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**How does the geography of a classroom influence
teaching and learning?**

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The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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Contents

Introduction	5
Literature Review	6
Methodology	13
Findings and Discussion	16
Conclusion	28
Reference List	31
Appendices	43

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Introduction

This research explores how the geography of a classroom influences teaching and learning focussing on the impact different seating arrangements can have on pedagogy and behaviour. Research and policy literature on effective classroom seating is sparse, with this topic insufficiently explored in primary educational environments and a limited consensus from both research and professional opinion.

The case study was conducted in an English, two-form, primary school, attended by 423 pupils. The sample included an educationally mixed group of 24 students aged 7-8. During the research, teaching and learning behaviours were observed whilst pupils were seated in three different arrangements: group, row, and horseshoe configurations. The researcher acknowledges an alternate form of seating is dominant in Early Years and Key Stage 1, however, carpet seating will not be explored in this research.

Data obtained indicated three key themes: influence on behaviour, impact on teacher pedagogy, and influence on learning style. This study explores relevant literature, discusses the researcher's methodology, and deliberates upon the implications of these findings and their potential to inform future practice.

Whilst there is existing literature that investigates related themes, studies specifically exploring and comparing the influence of different seating arrangements are limited. This gap is surprising given that seating is a fundamental classroom feature and can be readily rearranged. If certain seating layouts offer distinct advantages, educators need to be aware, prompting this research.

The study aims to identify strengths and challenges posed by each seating layout and provide suggestions for educational providers regarding the optimal geography of a classroom. The intention is to encourage teachers to reflect and implement seating arrangements that most effectively support their teaching style and their students' learning.

Literature Review

Classroom geography's impact on teaching and learning is a significantly under-researched topic, despite its crucial role in shaping educational dynamics. Over the past three decades, scholarly interest in this area has surprisingly decreased. This literature review aims to consolidate and synthesise existing research, organised into four subheadings (learning environments, influence on behaviour, impact on teacher pedagogy and influence on learning), exploring factors influencing classroom layouts and their implications for pedagogy and learning.

Learning Environments

The classroom is an essential space where learning and teaching converge; a unique environment influenced by many interconnected aspects. Both physical and abstract factors affect the dynamics of this environment, influencing teaching and learning (Barri, 2020). The significant impact these factors can have means understanding them is key to creating high-quality environments, where research has concluded improved student motivation, increased academic achievement and higher job satisfaction (OECD, 2009; Rusticus, Pashootan and Mah, 2022). Because of these influencing factors, educators have long disputed the definition of a learning environment due to its holistic nature (García-Tudela, Prendes-Espinosa and Solano-Fernández, 2021; Rusticus, Pashootan and Mah, 2022). For this research, learning environment refers to the space in which learning (the acquisition) and teaching (the transmission of knowledge) occur alongside one another, supported by tangible and theoretical factors (Cremin and Burnett, 2018; Muijs and Reynolds, 2018).

Literature has consistently supported the influence a high-quality environment has on students (Arroyo, Peñabaena-Niebles and Correa, 2023; Prameswari and Budiyanoto, 2017). The lack of consistent guidelines explaining key features of an effective learning environment is therefore surprising, however, this absence of policy has not restricted investigations into this topic (Rusticus, Pashootan and Mah, 2022). As evidenced by Zajda (2021), our minds favour abstract concepts when thinking about

effective learning environments. These are often explored within educational research, including student-teacher relationships and pedagogical approaches (Barri, 2020; Chaudhary and Singh, 2022; Robinson, 2022). However, there is a notable gap when investigating the physical aspects of classrooms, with the limited research typically exploring light, noise, temperature and colour (Barrett et al., 2015a; Barrett et al., 2015b; Cole et al., 2021; Vickery, 2014).

Seating arrangements have been somewhat overlooked in the academic realm, despite their profound impact on the learning environment, (Ali, 2017; Carden, 2022; Gremmen et al., 2016; Marx, Fuhrer and Hartig, 1999). Understanding how the physical layout of a classroom and seating arrangements influence student behaviour, interaction, and ultimately, learning outcomes, is crucial for practitioners, as they are the creators of learning environments (Paniagua and Istance, 2018).

Classroom layout refers to the arrangement of furniture, primarily seating and tables, within the physical learning space (Barri, 2020). Given that students spend around 190 days a year in classrooms, optimising the environment is vital for creating a conducive space for learning and growth (Long, 2023; Starkey et al., 2021). Over the last few decades, classroom seating has undergone significant evolution, reflecting shifts in educational philosophy and teaching practices (Cole et al., 2021; Wheldall and Bradd, 2010). Pre-1960s, classrooms were often characterised by rigid rows of desks facing the front, emphasising teacher-centred instruction and passive student roles; however, as educational practices have shifted towards more student-centred approaches, so have seating arrangements (Carden, 2022; Mujijs and Reynolds, 2018; Starkey et al., 2021). Paton et al. (2001) observed this change, their significant review of 294 classrooms concluded a dramatic shift in seating arrangements from rows to groups as a direct result of changes towards pedagogical practices. A driver for change in the late 1960s was the Plowden Report (1967) which challenged the classrooms' traditional physical characteristics and highlighted the importance of child-centred education and flexible layouts. This prompted a national shift away from traditional rows and towards more student-centred seating layouts (Wheldall and Bradd, 2010).

Research by Gremmen et al., (2016) found an even split between the use of row and grouped seating arrangements in classrooms, with alternative layouts being less

common. Although this study was conducted in the Netherlands several years ago, its findings remain relevant to English primary education due to similarities in teaching approaches.

Recently, the COVID-19 pandemic prompted a mandatory return to rows, adhering to social distancing requirements (DfE, 2020). This abrupt shift forced practitioners to reconsider classroom design, prompting reflection on different table layouts and their impact on teaching and learning (Carden, 2022). The removal of these guidelines prompted some researchers, including Rusticus, Pashootan and Mah (2023), to explore the effect of seating where they stated a lack of research in this area and therefore a reliance on dated conclusions.

Influence on Behaviour

Although sporadic, researchers have been investigating the relationship between classroom seating arrangements and student behaviour for over 80 years, and despite limited recent research, the available evidence shows that classroom layout strongly affects student behaviour (Marx, Fuhrer and Hartig, 1999; Wheldall and Bradd, 2010). Ali (2017) concluded that individuals are affected by their immediate surroundings, showing it is vital not to overlook classroom layout's influence on student behaviour and learning. Wannarka and Ruhl's (2008) research, significant in this field, found that a classroom's physical layout can influence students' behaviour, linking directly to academic success. This highlights the importance of considering physical layout when designing a learning environment.

Due to a national shift towards student-centred teaching, grouped seating is increasing. Gruber, Gelman and Ranganath (2014) found that individuals learn best when curious, and grouped arrangements can promote curiosity through interaction via active learning principles and explorative discussions with peers (Kumar, 2017). This conclusion supports that a grouped seating layout enables students to gain academic and social benefits from collaborative learning, by-products of new pedagogical practices (Deysolong, 2023; Kozanitis and Nenciovici, 2022; Norazman et al., 2019; Stevens-Smith, 2016). This contradicts older research, arguing against higher levels of disruptive behaviour when group seating is used (Hastings and

Wood, 2002; Simmons et al., 2015). Research by Tobia et al. (2020) further concluded that moving from rows to groups negatively affected student success, suggesting that teacher pedagogical style and seating are interdependent factors within an effective learning environment.

Research indicates a general consensus among practitioners, that when seated in rows, students exhibit higher levels of on-task behaviour (Hastings and Wood, 2002; Simmons et al., 2015; Wheldall and Lam, 1987). Ali (2017), on the other hand, observed talkative behaviour among students seated in rows. However, one must recognise that conversation is an inherent part of the learning process and often enhances understanding (Desender, Beurms and Bussche, 2016). Moreover, managing low-level disruptions is easier for teachers when students are seated in rows, allowing for clearer lines of sight to monitor behaviour (Muijs and Reynolds, 2017). Therefore, while talking may occur, the benefits of rows in facilitating an effective learning environment can outweigh potential drawbacks.

The implementation of horseshoe arrangements in educational settings remains relatively under-researched compared to common group and row layouts, due to its use dominantly within higher-education environments (Ali, 2017). Ali (2017) further concluded that students were less disruptive and more engaged with teachers and peers in this arrangement, as supported by recent research (Gutierrez, 2022). Horseshoe layouts have also been linked to increased student attention as a direct result of improved visual access to practitioners and demonstrations (Gutierrez, 2022; Hayashi, Mochizuki and Yamauchi, 2022).

Impact on Teacher Pedagogy

Pedagogy refers to the methods and approaches educators use to facilitate student learning (Friesen and Su, 2022). It is influenced by physical factors, including seating and resources, and personal factors, such as teaching experience and beliefs about teaching and learning (Barri, 2020; Muijs and Reynolds, 2018; Prameswari and Budiyanoto, 2017; Vickery, 2014). Seating choices often reflect the teacher's pedagogical views and preferences, explaining the increase of grouped seating, as student-centred practices are becoming widespread (Carden, 2022; Cole et al.,

2021; Gremmen et al., 2016). This shift is also witnessing an increase in researchers advocating flexible seating arrangements (Ali, 2017; Cole et al., 2021; Gremmen et al., 2016). However, some teaching professionals may find frequently rearranging classroom layouts impractical due to time constraints and logistical challenges (Ofsted, 2019). Whereas, Vickery (2014) argues that regular changes to classroom layout generate additional excitement, increasing student engagement. This supports Paniagua and Istance's (2018) finding, that pedagogy must be combined with appropriate classroom layouts for an effective learning environment.

Teachers' beliefs strongly influence pedagogical decisions (Cremin and Burnett, 2018; Li, 2013). Educators prioritising student-centred learning are likely to employ collaborative seating, while those favouring traditional, didactic approaches typically rely on rows (Marx, Fuhrer and Hartig, 1999). However, research by Gremmen et al. (2016) found no relationship between teacher beliefs and seating arrangements. This may be because practitioners are unaware of seating's impact on teaching and learning, due to its limited presence in teacher training and policies (Rusticus, Pashootan and Mah, 2022).

The synthesis of findings suggests the choice of classroom seating should be influenced by academic tasks and desired behavioural outcomes (Ali, 2017; Wannarka and Ruhl, 2008). When aiming to maximise students' independent on-task behaviour, rows are recommended as they restrict peer interaction and distractions (Hastings and Wood, 2002; Wannarka and Ruhl, 2008). However, for active tasks including brainstorming or exploration, seating layouts that facilitate collaboration, such as groups or horseshoes, are more suitable (Marx, Fuhrer and Hartig, 1999; Wannarka and Ruhl, 2008). Additionally, if teachers rely on direct instruction, clear visibility is crucial to optimise learning, therefore supporting a row or horseshoe layout (Muijs and Reynolds, 2018). This highlights the significant impact seating arrangements have on successful learning, urging teachers to deliberate carefully when choosing classroom layouts (Gremmen et al., 2016).

Teacher position and mobility in the classroom are considered vital for effective teaching, therefore it is essential to recognise that some layouts can restrict teachers' proximity (Ali, 2017). Dated research found that seating in rows led to more questions being directed at front-row students, whilst a horseshoe layout resulted in

an even question distribution (Marx, Fuhrer and Hartig, 1999). Lacroix and Lacroix (2017) supported this, arguing a disadvantage to students seated furthest from the teacher. This identifies the benefit of grouped and horseshoe arrangements, where active learning and feedback are equally frequent, a result of close teacher proximity (Ali, 2017; Wheldall and Bradd, 2010).

Influence on Learning

Investigations have shown how multiple factors within education influence learning (Ansari, Hofkens and Pianta, 2020; Robinson, 2022; Wang et al., 2020). However, whilst less researched, studies have found relationships between classroom design, engagement, and learning behaviours (Ali, 2017; Gremmen et al., 2016; Vickery, 2014). Barri (2020) boldly stated that classroom environments, especially the furniture, play a central role in cognitive progression. Recent research with a broad sample supports this claim, arguing positive correlations between high-quality learning environments and student academic achievement (Fraser, 2023). Wannarka and Ruhl (2008) highlighted the impact seating layouts had on students' academic engagement and development, and this was supported in more recent research by Rogers (2020), emphasising that the physical layout of seating significantly influences student involvement, engagement and holistic development.

Seating arranged in rows has positive impacts on learning behaviours, influencing productivity, willingness and independence (Gremmen et al., 2016; Marx, Fuhrer and Hartig, 1999; Wheldall and Bradd, 2010). However, recent research questions this traditional approach alongside modern pedagogies, arguing its negative impact on student attainment (Tobia et al., 2020). Hastings and Wood (2002) suggest row layouts are not suitable for active, student-centred learning; they should be used to support teacher-directive or lone work. Groups are strategic in facilitating student interaction within a learning environment via proximity to peers and should be used when promoting collaboration (Gremmen et al., 2016; Wheldall and Bradd, 2010). However, Rogers (2020) notes that while groups encourage peer interaction, they also introduce distractions, decreasing on-task behaviour. This aligns with research indicating that small-group layouts can hinder participation, prompting some teachers to opt against their use (Gremmen et al., 2016). Marx, Fuhrer, and Hartig (1999)

highlighted a positive correlation between horseshoe seating and student engagement through teacher questioning. Similarly, Rogers (2020) found increased participation in horseshoe arrangements, resulting from enhanced visibility of teachers and peers.

Studies support the significant role classroom arrangements play in student learning, highlighting the importance for educators to recognise the strengths and limitations of different seating to best benefit student academic success. (Barrett et al., 2015b; Hastings and Wood, 2002).

Literature Review Summary

Classroom seating has long been discussed, but recent research in British primary education is limited (Rogers, 2020; Wheldall and Bradd, 2010). Despite this, findings over the past four decades agree that seating arrangements influence teaching and learning (Hastings and Wood, 2002; Marx, Fuhrer and Hartig, 1999; Wheldall and Bradd, 2010). This demonstrates why this topic is relevant to educational practitioners now and for as long as seating is used in classrooms. This review has referenced the available research which highlights a gap in the current literature. This research aims to provide modern insights into the strengths and weaknesses of group, row and horseshoe layouts within classroom geography to inform practitioners who are, ultimately, the designers of effective learning environments (Paniagua and Istance, 2018).

Methodology

Research Design

This research utilised a case study design that aimed to investigate classroom geography's influence on teaching and learning, providing in-depth explorations within natural classroom contexts and allowing a comprehensive understanding of complex interactions (Thomas, 2021; Yin, 2014). Case studies can lack generalisability due to their singular-setting focus, weakening reliability (Bartlett and Vavrus, 2018). However, they excel in providing rich data on social phenomena, including behaviour (Quintão, Andrade and Almeida, 2020; Zainal, 2007).

This method was suitable as the research explored different seating arrangements' impact on behaviour, requiring detailed examination within a specific classroom context, and the limited research timeframe was also effectively addressed, as case studies gather rich detail within short periods (Denscombe, 2021; Hancock and Algozzine, 2006).

Participants

The research involved a Year 3 class of 24 students (aged 7 and 8) and 12 class teachers, selected using opportunity sampling. Opportunity sampling selects readily available participants and is often used for convenience (Bryman, 2016; Creswell and Creswell, 2018). This sampling method may limit representativeness (Etikan, Musa and Alkassim, 2016), however, all students, including those with pupil premium, special educational needs and disabilities, and English as an additional language, were observed, thus enhancing diversity. Furthermore, Lakens (2022) justifies small sample sizes, if caused by unavoidable resource restrictions.

Observations

Observations served as the primary method of data collection, due to their detailed insights and influence on teacher pedagogy (Papatheodorou, Luff and Gill, 2011). Observations provide rich, real-time perceptions of the dynamic interactions between classroom geography, teaching practices, and student behaviour (Walliman, 2018). The researcher, class teacher and teaching assistant (TA) conducted observations throughout 9 weeks, with each seating arrangement (group, row and horseshoe) being observed for three weeks [Appendix 1, 2, 3]. The researcher conducted weekly observations, while the teacher and TA recorded theirs at each cycle's end. This longitudinal approach provided sustained, comprehensive insights into classroom geography's impact on teaching and learning (Cohen, Manion and Morrison, 2018).

Avoiding the observer's paradox – when individuals change behaviour due to observation, compromising data authenticity – the researcher immersed themselves in a teaching role, reducing their influence and facilitating reliable observations (Cukor-Avila, 2000; Kawulich, 2005; Kumar, 2011). Furthermore, observer bias, a potential limitation, was minimised by ensuring findings were drawn only if recorded by all three observers (Gueyffier and Cucherat, 2019). This triangulation approach through inter-rater reliability enhanced the credibility and validity of results (Flick, 2018; Hammerton and Munafò, 2021; Honorene, 2017).

Informal Data Collection

Alongside observations, student/teacher voice was used, aligning with extensive educational research (Gillett-Swan and Baroutsis, 2023). This included student-written feedback [Appendix 4] and informal conversations with 12 teachers, capturing personal perspectives that observations alone could not (Skerritt, Brown and O'Hara, 2021). These methods provided valuable insights by capturing authentic responses, revealing deeper perceptions and contextual details (Swain and King, 2022).

An issue with informal conversations, however, is obtaining informed consent, as participants may not know their conversations are being used for research, raising ethical concerns (Miller and Bell, 2012). Addressing this, the research was an overt investigation where all participants were aware of the study's aims and that themes

from their informal conversations would be identified and recorded (Swain and King, 2022). Despite limitations, including student and teacher voices provided an additional layer of data, enhancing the depth and validity of research, ensuring a holistic understanding of classroom geography (Shah and Pabel, 2019).

Analysis

After data collection, coding was employed as part of thematic analysis, a methodological approach Braun and Clarke (2022) highlighted as crucial in qualitative data. Thematic analysis involves identifying and grouping qualitative data into themes (Silverman, 2021). Whilst this aids in identifying existing themes, it risks overlooking new ideas, as researchers may focus on preconceived concepts instead of allowing data to generate new topics (Heracleous and Fernandes, 2019). To address this, the researcher regularly revisited the data, ensuring comprehensive analysis and openness to emerging themes.

Ethical Considerations

This research obtained ethical clearance from York St John University. Ethical considerations are imperative in safeguarding participants, particularly children (Pillay, 2014; Ramrathan, Grange and Shawa, 2017). Gatekeeper informed consent was obtained [Appendix 5]. Participants were informed about the study and their right to withdraw at any stage (Kumar, 2019). Names were removed to ensure confidentiality and data storage followed recommended protocols. These ethical considerations, crucial for the vulnerable sample, align with established guidelines (BERA, 2018; Denscombe, 2021).

Methodology Summary

The methodology adopted a systematic and rigorous approach to investigating the influence classroom geography has on teaching and learning, while effectively acknowledging and addressing potential limitations inherent in the research design.

Findings and Discussion

This section presents the study's findings, organised by the themes identified through thematic analysis: influence on behaviour, impact on teacher pedagogy and influence on learning. The results address the research question: 'How does the geography of a classroom influence teaching and learning?'. The effects of group, row and horseshoe arrangements are discussed within each subheading.

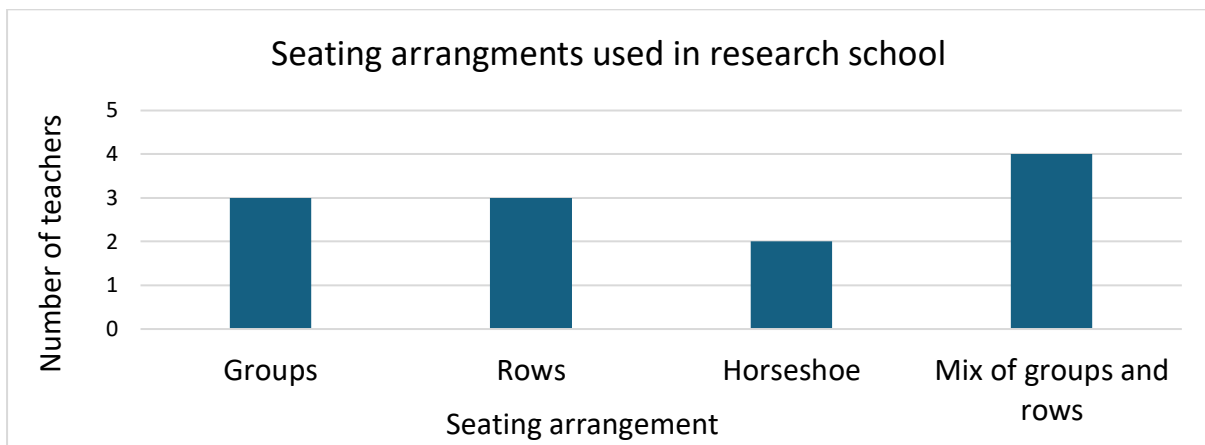


Figure 1

The research school included a mix of seating arrangements. Data revealed that 83% of teachers used grouped, row or group-row combination seating (*Figure 1*). This reflects Gremmen et al.'s (2016) findings and suggests why horseshoe layouts are under-researched in primary schools, because of their limited use. This does, however, challenge findings by Paton et al. (2001) who proposed a decline in the use of row seating.

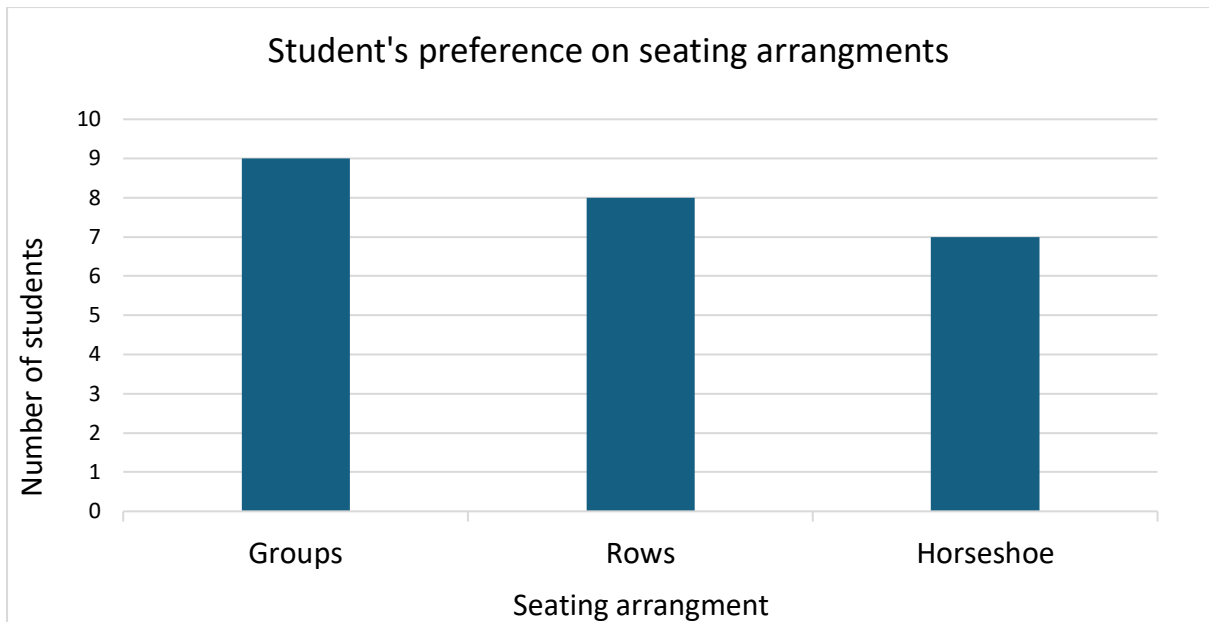


Figure 2

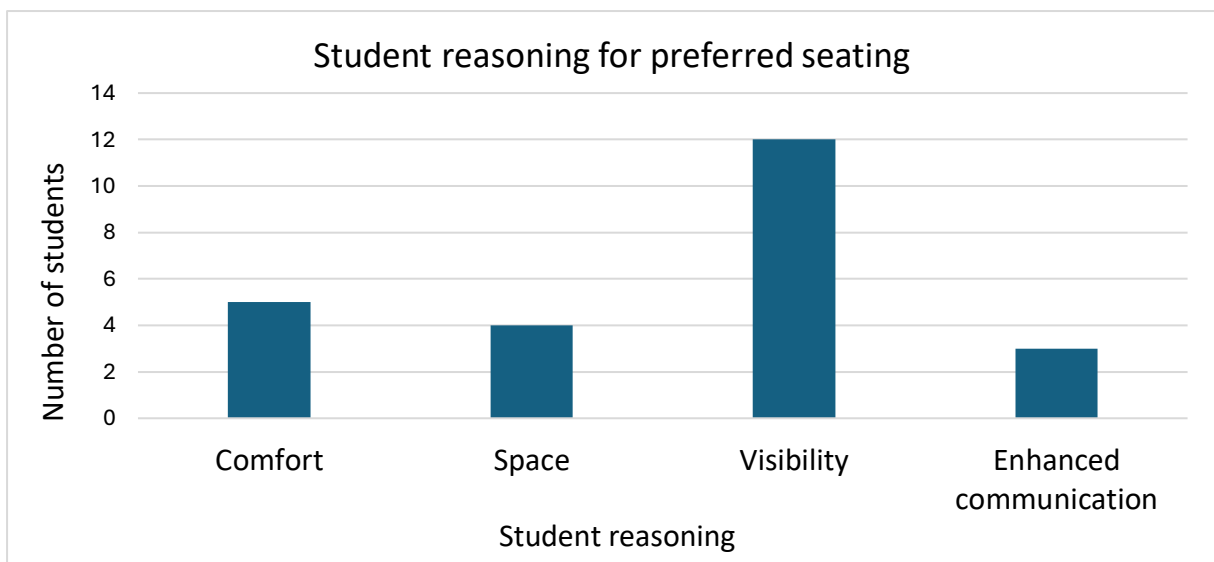


Figure 3

Student feedback revealed no significant preference for seating arrangement (Figure 2). Students' reasons for their preferences were categorised into four themes: comfort, space, visibility, and collaboration. Visibility was the most chosen factor, with over half of students citing it (Figure 3), indicating students prioritise clear visibility. This questions the effectiveness of some seating arrangements and highlights the importance of teachers accommodating student preferences to enhance learning (Muijs and Reynolds, 2018).

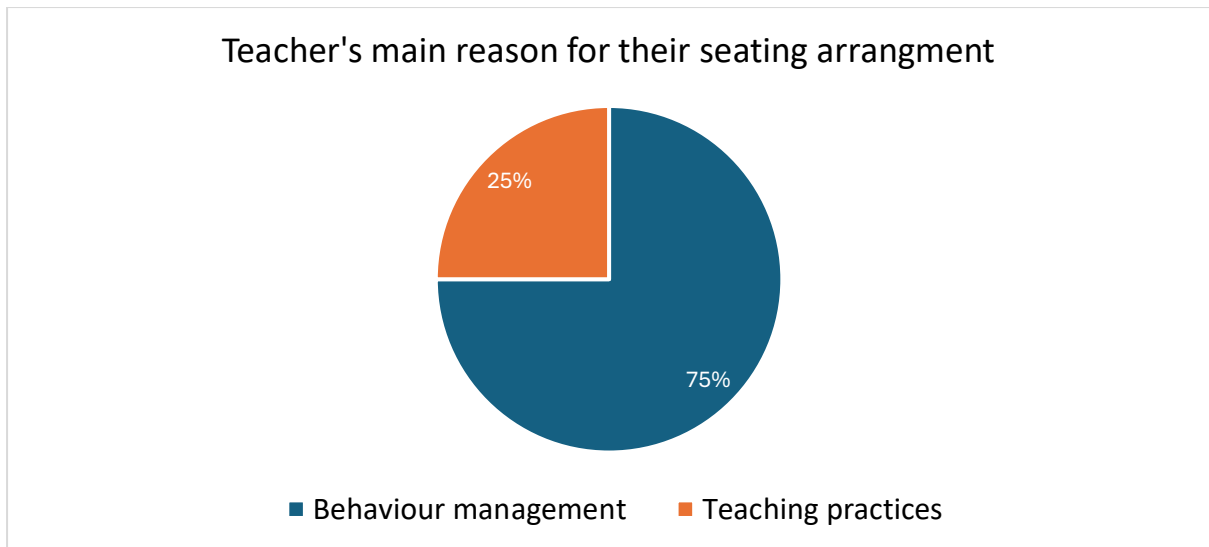


Figure 4

Influence on Behaviour

During discussions, 75% of teachers identified behaviour management as the primary reason for their seating arrangement choice (*Figure 4*). This finding highlights the significant impact classroom geography has on behaviour, aligning with Marx, Fuhrer and Hartig's (1999) research, showing teachers utilise seating for behaviour management.

Groups

In grouped arrangements, many students sat sideways, having to twist to see the teacher and whiteboard, leading to frequent disengagement during teacher-directed instruction. These observations indicate that grouped arrangements are less effective when lessons rely on directed instruction. As noted by Deysolong (2023), grouped seating may promote social behaviour, but inadequately supports independent learning. The nature of direct input requires clear visibility; students who need to turn during lessons experience discomfort and then display off-task behaviour. This data highlights the need for alternate seating to enhance engagement and on-task behaviour during teacher-led instruction.

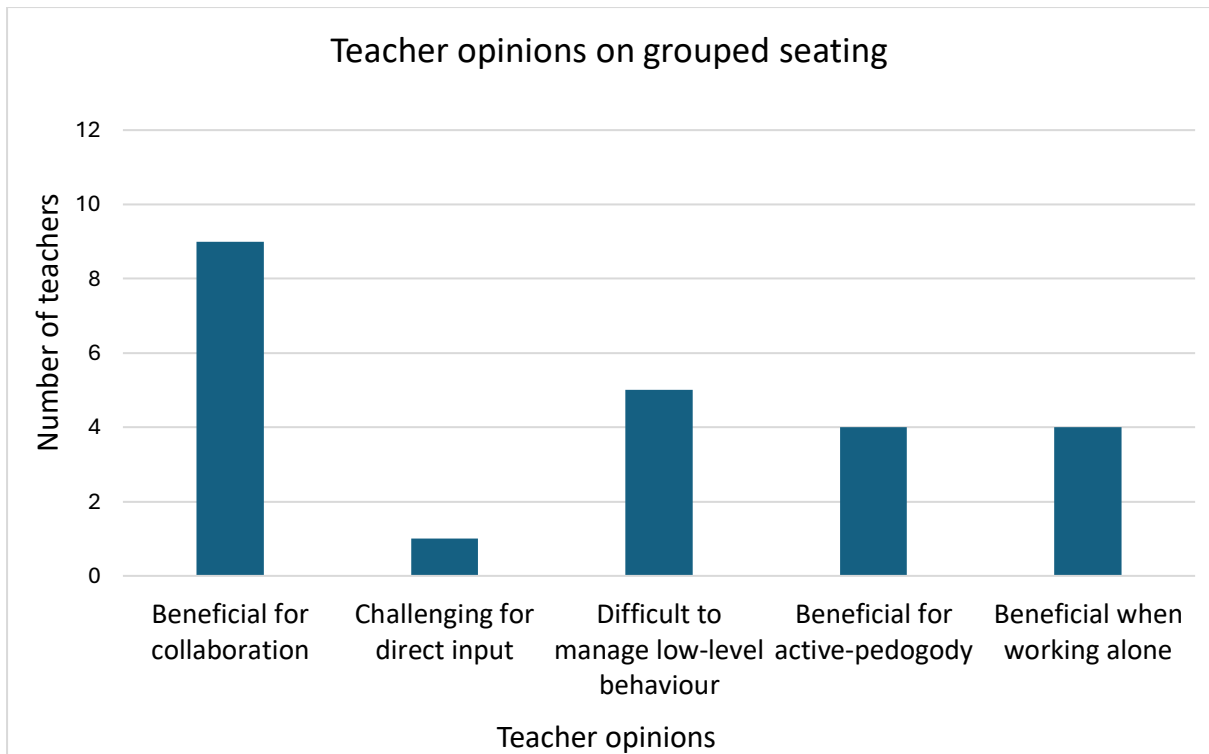


Figure 5

Grouped seating facilitated collaboration, leading to high levels of on-task behaviour during learning discussions, consistent with findings by Kumar (2017), suggesting a positive link between discussion and learning. However, off-topic conversations were common, especially when lessons lacked active principles, causing disruption that was challenging for teachers to manage independently. This finding was supported by 42% of teachers who reported difficulty managing low-level behaviour in grouped seating (Figure 5). Echoing findings from Simmons et al. (2015), this suggests that whilst grouped seating facilitates learning during collaborative activities, it also enables discrete disruptive conversations, which can be unmanageable.

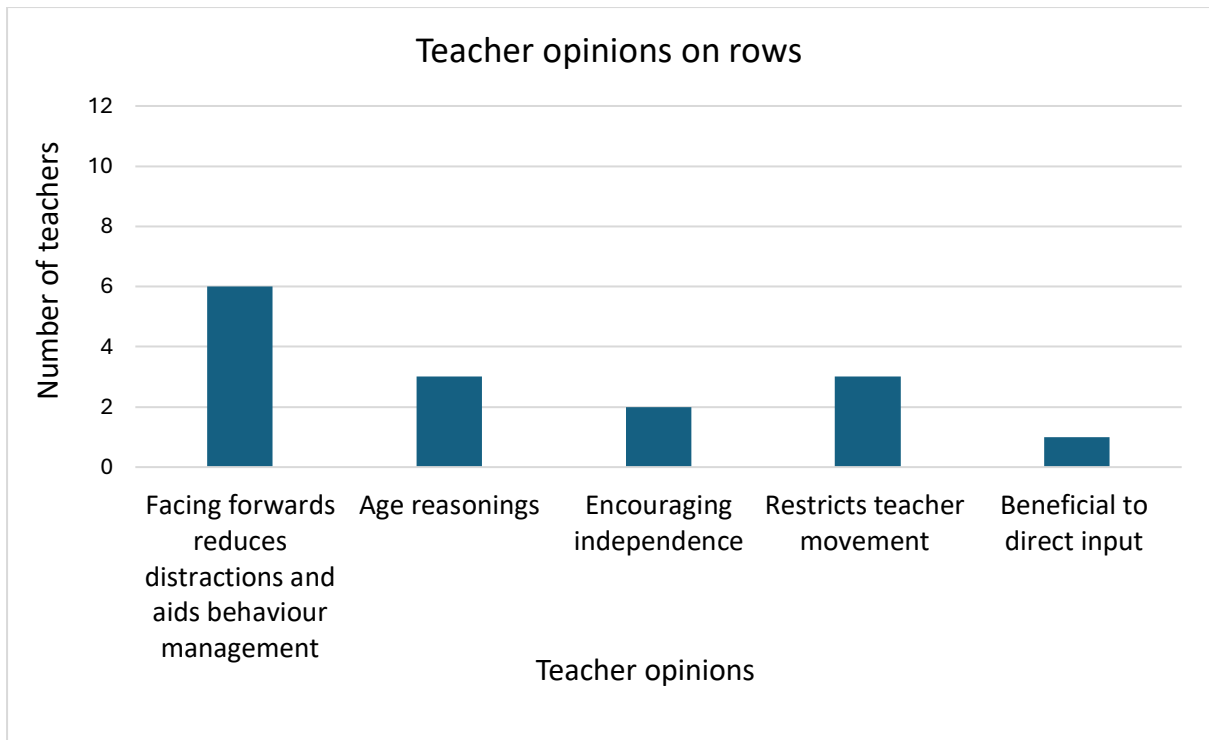


Figure 6

Rows

Row seating demonstrated several advantages for behaviour management. Teachers found it easier to capture the attention of the class and identify unfocused students. This aligns with Muijs and Reynolds' (2017) findings, emphasising the importance of clear sight when managing behaviour. Additionally, 50% of teachers acknowledged the benefits of forward-facing seating for effective behaviour management (Figure 6). These findings highlight the practical advantages of rows in fostering a learning environment where teachers can effectively manage behaviour, consistent with previous research (Hastings and Wood, 2002; Wheldall and Lam, 1987).

Furthermore, observations revealed that forward-facing seating actively guided students' attention forward, enhancing concentration and engagement with teacher-directed content. This focus facilitated higher levels of on-task behaviour, a factor associated with greater academic success (Hastings and Wood, 2002). The removal of seating arrangements where students face each other correlated with a reduction in disruptive behaviour, supporting the notion that seating arrangements influence classroom disruptions (Hastings and Wood, 2002; Simmons et al., 2015).

Additionally, rows reduced the number of talk partners, minimising opportunities for off-topic discussions. This finding challenges Ali (2017), who observed talkative behaviour in rows, as these findings identify the increased difficulty students had communicating.

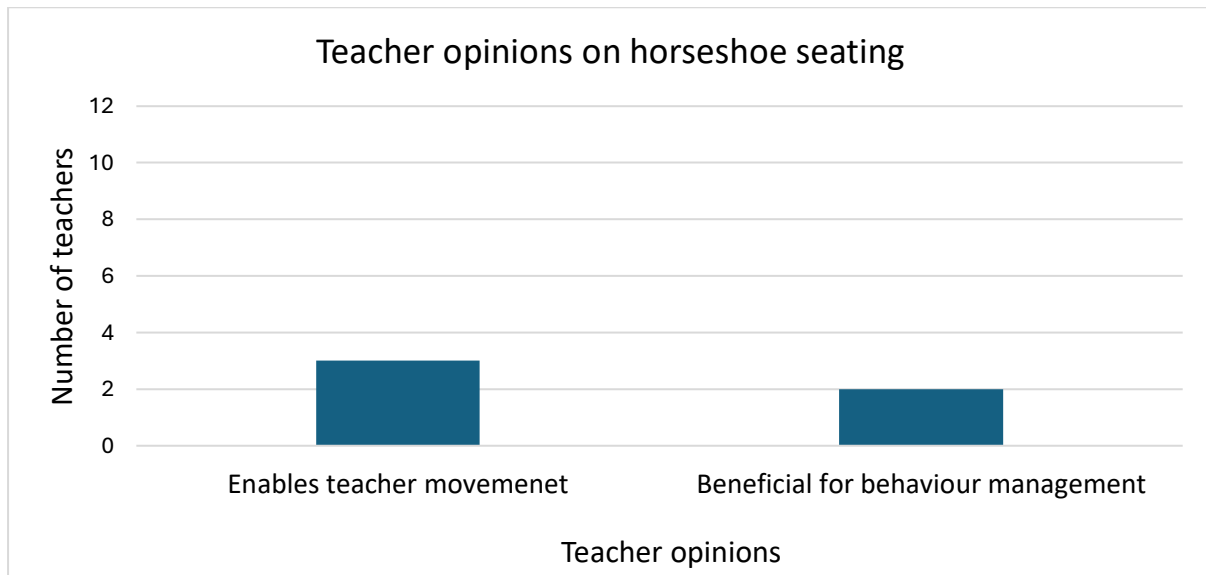


Figure 7

Horseshoe

In the horseshoe layout, where not all students faced forward, behaviour remained generally good. The arrangement allowed all students to be seen by the teacher and provided them with a clear view of the board. This is consistent with findings by Gutierrez (2022), supporting the effectiveness of horseshoe layouts in managing student behaviour and increasing engagement. This arrangement assisted in the management of low-level disruption; a point emphasised by teachers who used horseshoe seating in the school (Figure 7). These findings align with existing literature; suggesting that increased visibility for both teachers and students positively influences student behaviour and behaviour management (Gutierrez, 2022; Hayashi, Mochizuki and Yamauchi, 2022).

Summary of Behaviour

Combining data collected over 9 weeks, the findings demonstrate that seating arrangements impact student behaviour in the classroom, consistent with previous

research (Marx, Fuhrer and Hartig, 1999; Wannarka and Ruhl, 2008). Grouped arrangements had the highest levels of disengagement during teacher-directed instruction, with seat direction identified as a primary factor. Supporting conclusions by Gutierrez (2022) and Hayashi, Mochizuki and Yamauchi (2022), that visual access increases attention. Forward-facing seating arrangements, particularly rows, were found to be the most advantageous for effective behaviour management, supporting teachers through enhanced visibility. These conclusions align with previous research by scholars including Muijs and Reynolds (2017) and Simmons et al. (2015), enhancing the reliability and validity of the results.

Impact on teacher pedagogy

Groups

Grouped seating facilitated collaboration, aligning well with teaching styles that emphasise group learning and teamwork. 75% of teachers spoke highly of grouped seating and its effectiveness in promoting collaboration (*Figure 5*). This suggests that since student-centred pedagogies are becoming increasingly dominant in primary education settings, arrangements such as groups should be utilised to best support the teachers' practice. This explains why grouped seating has become more popular in the last decade as recent research also concludes a relationship between pedagogical preferences and classroom geography (Carden, 2022; Cole et al., 2021).

Observations found grouped layouts particularly beneficial for teachers working without TA support. One-third of teacher conversations identified this benefit (*Figure 5*). Grouped seating promotes collaborative learning, beneficial when there is limited teaching staff as the students act as facilitators for one another. Wannarka and Ruhl (2008) identified this, showing that interactive activities are most effective in group layouts.

Group arrangements also enabled unobstructed movement around the classroom. This allowed unrestricted teaching from anywhere in the room; a vital element of an effective learning environment (Ali, 2017). This increased teacher proximity and enhanced student activeness. Producing similar results to Wheldall and Bradd

(2010), teacher movement increases engagement levels, promoting active learning and greater understanding. Furthermore, teachers and TAs could access and assist individual students without causing class disturbance, facilitating personalised interventions and feedback to boost student attainment (Ali, 2017).

Rows

When seated in rows, teachers had to deliver instruction from the front. The layout made teacher movement challenging and disruptive because of its maze-like arrangement. This reduced teacher proximity, as only student work from the first row could be observed easily, posing disadvantages to students seated further back (Lacroix and Lacroix, 2017). Furthermore, manoeuvring between desks led to frequent disturbances and interruptions in the learning environment. 25% of teachers noted that rows restrict their movement around the classroom, highlighting practical teaching challenges (*Figure 6*). As Paniagua and Istance (2018) stated, pedagogy and classroom geography must complement each other to create an effective learning environment. If rows restrict crucial teacher movement, causing disruptions, then alternative seating should be explored.

Whilst forward-facing seating created high engagement during teacher-directed instruction, supporting Wannarka and Ruhl (2008), the arrangement limited the opportunity for dynamic teaching approaches. Row layouts posed challenges for teachers prioritising child-centred, explorative learning as it hindered the interactive engagement integral to these practices. Concurrent with Gremmen et al.'s (2016) findings, seating has significant impacts on teaching delivery, and therefore educators need to utilise the best layout for their teaching style.

Horseshoe

In horseshoe seating, front-of-class teaching was dominant, as teachers had unobstructed visibility of all students. Yet, when not positioned at the front, one-third of students typically had their back to the teacher. Muijs and Reynolds (2018) concluded that visibility impacted engagement, and this was evident in this study. When in full view of students, engagement levels were higher, mirroring findings from Rogers (2020), in which increased participation correlated with teacher visibility.

Horseshoe arrangements significantly benefitted teachers and TAs through its open layout, creating clear walk paths that facilitated quick, accessible movement allowing for dynamic teaching approaches including live marking. Previous studies have also concluded this benefit, identifying horseshoe's ability to facilitate dynamic teaching practises, enabling teacher proximity to the whole class (Ali, 2017; Wheldall and Bradd, 2010). This was acknowledged by all teachers who utilised horseshoe arrangements in the study, further strengthening their advantage of teacher flexibility (*Figure 7*).

Summary of Pedagogy

This research highlights how classroom geography impacts teaching effectiveness. Grouped seating benefits collaborative tasks and teacher movement but hinders engagement during teacher-directed input. While rows support directed instruction but challenge interactivity and teacher proximity. These findings reflect previous studies, identifying the benefits of groups for student-centred pedagogies, and rows for didactic approaches (Carden, 2022; Marx, Fuhrer and Hartig, 1999; Muijs and Reynolds, 2018). In contrast, the versatile horseshoe arrangement accommodates both directive and active teaching styles, promoting visibility and interaction, making it suitable for practitioners blending various pedagogical styles (Marx, Fuhrer and Hartig, 1999; Wannarka and Ruhl, 2008).

Whilst a national shift in teaching pedagogy is evident (Cole et al., 2021; Wheldall and Bradd, 2010), this research highlights the importance of aligning seating arrangements with pedagogical preferences, in line with Ali (2017) and Wannarka and Ruhl (2008). Despite Gremmen et al.'s (2016) research suggesting no correlation between pedagogy and seating, this study emphasises their interdependence in creating effective learning environments. The synthesis of findings supports that seating arrangements should align with pedagogical approaches, advocating for the horseshoe layout as optimal for blending various teaching styles. This supports existing literature, stressing the importance of a relationship between seating and teaching approaches (Paniagua and Istance, 2018).

Influence on Learning

Groups

Grouped seating promoted student discussions and teamwork, an observation supported by 75% of teachers (*Figure 5*). This finding supports the view that group seating contributes positively to students' holistic development, a priority in modern pedagogical approaches, and is beneficial to increasing student success. This finding reinforces previous literature, supporting the incorporation of grouped seating to foster teaching approaches centred around holistic growth (Deysolong, 2023; Kozanitis and Nenciovici, 2022; Norazman et al., 2019; Stevens-Smith, 2016).

This arrangement enabled student sharing of resources and fostered a supportive learning environment where students assisted one another. Having access to three classmates benefitted those who needed constant support, as peers would provide immediate help and encouragement. This is particularly beneficial when there is no/limited TA support. These findings highlight the positive outcomes facilitated by grouped layouts. This aligns with previous research which concluded that group seating promotes collaboration and peer support (Gremmen et al., 2016; Wheldall and Bradd, 2010). This consistency across studies validates these findings and emphasises the valued impact groups have on fostering student learning.

Observations did find that students had an increased tendency to become disengaged with teacher input whilst in group arrangements. However, the opposite was observed during practical activities, where group layouts facilitated high-quality learning behaviours, promoted learning-talk, and encouraged deeper explorations into new content. This challenged the findings of Gremmen et al. (2016), who stated that grouped layouts can hinder participation. Interestingly, this was not observed in this study as all sample students were particularly confident. Teachers, however, should consider individual characteristics; particularly introverted students who might not fully engage, ensuring seating supports and promotes learning for all.

Rows

Seating in rows was found to have a beneficial effect on student learning behaviours. The forward-facing layout encouraged focus, increasing the effectiveness of teacher-directed instruction. Consistent with previous research, findings show that rows positively impacted learning through improved concentration and reduced distractions (Gremmen et al., 2016; Marx, Fuhrer and Hartig, 1999).

However, most lessons were student-centred and often required elements of collaboration or resource sharing. Rows presented significant challenges for this style of learning, echoing Tobia et al. (2020). Further supporting findings by earlier research, that this seating arrangement is beneficial for independent work but may not be suitable for modern practices centred around active and collaborative exploration (Hastings and Wood, 2002). 25% of teachers mentioned age when discussing rows, reaching a consensus that rows are only suitable for students in upper Key Stage 2 (*Figure 6*). This aligns with beliefs that rows foster independence and autonomy in learning, best suited to older students (Bicard et al., 2012; Wannarka and Ruhl, 2008).

With fewer classmates in proximity, opportunities for discussions and peer support are reduced. This was disadvantageous to students who thrived in and gained greater understanding from collaborative learning. Additionally, students who needed frequent support sometimes struggled with only one partner, whilst the role of facilitator can be challenging for just one student, especially if they are not very willing to assist. This observation is supported by research highlighting the importance of facilitating student interaction within the learning environment, a factor that is not possible in rows due to its structured nature (Gremmen et al., 2016; Wheldall and Bradd, 2010). This limitation was particularly challenging when there was no TA support, ultimately affecting the class's learning climate and hindering the academic development of some students.

Horseshoe

Horseshoe seating arrangements cultivated a greater sense of collaboration among students. Observers noted that this layout reduced the expectation to always face forward, enabling increased student communication. This finding highlights the

potential learning benefits of an arrangement that can be considered semi-structured. Reflecting the work of Gutierrez (2022), horseshoe layouts encourage interaction and collaboration whilst maintaining clear visibility.

Whilst groupwork remained somewhat challenging, the horseshoe arrangement allowed easy movement and group formation, increasing students' chances to collaborate. But this had repercussions as the increased movement caused distractions, negatively affecting on-task behaviour. This layout, however, was better suited for modern teaching practices, enabling students to learn actively during lessons. This finding is consistent with previous research, where correlations between horseshoe seating and student engagement were concluded (Marx, Fuhrer, and Hartig, 1999).

Horseshoe seating enabled each student a clear view of the teacher and whiteboard, resulting in high engagement and on-task learning behaviours. The importance of visibility aligns with the findings from student feedback (*Figure 3*). This emphasises the effect unobstructed views have on student learning, reflecting the conclusions from Rogers (2020), showing that enhanced visibility directly increases student participation and successful learning.

Summary of Learning

Good learning behaviours were observed across all three seating layouts, which could be credited to the well-behaved sample. Whilst rows were beneficial for teacher-directed learning, they posed the greatest hindrance to employing collaborative activities, making learning challenging, especially for individuals who rely on collaboration or motivation, as such interactions were limited. The horseshoe layout enabled better communication compared to rows, but active learning remained a challenge. Therefore, in line with changing pedagogical approaches, grouped seating was observed to be the most effective in facilitating learning discussions and promoting a supportive learning environment. These findings support recent literature, demonstrating the impact classroom geography has on learning behaviours (Rogers, 2020; Wannarka and Ruhl, 2008).

Conclusion

This study found that group seating layouts are highly effective for fostering collaboration and promoting a supportive learning environment. The group arrangement enables sharing and teamwork, beneficial in classrooms with limited TA support. While group layouts can lead to disengagement during teacher-directed instruction due to restricted visibility, this arrangement aligns well with modern, student-centred pedagogical approaches. This research observed that student learning was more effective for the sample when seated in groups, encouraging practitioners who use active learning and encourage collaboration to use group seating arrangements.

The observations from this study found that row layouts can hinder student interaction and collaboration, key elements of student-centred pedagogies. Furthermore, this arrangement makes teacher mobility challenging, reducing teacher proximity to students seated towards the back of the classroom. However, data also showed that rows offered clear advantages for behaviour management and maintaining student focus during teacher-directed input. In this arrangement, the sample demonstrated high levels of on-task behaviour and increased engagement. Therefore, teachers would be well advised to use rows when delivering content-heavy lessons and some may find it particularly beneficial if they are struggling with managing disruptive behaviour.

This research revealed that within the sample class observed, student-centred lessons were regularly supported by didactic methods. It was found that horseshoe arrangements support a versatile learning environment, able to accommodate both collaborative activities and direct instruction. Additionally, the open layout facilitated clear views and enhanced teacher proximity. Therefore, this study found that employing a horseshoe seating layout offers an effective arrangement for teachers who use a blend of student-centred and directive teaching methods.

This study explored the relationship between classroom geography, teaching effectiveness and learning outcomes, with a specific focus on seating arrangements and their impacts on behaviour, pedagogy and learning. The findings support the

crucial role of seating layouts within learning environments, identifying the advantages and limitations of group, row and horseshoe arrangements. By understanding the implications of different seating formations, educators can make informed decisions, choosing the layout most effective for their specific learning environment and objectives. Overall, the study concludes the importance of aligning seating arrangements with pedagogical styles and desired student behaviours, demonstrating classroom geography's influential impact on teaching and learning.

Limitations and Strengths

The findings were drawn from observations based on a single class, limiting generalisability. However, it must be noted that the limited sample directly results from unavoidable resource restrictions and is therefore justifiable (Lakens, 2022). To increase the study's generalisability, the research employed rigorous methodological approaches, including thematic analysis, triangulation, and a longitudinal approach. These strategies allowed a comprehensive understanding of the impact classroom geography has, enhancing the credibility and validity of findings. Moreover, the conclusions made are consistent with previous research, further strengthening the study's reliability and relevance.

Implications for Theory and Practice

Regardless of the small sample observed, this study addresses a gap in current literature by directly examining the impacts different seating arrangements have on teaching and learning, offering a contemporary evaluation that enriches existing research. This study highlights the relationship between classroom geography and educational practices, providing valuable insights for teaching professionals. Educators can use these findings to make informed decisions about classroom design and seating options, thereby optimising student engagement, improving behaviour management, and enhancing learning outcomes.

Future Research

Whilst this research provides insights into achieving optimal classroom arrangements, future research could explore the long-term effects of different seating layouts across larger sample groups, evaluating the similarities and differences compared to this study. Additionally, future studies could investigate the influence classroom geography has on academic achievement, social-emotional development and overall classroom climate. By continuing to examine the dynamic relationship between classroom layouts and educational factors, researchers can offer high-value recommendations to support educators in creating suitable and effective learning environments.

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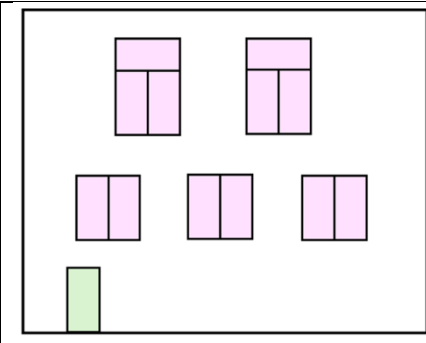
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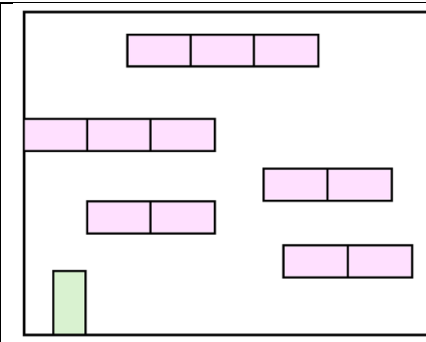
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Appendices


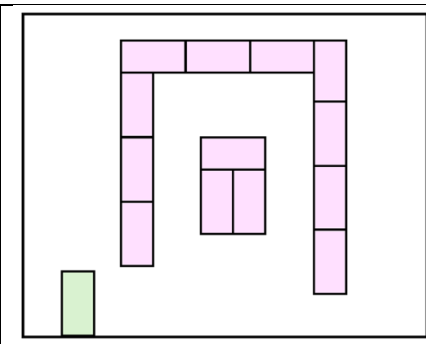
Appendix 1:

Table and seating arrangement = Groups	
	
Image of classroom layout	Birdseye view diagram




Appendix 2:

Table and seating arrangement = Rows	
	
Image of classroom layout	Birdseye view diagram

Appendix 3:

Table and seating arrangement = Horseshoe	
	
Image of classroom layout	Birdseye view diagram

Appendix 4:

Student feedback on their preferred seating arrangement	
<p>I prefer _____</p> <p>because _____</p> <p>_____</p> <p>_____</p> <p>_____.</p>	<p>Which did you prefer?</p> <p>_____</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Groups</p>  </div> <div style="text-align: center;"> <p>Rows</p>  </div> <div style="text-align: center;"> <p>Horseshoe</p>  </div> </div>
Student feedback form	Scaffolding provided for all students

Appendix 5:

<p>Dear Headteacher</p> <p>Re: BA (Hons) Primary Education Research Project</p> <p>Many thanks for offering a placement to one of our student teachers this term.</p> <p>As part of the Undergraduate BA (Hons) Primary Education with QTS Programme our student teachers are required to undertake a research project which forms the assessment for their 3rd year research module. This constitutes a small-scale investigation that supports student teachers in developing an in-depth knowledge and understanding of their chosen area. The student teachers have planned their project prior to placement and need to consult in school to make sure that it is appropriate for their actual setting. They have an ethical clearance from YSJU which requires the permission of the "gatekeeper"; in this case you as placement school Headteacher (or nominated alternate). The ethical clearance also addresses issues related to researching with children. The project will not be focusing on individual children, but sample groups, whole classes etc. so we would be grateful if you could consider whether you feel that additional parental permission is required or whether your permission as Headteacher is sufficient.</p> <p>If you wish to have parental permission, the university sees that "passive consent" (the student provides information for parents and they respond only if they wish their child NOT to be involved) as appropriate where gatekeeper permission has already been given</p> <p>This important piece of work will take place whilst the student is on placement at your school and student teachers are required to give you a copy of their ethical consent form. This will give you details of their research project to ensure you are fully aware of what they want to research whilst they are on placement.</p> <p>We were mindful, during the planning stages of this assessment, of the support that you give to YSJ student teachers during their time on placement and did not want to over burden you or your staff with extra demands. As a result, tutors from the University, will advise, support and mark the project once it is completed. Hence this will not be extra work for the mentors.</p> <p>We would be grateful if you could sign the form once the student has completed it, to show that you give your permission for the conduct of this small-scale research project.</p> <p>If you have any questions, then please feel free to contact me.</p> <p>Many thanks for your continued support with our student teachers</p> <p>Yours sincerely,</p>	<p>Manjinder Kaur Jagdev and Ru Unsworth Research tutors York St John University Lord Mayor's Walk York YO31 7EX m.jagdev@yorks.ac.uk r.unsworth@yorks.ac.uk</p> <p>QTS6004M Research Project Permission form</p> <p>Student name: _____ SE3 School: _____</p> <p>Headteacher permissions: I have read this student's ethical clearance form and give my permission for the conduct of this small-scale research project. Additional parental passive consent is not required/has been obtained (please delete as applicable)</p> <p>Headteacher's name: _____</p> <p>Headteacher's signature: _____</p> <p>Date: _____</p>
Headteacher informed consent	