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A case for space: Exploring the role of collaborative learning spaces in supporting first-year university students' sense of belonging

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ABSTRACT

First-year students often face considerable challenges adjusting to university life and integrating into the academic community. Facilitating peer interaction and collaborative learning can ease this transition by enhancing academic outcomes, and fostering a sense of belonging and connectedness with peers and the broader university community. The COVID-19 pandemic highlighted the importance of these connections, as campus restrictions and social distancing severely impacted belonging and academic motivation.

Physical learning spaces, and specifically their lay-out, can play an important role in enabling interactions among students and between students and educators. In response to the limitations of the traditional classroom configuration, educational developers of the Faculty of Science at KU Leuven (Belgium) launched a bottom-up initiative to convert several flat-floor seminar rooms on the science campus to official collaborative learning spaces with group islands, without additional costs or loss of seats.

In this paper, we briefly outline the rationale for the initiative, reflect on the implementation process, and consider its implications regarding formal and informal interactions and sense of belonging. Preliminary survey results suggest that the redesigned spaces encouraged peer and teacher interactions, which support students' sense of belonging. Given the role that learning space design can play in fostering interaction and belonging in first year-students, this initiative offers reflections for universities to consider (simple) spatial interventions and the physical learning environment as part of a broader education policy aimed at supporting student transition.

Keywords: first-year university students, sense of belonging, peer interaction, collaborative learning spaces, learner-centred education

Introduction

Transitioning to university is a significant life event that challenges students to adapt to a novel learning environment, form new relationships with peers and educators, and develop skills in autonomous learning, self-efficacy, and self-regulation (Brooman & Darwent, 2014; Freeman et al., 2007; Won et al., 2018). A critical factor in supporting this transition is the cultivation of a sense of belonging within the university community. Prior research shows that students who *feel they belong* in the university community and environment, are more likely to persist in their studies (Hausmann et al., 2007; Hoffman et al. 2002; Tinto, 2017; Thomas, 2015), report higher levels of well-being, and engage more actively in academic and social life (Bowman et al., 2019; Meehan & Howells, 2019; Pedler et al., 2021; Wilson et al., 2015).

The COVID-19 pandemic highlighted this further. Social distancing measures and restrictions on campus life underscored the importance of physical space and formal and informal interactions for student wellbeing,

motivation, and belonging (Dingle et al., 2022). Physical learning environments can actively shape these experiences by fostering interactions with fellow students and educational staff. Peer interaction, for example through active and collaborative learning, has been shown to ease the transition of first-year students into university, as it promotes the formation of social networks and strengthens sense of belonging (Crawford et al., 2024; Falkner & Munro, 2009), while also enhancing achievement, motivation, and persistence (e.g. Brouwer et al., 2019; Deslauriers et al., 2019; Freeman et al., 2014; Loes et al., 2017 Loes, 2022; Meeuwisse et al., 2010). Meeuwisse et al. (2010) captured some of these relationships in a theoretical model. As visualised in Figure 1, the model indicates the relationship between active and collaborative learning environments, peer-to-peer and peer-educator interactions, sense of belonging in the educational programme, and study success.

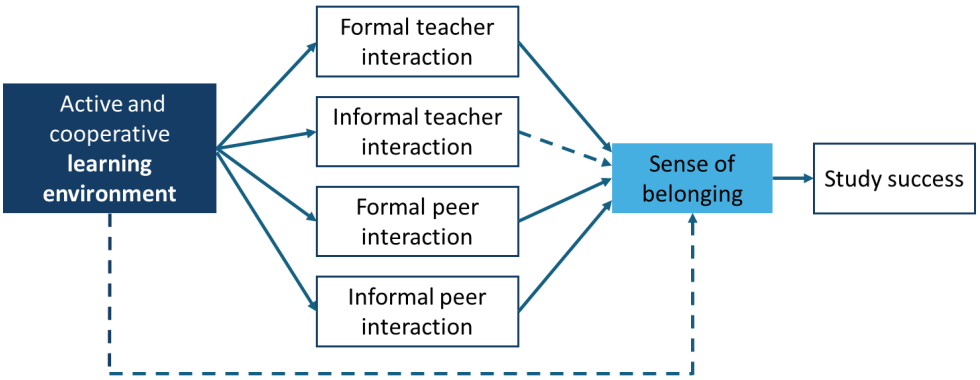

Figure 1 Accepted theoretical model by Meeuwisse et al. (2010) for the total group of students surveyed. Full arrows show significant relationships and dashed arrows show non-significant relationships.

While many universities have invested in high-tech active learning classrooms to support interaction-rich learning (Finkelstein et al., 2016) (Fig. 2, left), less attention has been paid to simple, low-cost spatial interventions that can transform existing spaces. Such spaces may offer a scalable, achievable and sustainable way to support formal and informal social interactions and a sense of belonging during the critical first year of study. This paper introduces a bottom-up initiative at KU Leuven's Faculty of Science, and shares preliminary insights into how such spatial interventions could foster social interaction and belonging, using the theoretical model by Meeuwisse et al. (2010) as a basis.

Bottom-up initiative: Redesigning traditional seminar rooms into low-budget collaborative learning spaces

In 2022, a group of educational developers from KU Leuven's Faculty of Science launched a bottom-up initiative to reconfigure two traditional flat-floor classrooms, with seating in rows, into officially registered collaborative learning spaces. This transformation involved rearranging tables and chairs into group islands (Fig. 2, right), without reducing seating capacity, while maintaining clear sightlines to the front projection or blackboard and ensuring accessibility. Teaching staff were informed of the changes and supported by educational developers in integrating more student interaction in their classes. Where necessary, assistance was provided to relocate to alternative rooms.

The response from educators, particularly teaching assistants, was largely positive, leading to the conversion of ten additional classrooms in subsequent years. These spaces are now regularly used for tutorials and practical sessions across several science programmes. Despite this progress, demand for more active learning spaces, especially those with larger capacities, continues to grow. This trend underscores the need for scalable strategies to expand collaborative learning spaces across the science campus.

Figure 2 Left: Example of a high-tech collaborative learning space on the science campus of KU Leuven. Right: A low-budget reconversion of a typical seminar-style classroom on the science campus of KU Leuven. Existing furniture was rearranged into group islands, while maintaining seating capacity.

Pilot study: Exploring the impact of collaborative learning spaces on first year-students' social interactions and sense of belonging

To investigate whether our 'simple' collaborative learning spaces influence students' social interactions and sense of belonging during the first year of university, 265 first-year students from seven Bachelor degree programmes of the Faculty of Science completed an online questionnaire, largely based on the theoretical model (Fig. 1) and survey developed by Meeuwisse et al. (2010). Closed items measured six constructs: (1) frequency and nature of space usage, (2) formal peer interaction, (3) informal peer interaction, (4) formal teacher interaction, (5) informal teacher interaction, and (6) sense of belonging. Open-ended questions provided qualitative insights into students' motivations and informal use of the spaces. The sample was diverse in terms of gender and study programme. Data collection took place in November 2024, after students had attended approximately half a semester of classes. As this study is a work in progress, this paper shares preliminary qualitative insights; quantitative analyses will follow in a subsequent paper.

The study received ethical approval from KU Leuven's ethics committee (reference number G-2024-8113-R2(MIN)). Informed consent was obtained digitally prior to participation.

Preliminary findings

Preliminary insights from the qualitative responses of the survey suggest that the spatial design of the collaborative learning spaces supports social interactions of first-year science students.

Students reported that the group-based seating made it easier to interact with peers, even in sessions not explicitly designed for group work, and facilitated the development of friendships:

> "It's easier to consult with fellow students."
>
> "You can easily ask questions to fellow students, for example when the teaching assistant is busy helping other students."
>
> "Even though collaboration is not explicitly incorporated in the classes, it's nice that you can more easily share insights with fellow students."
>
> "I like the group setup because I can more easily build friendships with others."
>
> "It helps me get to know my fellow students."

These comments reinforce that a classroom set-up with group islands can reduce social barriers and promote peer interaction.

In addition, several educators noted anecdotally that the set-up made it easier to reach students and engage with small groups. This observation aligns with those of Brooks (2012), who found that instructors consulted more frequently with individual students and small groups in active learning classrooms compared to traditional learning spaces.

When asked about reasons for using collaborative classrooms outside formal teaching hours, students highlighted collaboration needs (group assignments), social and study interactions, as well as practical considerations such as availability of study spaces on campus and commuting:

> "Discussing and working together on group assignments."
>
> "Social contact, getting to know new people, understanding the learning material"
>
> "Studying together with others in a social environment instead of alone."

However, some students were unaware that they could use the spaces informally:

> "I didn't know we were allowed to use the classrooms outside scheduled sessions. I assumed they were only for classes."

This suggests that clearer communication and signage could enhance the impact of these spaces by encouraging informal study and socialisation.

Insights, reflection, and future work

The qualitative analysis indicates that first-year students appreciated the opportunities for interaction and collaboration provided by the redesigned spaces, both during and outside of class time. These spaces were particularly valued for building social connections and accessing peer support.

The findings underscore the potential impact of learning space design on first-year student experience (Swart & MacLeod, 2021). While large-scale renovations or new buildings can be costly and time-consuming, this bottom-up initiative suggests that simple, low-cost interventions in existing spaces can yield meaningful benefits. This aligns with Finkelstein and Winer's (2020) recommendation to consider how small-scale spatial changes can support active learning across all classrooms and not just in purpose-built facilities.

However, scaling such initiatives requires addressing practical challenges. Although collaborative spaces can facilitate peer and teacher interactions, and serve as subtle 'nudges' toward more student-centered teaching pedagogies (Brooks, 2011; Brooks, 2012; Finkelstein & Winer, 2020; Aga, 2023), teacher buy-in remains a limiting factor. Not all educators are ready or eager to adapt their teaching practices to collaborative layouts and some prefer traditional seminar-style venues, even though collaborative spaces can accommodate mixed approaches combining interactivity and mini-lectures. Reconfiguring a learning space into a group set-up alone enables active learning but is not always sufficient to prompt educators to critically reflect on their teaching practices (e.g. Beery et al., 2013). Institutional policy support initiatives are therefore needed to encourage a transition to learner-centred approaches. Additionally, these rooms are often used for exams, requiring lay-out changes, that are best managed by campus services staff. Institutional strategies, scheduling policies, and professional development will be important to overcome these barriers.

Finally, clear communication is needed to promote informal use of learning spaces by students, as access to collaborative environments benefits students by facilitating group work, social interaction, and study between classes. To partially address this, QR codes have been placed near the entrance of the learning spaces, linking to a timetable that shows the room's availability, and includes a message encouraging students to check when a space is free for study.

Considering the role that learning space design can play in shaping first-year student experience, and the quick wins achievable by reconverting existing spaces, institutions should commit to integrating space design into their student success strategies.

Biographies

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Lotte Paesbrugghe is a master's student in Clinical Psychology (children and young adults) at KU Leuven (Belgium). For her thesis, she conducted a quantitative study on how collaborative learning spaces influence first-year students' sense of belonging, under supervision of Prof. Annelies Raes.

Annelies Raes (PhD) is Assistant Professor in Educational Technology at KU Leuven (Belgium). Her research focuses on instructional design, computer-supported collaborative learning, and synchronous hybrid education, using a design-based research methodology. E-mail: annelies.raes@kuleuven.be

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