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METHOD

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Detective mystery play: play-based research methods for facilitating young children's critical thinking

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ABSTRACT

This article explores the usefulness of detective role-play as a research method to facilitate young children's critical thinking. The study examines four specifically designed detective play experiences, adopting an ethical rights-based approach to research with children. This qualitative multiple-case study is grounded in play-based pedagogy within a social-constructivist theory. The study consists of four exploratory cases focusing on semi-structured mystery play experiences. Twenty-four children aged 5–6 years participated. Child-centred and pedagogically appropriate methods and tools were used to facilitate the voice and visualisation of children's thinking. Conducting observations (direct and video recorded) was effective in capturing the different ways young children expressed their thinking. Findings show that engaging in investigative collaborative enquiry, dazzling children's curiosity, empowering children, listening to and acknowledging children's thinking, and guiding and scaffolding were useful for facilitating critical thinking skills and dispositions. Additionally, the consideration of design elements, such as the degree of structure, open-endedness and content knowledge dependency, was found essential for creating productive spaces for facilitating children's thinking. For example, an open approach to a task is beneficial for an open-natured exploration of critical thinking, while a more structured and adult-controlled design is more effective for facilitating and developing specific skills or dispositions.

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Introduction

This article draws upon the researcher's PhD study (Martinez-lejarreta 2023) in which the focus was to investigate young children's critical thinking and how it was facilitated in the context of play. The choice of methods in this study was of critical importance due to the challenge of researching young children's thinking. Thinking is internal in its nature and is, in that sense, an 'invisible' process to the outsider if it is not manifested through verbal, written or other symbolic language such as body language or art. Hence the distinction between critical thinking (internal) and its representation in

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action 'critical activity' (Moon 2008, 125). When researching young children's thinking, the challenge can increase (Pantaleo 2017) if the context of research and the methods used do not catch children's attention, are not meaningful for the participants, and are not effective in capturing the different ways young children communicate. Because of this, it was necessary to find innovative and effective methods with an appropriate fit with data recording tools that ethically and efficiently captured and recorded young children's various modes of expression.

This methodological article provides insights into creative specially designed play-based methods, approaches, tools and key contextual and relational aspects for facilitating the early years of critical thinking and its research. Despite recognising the importance of developing critical thinking skills and dispositions in the educational arena, there is limited published research in relation to critical thinking and specific learning contexts (Vincent-Lancrin et al. 2019, 100), it is even more challenging to identify which unique elements contribute to more successful spaces for critical thinking.

This article provides insights into the utilisation of detective play as a research method to stimulate critical thinking. In this study, detective role-play was defined as:

> Impersonating a professional (detective expert role-play) whose job is to investigate a mystery (inquiry) and consequently find out what has occurred (problem solving) by drawing reasoned conclusions based on the interpretation and analysis of the evidence (critical thinking skills and dispositions).

The article provides answers to the following research questions:

1. In what way is detective role-play a productive research method to facilitate young children's critical thinking?
2. What are the relational and contextual characteristics inherent in facilitating critical thinking using detective mystery play?
3. What are the benefits and constraints of the four different detective mystery play cases to facilitate and investigate young children's critical thinking?

Methods

A qualitative multiple case study (Stake 1995; Yin 2014) was conducted to openly explore and obtain a descriptive account of what critical thinking looked like in the context of young children's detective play and how it was facilitated. This article focuses on understanding what it was, methodologically speaking, that facilitated and stimulated such thinking.

Four different mystery-solving play experiences (methods) comprised the cases, each designed specifically for the purpose of this study. An interpretivist (social-constructivist) (Vygotsky 1978) lens (Denzin and Lincoln 2011; Creswell and Poth 2018) was adopted to gain insights into understanding the usefulness of detective mystery play as a method for providing opportunities for young children's critical thinking.

A rights-based approach to research (e.g. Cassidy, Conrad, and De Figueiroa-Rego 2020) with young children was the basis that underpinned the study and this was reflected in the design and decision-making throughout. The design and methods were specially designed to be respectful to the children needs, understanding, interests, facilitating voice and decision-making, empowering children, inclusive of diverse capabilities and providing opportunities to exercise their rights.

Design

Informed by the critical thinking and early years pedagogy literature and grounded on the researcher's own early years teaching experience, a design that was pedagogically appropriate (Wall 2019; Arnott and Wall 2021), thought-provoking and catalytic (Baumfield et al. 2009) in the manifestation of critical thinking, founded in inquiry-based learning (Klefstad 2015), play-based problem-solving contexts (Powell 1987; Lechelt, Rogers, and Marquardt 2020) was created.

In the pedagogy-related critical thinking literature, aspects associated with methods, the vision of children as thinkers and learners, power relationships and participation were highlighted as key areas to consider. Moreover, problem-solving (Powell 1987), exploration (Lechelt, Rogers, and Marquardt 2020), inquiry (Klefstad 2015), cooperation and collaboration (Quinn 1997; Wegerif 2010; Murphy et al. 2014), dialogue (Quinn 1997; Wegerif 2010; Murphy et al. 2014), surprise (Runco and Jaeger 2012), active participation (Karin-Hognestad 2010; Florea and Hurjui 2015; Vincent-Lancrin et al. 2019; Fernández-Santín and Feliu-Torruella 2020), motivation (Vincent-Lancrin et al. 2019), curiosity (Florea and Hurjui 2015; Lechelt, Rogers, and Marquardt 2020), asking target questions (Quinn 1997; Kamarulzaman and Kamarulzaman's 2016) and freedom and independent thinking (Facione 1990; Paul, Binker, and Weil 1995; Fernández-Santín and Feliu-Torruella 2020) were all found to be useful pedagogic principles for facilitating critical thinking and were considered influential in the development of a method suitable functionality-wise, as well as appropriate for the age of the children targeted in this study.

Given that this study focuses on young children (the Scottish early years Primary 1 context), it was important to consider pedagogically appropriate approaches and methods that were useful when working with young children while at the same time being respectful of their needs and capabilities. Since the role of play is considered crucial in the holistic development of the child (including thinking) in Scotland and playful pedagogy is widely recognised as successful and encouraged (CfE: Scottish Government, 2019), detective mystery role play was chosen because it integrated and incorporated the various elements described above. More specifically, this choice allowed the combination of role-play (the act of pretending to be a particular character) with inquiry, problem-solving and questioning.

By detective impersonation, it was anticipated that children might resort to role-playing behaviours, values and language that would typically be associated with detectives in the process of becoming experts, and that this would be useful for critical thinking. This relates to Heathcote's *Mantle of Expert* (MoE) educational approach, in which drama and *becoming* an expert play a powerful role in the implementation of curricula and authentic learning (Heathcote and Bolton 1995). In this work, drama, especially expert character immersion (becoming the character), has been found to enable engagement 'both cognitively and affectively and requires them not merely to replay and repeat their existing understanding but to see the world afresh' (Heathcote and Bolton 1995, 8). The set imaginary context considers time, space, role and situation (Heathcote and Bolton 1995, 7), making it rich, complex and meaningful for thinking and learning. For this study, adopting the detective character contextualised by a problem to investigate was hoped to provide a rich experience for facilitating and exercising critical thinking. The four tasks (cases) consequently were designed for the children to understand,

reason and solve various mystery scenarios in the role of a super detective. The detective scenarios were designed to be solved with the support of a team of super detectives (a group of children and myself), which aimed to trigger both individual and collective critical thinking. This article focuses on examining the usefulness of these methods for stimulating or inhibiting children's thinking.

Method: 4 cases

The overarching aim of these mystery-solving experiences was to provide time, space and a meaningful context for stimulating and exercising 5-6-year-old children's critical thinking. Furthermore, the goal was to create experiences that stimulated engagement and curiosity, critical thought and its manifestation, and enable multiple forms of communication. The detective role-play aimed to stimulate the adoption of the role of a professional and competent inquirer who needed to think critically to actively and efficiently solve the encountered mysteries in line with *Mantle of the Expert*.

The four cases were:

- The *Mystery Box* (case 1) consisted of developing 'productive' questions with the ultimate goal of finding out what was hidden in a box. This activity mostly involved cognitive and communication skills (Figure 1).
- The *Zoo Mystery* (case 2) was designed as a more traditional theme-based learning activity – common in schools working with a project learning approach – which consisted of the detectives investigating and designing a zoo that would accommodate various animal needs. The activity involved cognitive skills, communicative skills, teamwork skills, artistic skills, using knowledge about geography and the animal world (knowledge-dependent to some degree), as well as using accessible resources to acquire further information (Figure 2).
- The *Snack Mystery* (case 3) was designed as a real-life simulation mystery role-play, where detectives needed to explore by moving around the scenario, looking at and analysing material evidence, to find out who committed the snack robbery. Physical clues were planted (e.g. animal paw prints, 'droppings', feathers) for children to investigate. The activity mostly involved cognitive, observational and analytical,

Figure 1. *Mystery Box.*

Figure 2. *Zoo Mystery*.

Figure 3. *Snack Mystery*.

communicative and teamwork, documenting and physical skills, as well as using resources to enquire about further information (Figure 3).

- The *Mystery House* (case 4) consisted of investigating the mysteries occurring in small-scale doll houses. Physical miniature clues were planted (e.g. mud, twigs, water, bubbles) for children to investigate. On this occasion, the children's detective role was represented by a Playmobil® figure. This activity mostly involved observation, interpretation of clues, relation making, analysing, inferencing and theorising skills (Figure 4).

All the cases entailed children engaging in mystery solving through enquiry, but each offered differences in the context of the children's performance and type of interactions (see Table 1).

This, in turn, provided a rich and in-depth description of the critical thinking phenomena, and the opportunity to explore the potential elements that were perceived as most beneficial, or limited the facilitation of critical thinking. In other words, it sought to understand in detail the possible effects (benefits and constraints) of those methodological differences in the phenomenon itself.

Figure 4. *Mystery House*.

Data collection

For the children to inhabit their detective role, the process of research was explained using a specially designed picture book: *Super-detective/researcher Lore & Co (*Arnott et al. 2020*;* Martinez-lejarreta 2023*)*. As the initial part of the ongoing informed consent process, this picture book gave children an understanding of what was going to happen so that they could decide whether they wanted to take part in the research, and therefore facilitated visual expectations regarding the role they were going to adopt. This process was essential in the child's rights orientation of the study. The researcher hoped this would make the children aware that the researcher was interested in finding out how children think and solve 'difficult puzzles'. In addition, as portrayed in Figure 5, the researcher offered children equipment including a 'deerstalker' super-detective hat, a personalised ID badge, a magnifying glass, tweezers to collect evidence, measuring tape, a detective notepad to take notes and an iPad for the group to document their discoveries, among others.

Table 1. Cases and differences.

Case	Description	Key activity	Role-play
Case 1: *Mystery Box*	Guessing game (asking, remembering and guessing) 'detective' training game (not an authentic investigation).	Formulate question, remember clues and make guesses to find out what is in the box.	Familiarising with the role. The context served as 'training', activating detective role-play behaviours.
Case 2: *Zoo Mystery*	Researcher/animal 'detective' zoo designing teamwork project (resembling a more 'traditional' school project).	Design a zoo considering habitat, animal and customer needs. Plan, research and use design learning.	Adopting a researcher 'animal detective' role.
Case 3: *Snack Mystery*	Simulation of a forensic scientist 'detective' investigation (use of scientific method and tools).	Investigate, analyse, relate each piece of evidence and meaning-making of the clues following the 'scientific method and tools'. Physically and through manipulatives compare/contrast, discard, link.	Adopting a forensic scientist 'detective' role.
Case 4: *Mystery House*	Small-scale 'Sherlock' private detective observation-based role-play (small-world observation and interpretation activity).	Engage in theorising, alternative thinking and hypothesising. Focus on observation, interpretation and theorising.	Adopting a traditional Sherlock private detective role.

Figure 5. Detective gear.

Table 2. Proposed research schedule per team of detectives.

	Days	Activities/Detective experiences (cases)
Research schedule	Day 1	*Super-detective researcher Lore & Co. picture book storytelling*: Research participation and information sharing session. (Ongoing Informed Consent)
		Case 1: *Mystery Box*
	Day 2	Case 2: *Snack Mystery*
	Day 3	Case 3: *Zoo Mystery*
	Day 4	Case 4: *Mystery House*

Table 2 shows the voluntary research schedule (if children could or wished to participate) for the four activities (cases).

Data recording methods

The use of data recording tools that ethically and efficiently captured and recorded young children's various modes of thinking manifestation and interaction was fundamental to this study. The main methods of data collection were direct observations and video – and audio-mediated observations. Data grounding this study consisted of video footage (audio-visual transcription), audio recording (audio transcription), the researcher's reflective moments (notes taken periodically before, during (taking care not to interrupt the activity) and after the data collection procedure), the children's detective notes (drawing and/or writing), photographs (taken by participants and the researcher) and collectively produced physical products (e.g. zoo poster). Data recording devices attempted to capture in essence what children said and did, capturing the many ways in which children voiced their thinking.

Sample

Twenty-four children participated in the main study. Children were 5–6-years-old at the time of data collection and belonged to two (Primary 1) school settings. The schools were

selected on a first-come first-served basis providing they fulfilled the studies' criteria (Martinez-lejarreta 2023, 83). Both schools were located in an urban environment in Scotland. The four detective mystery experiences took place within the children's school settings between 2018 and 2019. Researching in participants' natural settings is common practice in qualitative research (Creswell 2014). Among the benefits behind this practice is the familiarity of space, which the research does not alter or impact too much and potentially constrain natural behaviours. The experiences were designed for a small group to stimulate focused interaction and performance, and so the children worked in teams of two to four, depending on the case and practicalities of the context. These groups were formed by the teacher to consult children's availability if they wished to participate. A larger group might have elicited thinking in many different directions, which in this context could have been difficult for the researcher to follow, as well as being kept in the children's working memory.

Analysis

The codes and themes were predominantly grounded in and driven by data (Braun and Clarke 2022). However, a hybrid approach (Crabtree and Miller 1999) more accurately describes the approach to analysis since there was a fusion between what the researcher inductively encountered combined with the researcher's existing knowledge of the ready-made lists of skills and dispositions within the literature of critical thinking (e.g. Facione 1990; Halpern 1997).

Two distinct coding approaches were employed, *Process Coding* (Strauss and Corbin 1998; Saldaña 2016) and *Critical Incident Technique* (Flanagan 1954) to organise and make sense of the data in two complementary ways. The Critical Incident Technique was used to identify and extract the narratives that 'make a significant contribution' (Flanagan 1954, 355). Data were coded manually as well as using NVIVO Computer Assisted Qualitative Data Analysis Software (CAQDAS). Thematic analysis method was used to find patterns and themes in the coded data (Braun and Clarke 2016; Clarke and Braun 2017).

The approach and methods chosen for analysis enabled detailed exploration of the different interactions and processes occurring during the four detective mystery cases, how often they appeared in time, and whether they were patterns indicating the stimulation (not the cause) for certain processes. Each case study (mystery case) was analysed in isolation before proceeding to compare and contrast across the four cases and groups. This was important because the same codes and method of coding were not suitable for all four cases. For example, the *Mystery Box* case varied significantly in the type of data obtained from the *Mystery House* or the *Snack Mystery*. The *Mystery House* case, for example, was fragmented into different questions, and therefore this was done before analysing the case as a whole. See Martinez-lejarreta (2023) for more information.

Ethical considerations

Permission was granted by the School of Education Ethics Committee, local city council, head teachers, teachers, children's legal guardians and children themselves.

Children's decision-making process regarding participation was ongoing. Even though some children opted out before starting the study other children opted in or

out when new information emerged whilst playing detectives. Dissent was signalised differently (e.g. wearing or removing their detective gear/batches, verbalising it or using body language).

All children in the classroom were invited but only some were granted permission. In some cases, there was not enough capacity/time for all children to participate. This presented diverse challenges as some requested participation repeatedly. For this reason and despite not needing further data, an extra day was allocated for children to play. This was strictly excluded from the study and not recorded.

Video was used during the four cases, where it was necessary to capture the children's body language and actions that were vital for this research study. Visual data was blurred to ensure children's anonymity.

The University's secure cloud system (Strathcloud) was used to store data and was only accessible to the researcher.

Findings and discussion

Evidence across the four cases showed that detective mystery play experiences were productive for facilitating critical thinking skills and dispositions in 5–6-year-olds. Role-play and adopting a detective role were found to be particularly useful tools to stimulate children's intellectual engagement in a task and for them to 'articulate' such thought in the collective context. During the detective mystery play the children drew, wrote, sang, used strategic tools, body language and verbal utterances, including direct and private speech, to express thinking and communicate with one another. The complex array of multimedia data collected about each case was essential in capturing this: critical thinking manifested in a diverse range of ways with these young children.

The detective mystery play experiences were grounded in a Western early years play-based social-constructivist perspective (e.g. Pramling-Samuelsson and Carlsson 2008), which provided a robust research context to facilitate critical thinking in 5–6-year-old children. The detective activity was meaningful, age appropriate, respectful to children's needs and interests, and built on their prior experiences (within and out of school). Despite sometimes being problematic, the use of a flexible design reflecting children's prior experience, knowledge and skills was beneficial. This was significant as Facione (1990), Lai (2011) and Vincent-Lancrin et al. (2019) all agree that for children to engage in critical thinking this basis is necessary. Consequently, it was important to design contexts that incorporated familiar topics that most children could engage with to increase the likelihood of success.

Naturally, some children across the study showed differences in what they knew, as well as in the vocabulary and skills relating to the verbal articulation of thinking. Differences in knowledge, strategies and ways to think and manifest thinking were evident during enquiry, however, this did not inhibit the children from participating or demonstrating their own capabilities as thinkers and investigators in the four detective experiences. For example, despite a child in the *Snack Mystery* case not knowing much about certain animals and wrongly thinking that mice had feathers instead of fur, this did not inhibit them from engaging in enquiry, engaging in dialogue and showing behaviours and abilities coded as or related to critical thinking. At the same time, prior knowledge and experiences did facilitate some children's connection making, transference and in-depth analysis. For example, a child's prior knowledge and experience of having a sick

cat at home was shown to be useful in helping her to form her thinking, and this was reflected in her coded Critical Thinking Moment during the *Snack Mystery* investigation. Based on this evidence, using a pedagogically appropriate method as a foundation for research design was inclusive and embraced children's differences.

Since play-based pedagogically appropriate methods are too broad and do not provide enough information on what may facilitate success, it was important to explore what underlying elements were key to stimulating critical thinking within this play-based context. From the analysis across the four case studies, seven main overarching themes or pedagogical moves (contextual-relational findings) were found to be of key importance for creating pedagogically appropriate contexts for facilitating critical thinking:

1. Engaging children in investigative enquiry processes and problem solving (play and exploration);
2. Dazzling children's curiosity and interest;
3. Empowering children (detective play empowering, power autonomy);
4. Engaging children in collaborative learning experiences;
5. Listening to children;
6. Recognising and acknowledging children's thinking (explicitly mention and value); and
7. Guiding and scaffolding children's thinking.

Contextually, the investigative enquiry process of detective play facilitated problem solving in the children, an important facet of critical thinking (Halpern 1997). The mysterious and novel nature of the design dazzled children's curiosity and interest, which motivated engagement in the task. To take on the role of detective, and the support of strategic and accessible detective tools, meant the children were empowered and could have autonomy within the play episode.

The collaborative contexts also meant they engaged in discussions, learnt from one another's perspectives and collaborative decision-making, and had opportunities to scaffold each other's thinking. This was particularly important considering how young children's critical thinking occurs and develops (e.g. Karin-Hognestad 2010; Vincent-Lancrin et al. 2019; Fernández-Santín and Feliu-Torruella 2020). Similarly, relational factors including the teacher's role in listening to the children and supporting their curiosity and interest helped critical thinking to manifest. The adults' role, listening, recognising, acknowledging and valuing children's thinking was important and provided opportunities to understand as well as support, guide and scaffold children's thinking. This sense of value motivated children to contribute, take responsibility and make decisions with a sense of belonging and ownership, all of which were important for facilitating authentic participation and critical thinking.

Although these findings can be generalised across the cases, each one had specific benefits and constraints. Elements such as the breadth of objective; amount of structure; openness of outcomes; opportunities for children to influence and control; collaborative and hands-on experimental nature; and the need for 'familiar' content were found to be important elements to consider when intending to enhance opportunities for critical thinking. These dimensions were narrowed down from a larger group of elements, some of which were discarded as they were not found significant for critical thinking.

For example, 'opportunities for physical activity' was discarded, as no impact was found on the critical thinking manifesting.

Figure 6, uses a series of 'continuums' to visually compare the degree of each of the identified key elements across the *Mystery Box, Zoo Mystery, Snack Mystery* and *House Mystery* cases.

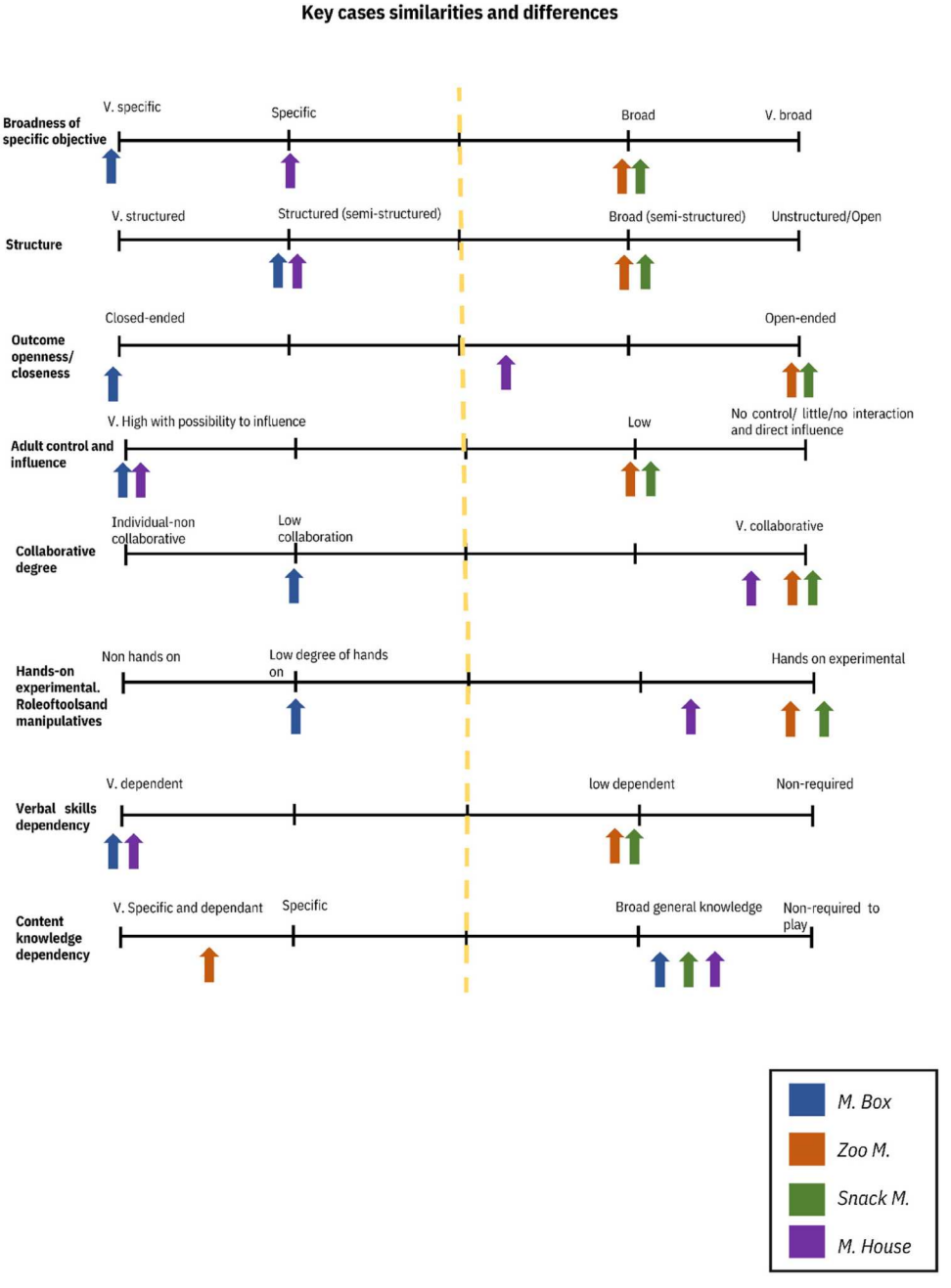

Figure 6. Similarities and differences across the four cases.

Overall, the cases with tendencies towards the right side of the continuum were more productive than those on the left for providing a wider range of opportunities for the use of critical thinking skills and dispositions. Despite this, for stimulating specific critical thinking skills and dispositions and for easier assessment of their occurrence, designing an experience with the elements tending to be in the left part of the line was reasonable, as it seemed more likely that the teaching or research objectives would be met. For example, the *Snack Mystery* was probably the most productive case in fulfilling the more open explorative aims of this study to learn about young children's critical thinking. This experience has provided further evidence to reflect on which critical thinking skills and dispositions were visibly 'used' by children and which could require further stimulation and development. The latter could be benefited by a more structured, controlled, objective-specific designed experience, for example, the *Mystery Box*. Therefore, the use of detective play activities in combination, either to build skills and dispositions or to target gaps in children's knowledge, would be a productive approach for teachers and researchers to consider.

Conclusions

Detective mystery play has shown to be useful to stimulate thinking and trigger its manifestation.

This study offers insights on what design elements have been found useful and the relational-contextual elements to consider when aiming to facilitate critical thinking.

Utilising play as a research method provided children with a meaningful research experience that was motivating, inclusive, flexible and respectful to children's needs and the different ways that children expressed voice. Based on the findings, pedagogically appropriate play-based methods show innovative ways of creating prolific and meaningful spaces for eliciting young children's thinking for the purpose of research and practice.

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