

Interaction quality in toddler classrooms: a cluster analysis across activity settings and structural associations

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Introduction

Why should we focus on educator-child interactions in toddler classrooms ?



0-3 years

Critical window

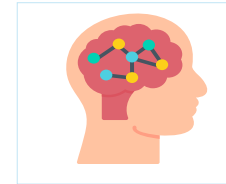


Educator-child interactions

Developmental benefits



Language



Cognitive



Socio-emotional

Prevention



Challenges

Introduction

How can we define and observe these interactions in practice ?

Classroom Assessment Scoring System (CLASS-Toddler)

Language development

Emotional and Behavioral Support (EBS)



Positive Climate (PC)

Warm, respectful relationships

Negative Climate (NC)

Negativity, harsh tone

Teacher Sensitivity (TS)

Responsive to children's needs

Regard for Child Perspective (RCP)

Child independence and choices

Behavioral Guidance (BG)

Promote positive behavior

Engaged Support for Learning (ESL)



Facilitation of Learning and Development (FLD)

Active involvement in activities

Quality of Feedback (QF)

Clarify and extend understanding

Language Modeling (LM)

Use of rich language

1 2 3 4 5 6 7
LOW MID HIGH

Introduction

What patterns of interaction quality can we identify in toddler classrooms ?
3 distinct profiles

**Profile 1 –
High quality**

High EBS
High ESL



**Profile 2 –
Moderate quality**

High EBS
Low ESL



**Profile 3 –
Low quality**

Low EBS
Low ESL

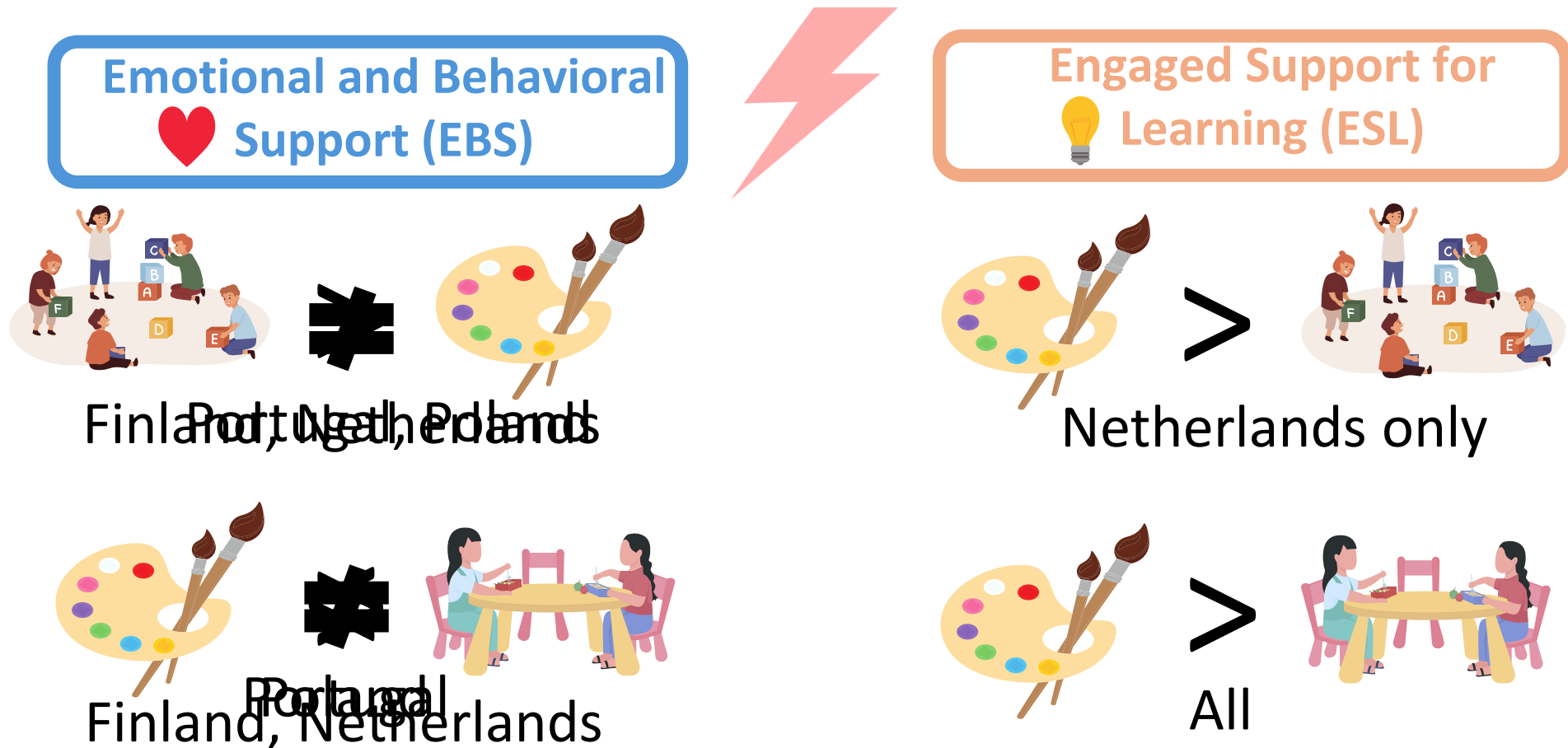


Introduction

Are all activity settings equally supportive ?

No, but there are cross-national variations

Activities

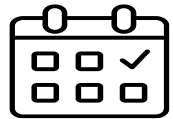


Introduction

What structural features influence quality in toddler classrooms ?

Both individual and classroom characteristics, although the evidence is mixed

Staff-level



Years of experience + - \neq



Qualifications + - \neq



In-service training +



Age -



Classroom-level



Staff/child ratio + \neq



Group size + \neq



Mixed-age -



Home language + -

Research gaps

Gap 1: Cluster analysis has been used only once in toddler classrooms (Wyslowska & Slot, 2020), and never in the French context.

Gap 2: Activity settings are underexplored in toddler classrooms (Cadima et al., 2023), including in the French context.

Gap 3: Structural predictors of quality remain unclear in toddler classrooms, especially in France.

Research questions and aims

1) What profiles of classroom interaction quality can be identified ?

Aim 1 : To identify clusters of classroom interaction quality

2) How are activity settings distributed across these profiles ?

Aim 2: To examine how settings relate to these profiles

3) Which structural features are associated with each profile ?

Aim 3: To explore links between classroom/staff characteristics and interaction quality profiles

Methodology

40 toddler classrooms



15 to 36 months old

Each classroom visited once

“Follow your daily routines”

Questionnaires

Structural features (e.g., qualifications)



Extraction of cycles

Educator-led activities ($N=24$)

Book reading ($N=22$)

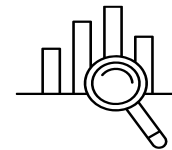
Mealtimes ($N= 39$)

Child-managed activities ($N= 37$)



Clear definitions

Specific criterion for start and end of observation for each activity



CLASS-T

Each rated cycle was 15 to 20 min

Inter-rater reliability was assessed on 19% of the data

Research questions and aims

1) What profiles of classroom interaction quality can be identified ?

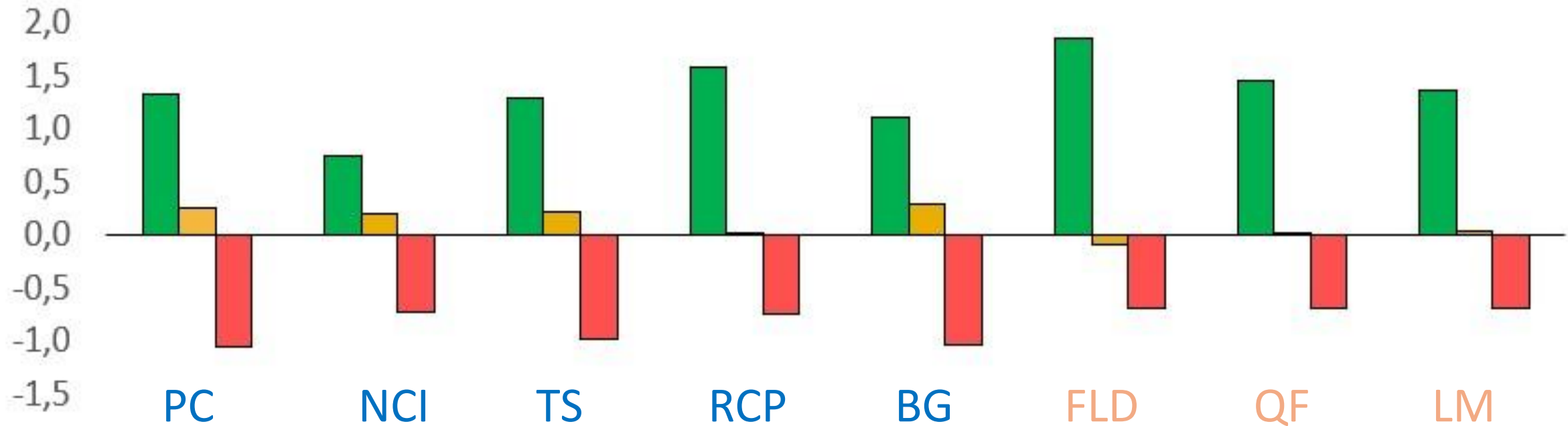
Aim 1 : To identify clusters of classroom interaction quality

Results

N cluster 1 : 17
N cluster 2 : 67
N cluster 3 : 37

The mean standardized CLASS dimension scores for the three clusters

Cluster 1 - high EBS and ESL Cluster 2 - high EBS and low ESL
Cluster 3 - overall low quality



Key interpretations

- Cross-national comparisons with Wysłowska & Slot (2020)

Same number of profiles (3), but different distributions:

<u>Profiles</u>	<u>Our study</u>	<u>Wysłowska & Slot</u>
Overall high quality	14% ←	39% ←
High emotional, low learning	55% ←	27% ←
Overall low quality	31%	34%

This suggests **lower overall interaction quality**, especially in **engaged support for learning > concerning for children's language development**.

Key interpretations

 Cluster 1 (N=17) - relatively high overall quality

→ Rare : $\approx 14\%$ of classrooms

→ Moderate scores overall

Room for improvement

 Cluster 2 (N=67) - emotionally supportive, low cognitive stimulation

→ Most frequent : $\approx 55\%$

→ Well-documented pattern of warmth without learning support

Reflects professional beliefs and cultural focus on emotional well-being

 Cluster 3 (N=37) - low overall




→ Represents $\approx 37\%$ of classrooms

Limited developmental opportunities

Not all children experience the same interaction quality, and that has real implications for development

Implications

Targeted support is needed:

-  Cluster 1 - Could benefit from ongoing support to maintain and deepen high-quality practices.
-  Cluster 2 - We need to focus on language-rich interactions.
-  Cluster 3 - Support should focus on building warmer, more responsive, and language-supportive interactions.

Highlights the need for professional development that's tailored to the specific needs of each profile

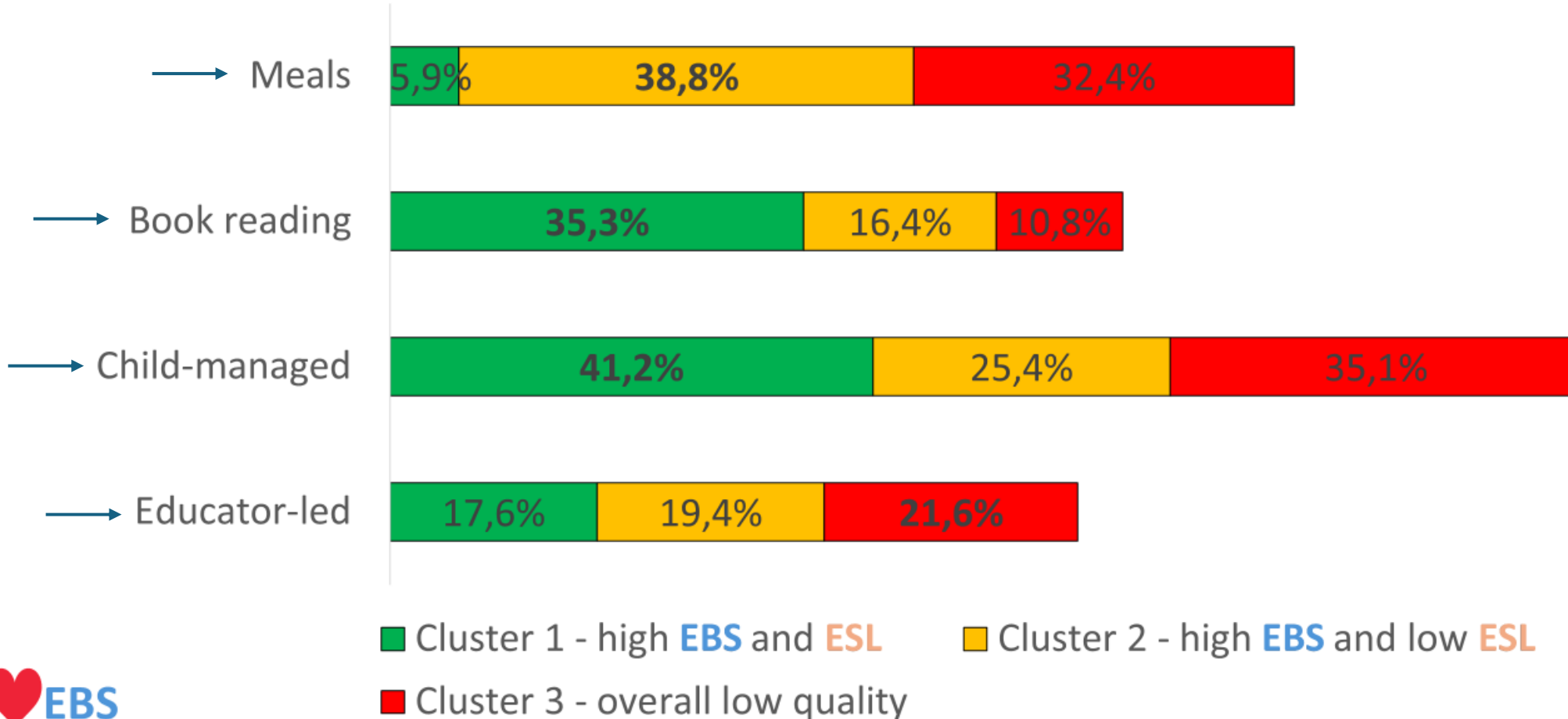
Research questions and aims

2) How are activity settings distributed across interaction quality profiles ?

Aim 2: To examine how settings relate to these profiles

Results

Distribution of activity settings within each interaction quality cluster



Key interpretations

Mealtimes are mostly found in lower-learning profiles, **suggesting missed opportunities for richer interactions.** ✓ **Logistical demands**

Book reading is mostly found in high-quality classrooms, **highlighting its strong potential to support rich interactions.** ✓
Structured nature, visual cues, emotional engagement

Child-managed activities are present in both high- and low-quality profiles, **indicating that interaction quality in these settings is variable.** ✓
Educator engagement

Educator-led activities appear across all profiles, but slightly more in low-quality classrooms. ✗ ✓ **Content delivery, group management**

Not all settings support quality equally, it seems to depend on how they're used

Implications

Improve the quality of interactions **across all settings**, including everyday moments like **meals** and **child-managed activities**.

Support educators in adjusting their interactions to the **specific demands of each activity**.

Book reading can be used as a **starting point**, it can model transferable practices (e.g., scaffolding).

Activity type should be considered in **observation tools** to better reflect contextual variation in interaction quality.

Research questions and aims

3) Which structural features are associated with these profiles ?

Aim 3: To explore links between classroom/staff characteristics and interaction quality profiles

Results

Multinomial logistic regression was used to explore how educators' structural features relate to their likelihood of being associated with low, moderate, or high interaction quality profiles.

Moderate vs. Low Quality Profile

- **Educator age** ←
 - $B = 0,200, p < 0.05 \rightarrow$ Older educators more likely to be in the **moderate** profile ($OR = 1,22$)
- **Children speaking a home language \neq French** ←
 - $B = 1.169, p < 0.05 \rightarrow$ increases odds of being in the moderate profile ($OR = 3.21$)x
- **Number of children educators were concerned about language development** ←
 - $B = 1,718, p < 0.05 \rightarrow$ increases odds of being in the moderate profile ($OR = 5.57$)x
- **Years of experience** ←
 - $B = -0.221, p < 0.05 \rightarrow$ More experience decreases the odds of being in the **moderate** profile ($OR = 0.80$)

High vs. Low Quality Profile

- **Educational level** ←
 - $B = 2.50, p < 0.05 \rightarrow$ higher educational attainment significantly increase the odds of being in the high profile ($OR = 12.22$)

✗ **Non-significant variables:** ←

- Adult/child ratio
- Group size
- Mixed-aged classrooms
- In-service training
- Pre-service qualifications
- Educator concern about children's language dev.

These structural features did not significantly predict interaction quality profiles.

Key interpretations

Moderate profile (vs low profile): educators were older but had less experience > this might reflect greater **openness to change**, or more **recent training** ?

✗ Age: Baron et al., 2023

✓ Experience: Pessanha et al., 2007

Educators reporting multilingual children and greater number of language concerns were more likely in the moderate-quality profile (vs. low-quality) > may reflect **greater awareness or sensitivity to children's developmental needs** ? **Adapt more in complex settings** ? (ability to notice and respond accordingly)

✓ Multilingual: Slot et al., 2017

Key interpretations

Higher educational attainment predicted the high-quality profile (vs low profile)
> may indicate broader **general knowledge** or stronger **cognitive skills** ?

✓ Educational attainment: Manning et al., 2019

No significant effect for group size, ratio, or trainings: **due to limited variability across classrooms ? structural features alone do not explain interaction quality ?**

✓ Group size/ratio: Pessanha et al., 2007; Slot et al., 2015

✗ Pre-service qualifications: Manning et al., 2019

✗ In-service training: Egert et al., 2020: **not targeted/intensive ?**

Not all structural features matter equally, some may only be relevant in specific quality profiles

Implications

Go beyond **classic structural features**

Raise education levels among staff working directly with children

Rethink professional development: invest in targeted, sustained, practice-based PD

Global implications for practice & Policy

Professional development:

- Prevention: improve overall quality, **especially learning support**
- Address educators' **knowledge** and **beliefs**
- Tailor content to educators' profiles
- Use **video feedback** and **reflective practice** tools

Review initial training:

- Go beyond careiving: **integrate pedagogy** and **child development**
- Embed **language development** as a core component

Policy recommendations:

- Develop a **national framework** for quality interactions
- Implement an **early childhood curriculum**
- Establish **systematic quality monitoring of process indicators** and include **contextual data** to go beyond classic structural features

Perspectives

**Sharing
knowledge**



Modeling



Scaffolding



**Providing
feedback**



Activities

Take home message



Interaction profiles vary

Settings matter

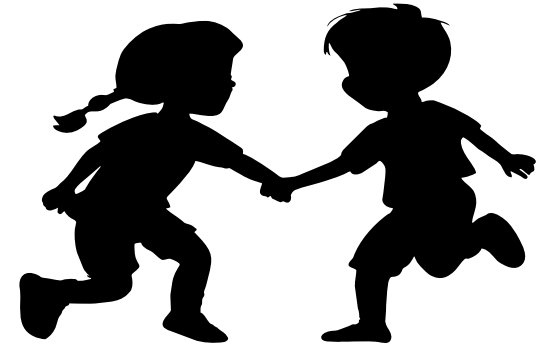
Targeted PD is needed

Thank you for your attention !

Thank you to my supervisors:

Christelle Maillart

Caroline Masson



References

- Anders, Y., & Rossbach, H. G. (2015). Preschool teachers' sensitivity to mathematics in children's play: The influence of math-related school experiences, emotional attitudes, and pedagogical beliefs. *Journal of Research in Childhood Education*, 29(3), 305-322.
- Bandel, E., Aikens, N., Vogel, C. A., Boller, K., & Murphy, L. (2014). *Observed quality and psychometric properties of the CLASS-T in the Early Head Start Family and Child Experiences Survey*. Mathematica Policy Research.
- Baron, F., Linberg, A., & Lehl, S. (2023). Interaction quality in German early childcare settings: investigating the domains of CLASS Toddler and the associations with structural characteristics. *Early Child Development and Care*, 193(13-14), 1485-1502.
- Biel, C. H., Buzhardt, J., Brown, J. A., Romano, M. K., Lorio, C. M., Windsor, K. S., ... & Goldstein, H. (2020). Language interventions taught to caregivers in homes and classrooms: A review of intervention and implementation fidelity. *Early Childhood Research Quarterly*, 50, 140-156. <https://doi.org/10.1016/j.ecresq.2018.12.002>
- Broekhuizen, M. L., Van Aken, M. A., Dubas, J. S., & Leseman, P. P. (2018). Child care quality and Dutch 2-and 3-year-olds' socio-emotional outcomes: Does the amount of care matter?. *Infant and Child Development*, 27(1), e2043. <https://doi.org/10.1002/icd.2043>
- Burchinal, M., Howes, C., Pianta, R., Bryant, D., Early, D., Clifford, R. et Barbarin, O. (2008). Predicting child outcomes at the end of kindergarten from the quality of pre-kindergarten teacher–child interactions and instruction. *Applied Development Science*, 12 (3), 140-153. (<https://doi.org/10.1080/10888690802199418>)
- Cabell, S. Q., DeCoster, J., LoCasale-Crouch, J., Hamre, B. K., & Pianta, R. C. (2013). Variation in the effectiveness of instructional interactions across preschool classroom settings and learning activities. *Early Childhood Research Quarterly*, 28(4), 820-830. <https://doi.org/10.1016/j.ecresq.2013.07.007>
- Cadima, J., Aguiar, C., Guedes, C., Wysłowska, O., Salminen, J., Slot, P., ... & Lerkkanen, M. K. (2023). Process quality in toddler classrooms in four European countries. *Early Education and Development*, 34(7), 1565-1589. <https://doi.org/10.1080/10409289.2022.2139548>
- Carr, R. C., Mokrova, I. L., Vernon-Feagans, L. et Burchinal, M. R. (2019). Cumulative classroom quality during pre-kindergarten and kindergarten and children's language, literacy, and mathematics skills. *Early Childhood Research Quarterly*, 47, 218-228. (<https://doi.org/10.1016/j.ecresq.2018.12.010>)

References

- Curby, T. W., LoCasale-Crouch, J., Konold, T. R., Pianta, R. C., Howes, C., Burchinal, M. ... et Barbarin, O. (2009). The relations of observed pre-K classroom quality profiles to children's achievement and social competence. *Early Education and Development*, 20(2), 346-372. <https://doi.org/10.1080/10409280802581284>
- Diebold, T., & Perren, S. (2020). The impact of childcare-group situational age composition on caregiver-child interactions. *European Journal of Developmental Psychology*, 17(4), 598-615. <https://doi.org/10.1080/17405629.2019.1699050>
- Ebbels, S. H., McCartney, E., Slonims, V., Dockrell, J. E., & Norbury, C. F. (2019). Evidence-based pathways to intervention for children with language disorders. *International journal of language & communication disorders*, 54(1), 3-19.
- Egert, F., Dederer, V., & Fukkink, R. G. (2020). The impact of in-service professional development on the quality of teacher-child interactions in early education and care: A meta-analysis. *Educational Research Review*, 29, 100309.
- El Kouba, E., Moitel, C., Martinez Perez, T., & Maillart, C. (2022). Effects of a Professional Development Program Designed by Speech-Language Pathologists Targeting the Use of Vocabulary Strategies in Preschool Volume 46, No 4, 2022 Teachers: A Pilot Study. *Canadian Journal of Speech-Language Pathology and Audiology*, 46(4). <https://hdl.handle.net/2268/296986>
- Ereky-Stevens, K., Funder, A., Katschnig, T., Malmberg, L. E., & Datler, W. (2018). Relationship building between toddlers and new caregivers in out-of-home childcare: Attachment security and caregiver sensitivity. *Early Childhood Research Quarterly*, 42, 270-279. <https://doi.org/10.1016/j.ecresq.2017.10.007>
- Gest, S. D., Holland-Coviello, R., Welsh, J. A., Eicher-Catt, D. L., & Gill, S. (2006). Language development subcontexts in Head Start classrooms: Distinctive patterns of teacher talk during free play, mealtime, and book reading. *Early Education and Development*, 17(2), 293-315. https://doi.org/10.1207/s15566935eed1702_5
- Goble, P., & Pianta, R. C. (2017). Teacher-child interactions in free choice and teacher-directed activity settings: Prediction to school readiness. *Early education and development*, 28(8), 1035-1051. <https://doi.org/10.1080/10409289.2017.1322449>
- Guedes, C., Cadima, J., Aguiar, T., Aguiar, C., & Barata, C. (2020). Activity settings in toddler classrooms and quality of group and individual interactions. *Journal of Applied Developmental Psychology*, 67, 101100. <https://doi.org/10.1016/j.appdev.2019.101100>

References

- Hadley, E. B., Barnes, E. M., & Hwang, H. (2023). Purposes, places, and participants: A systematic review of teacher language practices and child oral language outcomes in early childhood classrooms. *Early Education and Development*, 34(4), 862-884. <https://doi.org/10.1080/10409289.2022.2074203>
- Hatfield, B. E., Finders, J. K., Zandbergen, D. L., & Lewis, H. (2022). Associations between consistent and high-quality teacher-child interactions and preschool children's self-regulation and activity in the stress response system. *Early education and development*, 33(7), 1222-1236.
- Hindman, A. H., Farrow, J. M., Anderson, K., Wasik, B. A., & Snyder, P. A. (2021). Understanding child-directed speech around book reading in toddler classrooms: evidence from early head start programs. *Frontiers in Psychology*, 12, 719783. <https://doi.org/10.3389/fpsyg.2021.719783>
- Houben, L., Bouchard, C., Geurten, M., Hreich, E. K., & Maillart, C. (2025). Individualized Professional Development Program Designed by Speech-Language Pathologists to Increase Vocabulary Strategies in Low Socioeconomic Status Preschools: A Multiple Case Study. *Canadian Journal of Speech-Language Pathology & Audiology*, 49(1).
- Indrio, F., Pietrobelli, A., Dargenio, V. N., Marchese, F., Grillo, A., Vural, M., ... & Pettoello-Mantovani, M. (2023). The key 1000 life-changing days. *Global Pediatrics*, 4, 100049.
- La Paro, K. M., Hamre, B. K., & Pianta, R. (2012). Classroom assessment scoring system - toddler. Paul H. Brookes.
- Loizou, E., & Recchia, S. L. (2018). In-service infant teachers re-envision their practice through a professional development program. *Early Education and Development*, 29(1), 91-103. <https://doi.org/10.1080/10409289.2017.1343561>
- Manning, M., Wong, G. T., Fleming, C. M., & Garvis, S. (2019). Is teacher qualification associated with the quality of the early childhood education and care environment? A meta-analytic review. *Review of educational research*, 89(3), 370-415. <https://doi.org/10.3102/0034654319837540>
- Markussen-Brown, J., Juhl, C. B., Piasta, S. B., Bleses, D., Højen, A., & Justice, L. M. (2017). The effects of language-and literacy-focused professional development on early educators and children: A best-evidence meta-analysis. *Early childhood research quarterly*, 38, 97-115.

References

- Moitel, C., El Kouba, E., Martinez Perez, T., & Maillart, C. (2021). Accompagner des éducateurs pour soutenir le développement langagier de jeunes enfants: Une intervention indirecte menée au Liban. *ANAE: Approche Neuropsychologique des Apprentissages chez l'Enfant*, 33(TomeIV). <https://hdl.handle.net/2268/265648>
- Pessanha, M., Aguiar, C., & Bairrão, J. (2007). Influence of structural features on Portuguese toddler child care quality. *Early Childhood Research Quarterly*, 22(2), 204-214.
- Salminen, J., Guedes, C., Lerkkanen, M. K., Pakarinen, E., & Cadima, J. (2021). Teacher–child interaction quality and children's self-regulation in toddler classrooms in Finland and Portugal. *Infant and Child Development*, 30(3), e2222. <https://doi.org/10.1002/icd.2222>
- Slot, P. L., Boom, J., Verhagen, J., & Leseman, P. P. (2017). Measurement properties of the CLASS Toddler in ECEC in The Netherlands. *Journal of Applied Developmental Psychology*, 48, 79-91. <https://doi.org/10.1016/j.appdev.2016.11.008>
- Slot, P. L., Leseman, P. P., Verhagen, J., & Mulder, H. (2015). Associations between structural quality aspects and process quality in Dutch early childhood education and care settings. *Early Childhood Research Quarterly*, 33, 64-76. <https://doi.org/10.1016/j.ecresq.2015.06.001>
- Wysłowska, O., & Slot, P. L. (2020). Structural and process quality in early childhood education and care provisions in Poland and the Netherlands: A cross-national study using cluster analysis. *Early Education and Development*, 31(4), 524-540. <https://doi.org/10.1080/10409289.2020.1734908>