily, and environmental dimensions, then educational design cannot concern itself exclusively with what is to be taught. It must also attend to the conditions under which learners become able to encounter, engage with, and transform that experience into learning.

References

- Blair, C., & Raver, C. C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Annual Review of Psychology*, 66, 711–731. <https://doi.org/10.1146/annurev-psych-010814-015221>
- Bui, G., & Newton, J. (2021). Task complexity and instructed second language learning. *Language Teaching Research*, 25(6), 895–914. <https://doi.org/10.1177/13621688211013522>
- Diamond, A. (2013). Executive functions. *Annual Review of Psychology*, 64, 135–168. <https://doi.org/10.1146/annurev-psych-113011-143750>
- Doebel, S. (2020). Rethinking executive function and its development. *Perspectives on Psychological Science*, 15(4), 942–956. <https://doi.org/10.1177/1745691620904771>

Gregson, M. (2023). Tracking trends in coursebooks for young learners. *ELT Journal*, 77(2), 245–273.
<https://doi.org/10.1093/elt/ccac048>

Harmer, J. (2007). *The practice of English language teaching* (4th ed.). Pearson Longman.

Immordino-Yang, M. H., & Damasio, A. (2008). We feel, therefore we learn: The relevance of affective and social neuroscience to education. *Mind, Brain, and Education*, 1(1), 3–10.
<https://doi.org/10.1111/j.1751-228X.2007.00004.x>

Jusslin, S., Korpinen, K., Lilja, N., Martin, R., Lehtinen-Schnabel, J., & Anttila, E. (2022). Embodied learning and teaching approaches in language education: A mixed studies review. *Educational Research Review*, 37, 100480.
<https://doi.org/10.1016/j.edurev.2022.100480>

Macedonia, M. (2019). Embodied learning: Why at school the mind needs the body. *Frontiers in Psychology*, 10, 2098. <https://doi.org/10.3389/fpsyg.2019.02098>

Macedonia, M., & Klimesch, W. (2014). Long-term effects of gestures on memory for foreign language words trained in the classroom. *Mind, Brain, and Education*, 8(2), 74–88. <https://doi.org/10.1111/mbe.12068>

Oppici, L., Mathias, B., Narciss, S., & Proske, A. (2023). Benefits of enacting and observing gestures on foreign language vocabulary learning: A systematic review and meta-analysis. *Behavioral Sciences*, 13(11), 920.
<https://doi.org/10.3390/bs13110920>

Pulvermüller, F. (2005). Brain mechanisms linking language and action. *Nature Reviews Neuroscience*, 6(7), 576–582. <https://doi.org/10.1038/nrn1706>

Richards, J. C., & Rodgers, T. S. (2014). *Approaches and methods in language teaching* (3rd ed.). Cambridge University Press.

Shapiro, L. (2019). *Embodied cognition* (2nd ed.). Routledge.

Tellier, M. (2008). The effect of gestures on second language memorization by young children. *Gesture*, 8(2), 219–235. <https://doi.org/10.1075/gest.8.2.06tel>

Thaut, M. H., McIntosh, G. C., & Hoemberg, V. (2015). Neurobiological foundations of neurologic music therapy: Rhythmic entrainment and the motor system. *Frontiers in Psychology*, 5, 1185.
<https://doi.org/10.3389/fpsyg.2014.01185>