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Intended versus implemented workspace: a systematic literature review of the implementation of activity-based working in higher education

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Abstract

Purpose – The purpose of this study is to apply spatial theory to a review of the literature on activity-based working in higher education. Globally, the office concept of activity-based working (ABW) is increasingly implemented in higher education, and scholars contributed to developing empirical explanations of the effects of implementing ABW in higher education. However, the focus on theory building is limited, decreasing the predictability and the understanding of implementing ABW.

Design/methodology/approach – The authors developed a theoretical framework by categorizing the empirical findings of earlier accounts by integrating them with Lefebvre's spatial theory. They conducted a systematic literature review of 21 studies published between 2008 and 2022 that reported on the phenomenon of ABW among higher-education employees.

Findings – It remains to be seen whether the implementation of the ABW in higher education is successful in terms of pre-defined goals. The studies investigating academic workplace concepts have led to inconsistent findings that lack an underlying framework. As the ABW concept fails to adequately support academics' work processes, it is recommended that managers and architects consider their subjective perspectives about the use of space and take the time to understand the users' fundamental values.

Originality/value – The authors integrated the selected studies with Lefebvre's spatial theory, and this model includes three perspectives that can explain workers' experiences with ABW. This theoretical

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framework can assist researchers in gaining a deeper understanding of ABW and support practitioners in implementing it in higher education.

Keywords Academic workplace, Activity-based working, Higher education, Lefebvre, Systematic literature review

Paper type Literature review

1. Introduction

The purpose of this paper is to apply Lefebvre's (1991) spatial theory to a review of the literature on activity-based working (ABW) in higher education. ABW is an unassigned open-plan configuration (Chacon Vega *et al.*, 2020) in which a space is divided into zones based on users' activities instead of their ownership (Kingma, 2018; Rolfö *et al.*, 2018). Thus, employees choose their workstations according to their needs for specific tasks.

Worldwide, organizations have exchanged traditional cell offices for ABW systems (Roskams and Haynes, 2021). While ABW is increasingly implemented in higher education (Muhonen and Berthelsen, 2021), its effects on staff members have mainly been studied in office environments, with staff members focusing on productivity, satisfaction and collaboration (Kegel, 2018; Jensen and van der Voordt, 2020). Although an increasing focus on collaboration is also evident in higher education, individual work remains a central principle (Berthelsen *et al.*, 2018). ABW could have a negative effect on individual work as it increases the likelihood of noise, distractions and interruptions (Haapakangas *et al.*, 2018). Academics have criticized the use of ABW in academia for separating teachers from students (Wilhoit *et al.*, 2016; Marrewijk and Van den Ende, 2018; Sandström and Nevgi, 2020; Nooij *et al.*, 2022) and formalizing their relationships (Van Marrewijk and Van den Ende, 2018).

Within the context of higher education, findings on ABW are mixed; studies report positive and negative results. For instance, some reveal increased interaction with colleagues (Candido *et al.*, 2021), appreciation of aesthetics (Brunia *et al.*, 2016; De Been and Beijer, 2014), increased teamwork and collaboration (Parkin *et al.*, 2011), knowledge sharing (Häne *et al.*, 2020) and increased functionality (Gorgievski *et al.*, 2010). Meanwhile, other studies report declining productivity (Francis, 2019), noise complaints (Boge *et al.*, 2019), concentration interruptions (De Been and Beijer, 2014; Gorgievski *et al.*, 2010), reduced safety (Wilhoit *et al.*, 2016), a lower sense of belonging (Sandström and Nevgi, 2020), decreased interaction with colleagues (Muhonen and Berthelsen, 2021; Nooij *et al.*, 2022) and students (Van Marrewijk and Van den Ende, 2018; Sandström and Nevgi, 2020; Nooij *et al.*, 2022).

These conflicting findings prevent us from using the current literature to infer whether employees in higher education experience ABW positively or negatively. Therefore, our central research question is:

RQ1. Why is the activity-based workspace implemented, and how is it experienced by employees in higher education?

We noticed that the papers discuss only some aspects of the perception of space; for example, how it is used, but not how and why it is developed. As space, or the workplace, is not a neutral container but imagined before it is built (Lefebvre, 1991), it contains ideas and ideals about goals, organizational processes and users' experiences that should be considered when studying the workplace (Peltonen, 2011). Lefebvre (1991) offers a holistic framework in which the ABW concept can be explained ideologically, processual and as an experience. An analysis of the spatial perspectives allows us to look closely at what is expected to change, whether these changes occurred, and the possible consequences of the changes. This paper synthesizes the selected articles in light of Lefebvre's (1991) spatial

theory, which connects these three spatial perspectives that operate simultaneously: the conceived, the perceived and the lived space, known collectively as the "spatial triad." He argues that space does not exist in itself but is socially produced, indicating a relationship between spaces, users and their behavior. Thus, understanding the workplace should entail investigating all three perspectives, as they operate concurrently.

We studied the workplace from these three interrelated perspectives to build on existing spatial theory and assist users and developers of ABW in academia. We used a continuous comparison process between empirical data on ABW and the spatial concepts Lefebvre discussed to develop our framework.

2. Methodology

The core of our review is the set of 21 papers reporting on ABW in higher education, a body of literature deriving mainly from four fields: research on higher education, facilities, corporate real estate and organizational change management. Our methodological approach consisted of two broad steps. First, we systematically reviewed the literature, and second, we developed a theoretical framework (van Teunenbroek *et al.*, 2020).

2.1 Data collection

Academics published the selected studies in journals, books, conference papers or working papers made publicly available before March 2022. We limited our search to articles written in English (Table 1). We searched academic databases such as Scopus, Google Scholar and Academia and references cited in the articles found.

First, we searched databases (between January 2021 and July 2021 and again between January 2022 and March 2022) using the key term "activity-based-working," and "higher education." We searched for studies with these keywords in their titles, keywords or abstracts. Finally, we added additional keywords (Appendix), such as activity-based flexible

Table 1. Data collection: selection approach

Selection approach and data collection	
Application or inclusion criteria	1. Limited our search to articles published before March 2022
	2. Limited our search to articles written in English
Selection approach round I	1. Search databases (Scopus, Google Scholar and Academia) and references in the articles we found
	2. Focused on "activity-based working," which had to be mentioned in the title, keywords and/or abstract.(n = 1,100)
	3. Focused on employees in "higher education."(n = 107)
	4. Added additional keywords, such as "activity-based flexible office," "flexible office" and "open-plan office" (Appendix) (n = 116)
Selection approach round II	1. Manually selected or eliminated the identified articles by: a) focusing on papers in contexts where workstations were unassigned and activity-centered zones existed b) focusing on articles that specified a transition to flexible, activity-based working. We excluded conceptual papers c) focusing on research articles that reported outcomes before, during, and after the transition. We excluded papers that only reported active design and mobile working (n = 21)
	2. Personal and email contact with several authors of the identified papers

Source: Author's work

office, flexible office and open plan office, as these terms are used interchangeably. We used the procedure described below to review each paper, including those focusing on flexible and open-plan offices, to determine whether they focused on ABW.

Before systematically reviewing the identified papers, we used several inclusion criteria to refine our search (Table 1). We focused on studies reporting on employees in higher education, either research universities or universities of applied sciences. We aimed to develop a theoretical framework grounded in empirical findings, so we selected papers on transitions to flexible, ABW or open-plan offices. A characteristic of flexible offices is that users do not have fixed desks (Chacon Vega *et al.*, 2020; Marrewijk and Van den Ende, 2018) and are provided with various workplaces to perform their daily tasks. The articles had to report on outcomes about users and/or managerial experiences and/or practices. Articles had to describe a situation before, during, post-occupancy or ongoing ABW processes. Therefore, we excluded studies that reported exclusively on collaborative design or mobile working, as they did not fit our selection criteria of focusing on a transition. We focused on higher education, and when other organizations were also covered in the paper (Boge *et al.*, 2019; Häne *et al.*, 2020; De Been and Beijer, 2014), we exclusively considered the outcomes in higher education.

This process resulted in selecting 21 articles published between 2008 and 2022. A total of 15 articles used a qualitative research strategy, and five used a quantitative research strategy. One article used a mixed-methods strategy.

2.2 Data analyses

We coded each article's research strategy, indicating whether the data were based on a case study, interviews or surveys (see Table 2 for an overview).

While reading the articles, we coded whether they mentioned the conceived (ideological and goal-oriented), perceived (practiced) or lived (experienced) space. Within these perspectives, we coded for emerging themes. As the next step, in the process of constant comparison, we merged similar themes into higher-order categories (Miles *et al.*, 2014). We then used these to structure the paper (e.g. quantitative goals in Section 4.4). In addition, within the perceived and lived space, we structurally coded whether employees perceived the described outcome as positive or negative.

3. Results

The shift toward flexible office concepts is said to be motivated by several factors. The general literature on physical universities shows that accommodation costs are the second-most-expensive item in most universities' budgets after labour. On average, institutions

Category	Review approach to the included papers (n = 21)	
1	Research strategy and sample country	1. Research strategy: whether the data were collected via case studies, interviews or surveys 2. Country setting: in what country were the data collected?
2	Stage of transition	The stage(s) studied: before, during or post occupancy or case study design
3	Spatial triad	Whether the paper mentioned one or several of the concepts in the spatial triad: ideological, material or social
4	Outcome	1. Positive outcomes 2. Negative outcomes

Source: Author's work

Table 2. Review approach to the selected papers to develop a theoretical framework

devote 6% of their budgets to accommodations (Temple, 2014), meaning they can realize significant savings by managing their facilities efficiently.

Studies report that the 70% average vacancy rate of university offices can be reduced by introducing flexible office concepts (van der Voordt, 2004; Pinder *et al.*, 2009). In addition, this would support academic ideas that, to achieve more innovation, employees should increase collaboration and active knowledge sharing. Moreover, many campuses, especially in Europe, were constructed after the Second World War and have become outdated (Den Heijer and Curvelo Magdaniel, 2012). The desire for modernization is driven by the need for technological innovation in building systems and IT infrastructure, as well as increasing competition to attract students – an area that buildings contribute to because students prefer attractive buildings. Another important reason for changing facilities is the movement from teacher-centered to more student-centered didactic practices (Beckers, 2016). These practices require new curricular spaces and more interaction between students and teachers. Institutional buildings should be able to support these changes.

3.1 Spatial triad

We present the findings reported in studies on ABW in higher education in three categories:

(1) the conceived (ideological) space;

(2) the perceived (practiced) space; and

(3) the lived (experienced) space (Table 3), better known as Lefebvre's (1991) spatial triad.

In Lefebvre's theory, the conceived space (representations of space) refers to how space is systematized, explicitly designed and technologically pre-defined for control and dominance. In other words, the conceived space contains the ideological and normative concepts that underlie space. It is the modeled, calculated and managerial space.

The perceived space describes the physical space and its routine-based use or spatial practices. It is the space that enables processes and is a means of production. For instance, intuiting that the table in front of the classroom is not for students' use is typical of the perceived space.

Representational space describes the lived space: how employees give meaning and personal value to subjectively imagined and experienced space. For instance, this includes how satisfied employers are with a particular space and the names people give to certain spaces, like naming a silent room "the graveyard".

In sum, the conceived space refers to how space is intended to be used, the perceived space to how it is used and the lived space to how people experience it. Ideally, these perspectives harmoniously combine. However, most of the time, a specific perspective dominates the others.

3.2 General overview

Our comparison of the selected papers showed that ABW concepts are defined in different terms. Only by studying the description of the concepts (flexible office, open-plan offices, ABW) did the studied office concept become evident. A flexible office is the umbrella term for an office concept in which users have spaces that support their specific activities. As defined by Chacon Vega (2020) and Kingma (2018), the typical configuration of an activity-based workplace is an open-plan area where users do not have an assigned workstation and can choose a zone that supports their activities.

The ABW concept was studied via both qualitative and quantitative strategies. Qualitative strategies included case studies (Brunia *et al.*, 2016; Parkin *et al.*, 2011; Sandström and Nevgi, 2020; Vitasovich *et al.*, 2016; van der Voordt and van der Klooster,

Characteristics spatial perspective	Spatial triad		
Perspective[a]	Conceived	Perceived	Lived
Interpretation[a]	Ideological	Practiced	Experienced
Equivalence[a]	Representation of space	Spatial practices	Spatial representation
Description[b]	Preconceived concept created by spatial professionals: How is it intended?	How an employee uses a certain space: How is it used?	How employees passively experience space and develop symbolic material: How is it experienced?
Focus on	How people should behave What the space was intended for	How people behave How space is used routinely in work processes	How people value a space How space is assessed
Main keywords	Intended use, reducing costs, spatial efficiency, strategic organizational goals (like increasing collaboration and communication)	Process, practices, routines, learned space, collaboration, communication, concentration, effective working, interaction	Symbols, experience, well-being, identity, satisfaction, safety, privacy, commitment culture, values

Sources: Author's work; [a]Lefebvre (1991); [b]van Marrewijk and van den Ende (2018)

Table 3.
The spatial triad (Lefebvre, 1991) as interpreted in this article

2008), ethnographies (Van Marrewijk and Van den Ende, 2018; Nooij *et al.*, 2022), interviews (Baldry and Barnes, 2012; Muhonen and Berthelsen, 2021; Pinder *et al.*, 2009), literature reviews (Backhouse *et al.*, 2019; Engelen *et al.*, 2019; Häne *et al.*, 2020) and mixed methods (Wilhoit *et al.*, 2016; Sprang *et al.*, 2013). Quantitative strategies were based on questionnaires (De Been and Beijer, 2014; Boge *et al.*, 2019; Gorgievski *et al.*, 2010; Hopland and Kvamsdal, 2020).

In general, most studies reported negative effects, but the research focus differed, with some focusing on collaboration outcomes and others on satisfaction or communication. Adverse concentration effects were the most frequently mentioned results of ABW (Candido *et al.*, 2021; Engelen *et al.*, 2019; Gorgievski *et al.*, 2010; Vitasovich *et al.*, 2016). Other often mentioned negative results of ABW were:

- lack of privacy (Baldry and Barnes, 2012; Engelen *et al.*, 2019; Gorgievski *et al.*, 2010; Parkin *et al.*, 2011; Vitasovich *et al.*, 2016; Berthelsen *et al.*, 2018);
- reduced productivity (Berthelsen *et al.*, 2018; Muhonen and Berthelsen, 2021; Candido *et al.*, 2021; Sandström and Nevgi, 2020);
- increased student-teacher distance in time and space (Baldry and Barnes, 2012; Van Marrewijk and Van den Ende, 2018; Sandström and Nevgi, 2020; Nooij *et al.*, 2022); and
- decreasing autonomy (Baldry and Barnes, 2012; Engelen *et al.*, 2019).

Some studies report positive effects, such as cost reduction (Häne *et al.*, 2020) or increasing functionality (Gorgievski *et al.*, 2010; Candido *et al.*, 2021; Häne *et al.*, 2020). Many positive outcomes were also, puzzlingly, reported as negative outcomes in other studies. For instance, communication was reported to increase (Engelen *et al.*, 2019; Häne *et al.*, 2020; Candido *et al.*, 2021) and decrease (Berthelsen *et al.*, 2018; Engelen *et al.*, 2019). Collaboration was also reported to increase (Häne *et al.*, 2020), remain steady (Parkin *et al.*, 2011) and decrease (Vitasovich *et al.*, 2016). In some cases, interaction among academics increased (Häne *et al.*, 2020; Candido *et al.*, 2021), whereas other studies reported decreasing interactions (Vitasovich *et al.*, 2016; Boge *et al.*, 2019; Nooij *et al.*, 2022).

In conclusion, some studies reported positive effects from ABW, but most reported negative effects. In addition, multiple outcomes were studied, and a positive effect on one outcome did not guarantee a positive impact on another outcome. Sometimes, different studies reported positive and negative effects of ABW on the same outcome. These different outcomes require further explanations of how ABW is implemented and experienced. Part of the problem stems from studies focusing on different aspects of the concept. We do not distinguish between outcomes in this study.

3.3 Conceived space

The conceived space concerns ideas, ideals, drawings (e.g. maps, pictures, signs), descriptions, definitions, regulations and theories of space (Lefebvre, 1991), which are often reflected in organizational goals. Quantitative goals refer to aligning the spatial supply to meet demand, cost efficiency, effective use and including users in the design. Spatial representations refer to floorplans and pictures of space. Qualitative goals refer to increased productivity, collaboration and knowledge-sharing. Table 4 provides an overview of the 12 papers that describe the conceived space.

Quantitative goals. Almost all studies mention the theoretical drivers behind ABW and the desired goals, such as cost reduction and spatial efficiency. However, only a couple of papers report the institution's aims when introducing ABW (Muhonen and Berthelsen, 2021;

First author	Year	Goals	Described as
Backhouse	2019	Quantitative goals, co-design Qualitative goals	Cost reduction, including users in the design Collaboration and knowledge-sharing
Baldry	2012	Spatial representation	Pictures of office arrangements
De Been	2014	Spatial representation	Floorplans
Berthelsen	2017	Quantitative goal	Cost reduction
Gorgievski	2010	Quantitative goals, co-design	Benchmarks, floorplans, including users in the design
Häne	2020	Qualitative goals	Increased productivity, collaboration and knowledge-sharing
van Marrewijk	2018	Quantitative goals, spatial representations, qualitative goals	Pictures, increased productivity, collaboration Interaction and collaboration
Muhonen	2021	Quantitative goals	Cost efficiency
Nooij	2022	Quantitative goals, co-design Spatial representations Quantitative goals	Cost efficiency Including users in the design Pictures, floorplans Increased collaboration, knowledge-sharing, satisfaction
Van Sprang	2013	Qualitative goals, Spatial representations	Increased productivity, collaboration and knowledge sharing, pictures
Vitasovich	2016	Quantitative goals, Co-design, qualitative goals	Cost efficiency, including users in the design, Increased productivity, collaborations
Van der Voordt	2008	Quantitative goals, spatial representations, qualitative goals	Reduced accommodation cost, pictures interaction and collaboration

Source: Author's work

Table 4. Overview of the papers describing the conceived space

Marrewijk and Van den Ende, 2018; Vitasovich *et al.*, 2016; Nooij *et al.*, 2022). These studies mention that cost reduction is an essential driver for implementing ABW, but whether and what costs have been reduced remains unclear. Pinder (2009) implied cost reduction when he showed that ABW reduced the square meters of accommodation in three cases, which reduced accommodation costs (van der Voordt, 2004). Nevertheless, cost reduction is minimally reflected upon or calculated in the studies we found, obscuring whether it is ever realized. Moreover, Berthelsen (2018) and Nooij *et al.* (2022) note that the eventual spatial cost reduction led to such high costs in dissatisfaction that the new office environments were ultimately remodeled.

None of the studies show an operationalization of spatial efficiency in terms of occupancy rates, user density, full-time employee/desk ratios. As such, it remains to be seen whether ABW leads to the desired spatial efficiency.

Qualitative goals. We found that Häne (2020), Backhouse (2019), Sandström and Nevgi, (2020), Van Marrewijk and Van den Ende (2018), Vitasovich (2016), Van Sprang (2012), Pinder (2009) and Van der Voordt and Van der Klooster (2008) reflected upon whether the qualitative goals (increased productivity, collaboration and knowledge-sharing, for example) had been met. For instance, Van der Voordt and Van der Klooster (2008) reflected upon the intended goals of interaction and collaboration and concluded that ABW had not met these aims.

Spatial representations. As already mentioned, the conceived space is represented in drawings and photographs, which were included in several articles (Baldry and Barnes, 2012; Marrewijk and Van den Ende, 2018; Gorgievski *et al.*, 2010). These spatial representations show how ideas and ideals are captured in the design, thus playing an essential role in our understanding of the academic workplace. In the remainder of the papers, however, the reader must imagine the studied workplace.

The drawings and photographs that are presented show surroundings that are notably similar: all show open-plan offices, enclosed spaces for concentrated work, spaces for socializing and mixed zones for meeting with students, colleagues and guests. The styling is also similar, with few indications of academic processes. The new academic workplace appears to be a predetermined, homogeneous, abstract space, which has consequences for users' perceived and lives space, as will be discussed below.

Co-design. Space design is part of the conceived space, resulting in the drawings representing the workplace. To increase the successful implementation of ABW, some studies mention the importance of including users in the design stage to construct spaces that meet their needs and support their work processes (Sandström and Nevgi, 2020; Vitasovich *et al.*, 2016; Gorgievski *et al.*, 2010; Pinder *et al.*, 2009). The literature reports that if users and their work processes are not included in the design stage, they are more likely to receive spaces they do not recognize (Sandström and Nevgi, 2020). Therefore, didactic and academic practices should be integrated into workplace design for higher education (Sandström and Nevgi, 2020).

In summary, to gain insight into each case and the field overall, we need information about user density, full-time employee/desk ratio, occupancy rates before and after, floor space reduction and accommodation costs realized by implementing ABW. Most papers lack benchmarks that make comparisons between institutions possible, and only Pinder (2009) presented user density concerning floorspace. We argue that the literature and the field of workplace study would benefit from including the conceived space (visuals, benchmarks and evaluation of intentions) to determine whether the implementation of ABW was successful in terms of pre-defined goals. Whether managerial intentions (i.e. quantitative and qualitative goals) have actually been met remains unclear. As such, we can conclude that the introduction of ABW was grounded in weak rationales.

The conceived space is an essential subject of study as it kickstarts the process of introducing ABW, but few studies include it. Instead, most studies focus on qualitative intentions and users' practices and experiences of the perceived and lived space.

3.4 Perceived space

Once a space has been constructed, the perceived space arises. This features the physical space, its work processes and the learned use of space. It is, in other words, the material dimension of social interaction and includes both physical space and spatial practices (Lefebvre, 1991). The perceived space is related to employees' spatial routines and working processes, like conducting research, grading, preparing classes and reading (Muhonen and Berthelsen, 2021; Sandström and Nevgi, 2020). The literature makes concluding whether the perceived space is experienced as positive challenging, as both negative and positive results have been reported (Table 5).

Interaction and collaboration. Vitasovich (2016) reports increased interaction, collaboration and knowledge-sharing among colleagues, possibly because it is easier to start conversations with colleagues in shared spaces (Vitasovich *et al.*, 2016; Pinder *et al.*, 2009). Nooij *et al.* (2022) describe decreased collaboration and knowledge-sharing due to the lack of substantive talks among academics, which requires the privacy of separate rooms.

First author	Year	Code	Described as	Direction
Baldry	2012	Interaction	Fewer informal conversations	Negative
De Been	2014	Concentration	Noise complaints	Negative
Berthelsen	2018	Concentration	Noise complaints	Negative
Boge	2019	Workplace efficiency	Productivity, concentration, well-being, health	Negative
Brunia	2016	Ambient conditions	Air quality, temperature, Acoustics, daylight	Negative/ Positive Negative/ Positive
Candido	2020	Concentration Ambient Conditions	Distractions Air quality, temperature Noise, distractions	Negative Negative Positive
Francis	2019	Concentration, ambient conditions	Distractions Air quality, acoustics, temperature lighting	Negative Negative
Gocer	2019	Concentration	Distractions	Negative
Gogievski	2010	Concentration, interaction	Noise complaints, working from home	Negative
Hane	2020	Concentration	Noise complaints	Negative
Hopland	2019	Concentration	Distractions	
Van Marrewijk	2018	Interaction	informal conversations	Negative
Muhonen	2020	Concentration, teamwork, interaction, ambient conditions	Noise complaints, working from home, informal conversations Lack of control	Negative Negative Negative
Nooij	2022	Interaction Workplace efficiency	Informal conversations, substantive talks Productivity, concentration, Working from home	Negative Negative Negative Negative
Parkin	2011	Teamwork, concentration	Interaction noise complaints	Positive, negative
Pinder	2009	Teamwork	Increased interaction	Positive
Sandstrom	2019	Concentration	Interruptions	Negative
Vitasovich	2016	Teamwork, concentration	Increased interaction, noise complaints	Positive, Negative
Van der Voordt	2008	Concentration, interaction	Noise complaints, informal conversations	Negative Negative

Source: Author's work

Table 5. Overview of the papers describing the perceived space

ABW seems unsuccessful in supporting the highly valued interaction between teachers and students (Muhonen and Berthelsen, 2021; van der Voordt and van der Klooster, 2008; Marrewijk and Van den Ende, 2018; Nooij *et al.*, 2022). Student–teacher conversations depend on an environment with auditory and visual privacy, which is rarely true for ABW spaces; lacking secluded rooms (Sandström and Nevgi, 2020; Nooij *et al.*, 2022). Marrewijk (2018) observed fewer informal conversations and increased distance between students and teachers in time and space after ABW implementation. ABW was reported to increase formal barriers between teachers and students (Sandström and Nevgi, 2020), because the new environment inhibited easy, informal contact between staff and students by excluding students from a teachers' workspace (Baldry and Barnes, 2012; Marrewijk and Van den Ende, 2018; Nooij *et al.*, 2022) for privacy and confidentiality (Sandström and Nevgi, 2020).

Workplace efficiency and concentration. In most studies, the perceived space was found to support the users' work processes insufficiently, resulting in negative perceptions of the

workplaces provided, including their efficiency (Boge *et al.*, 2019). In academia, individual work remains key, and concentration is vital for the academic process (Haapakangas *et al.*, 2018). For an academic, about 40% of the time is devoted to individual work that requires concentration (Pinder *et al.*, 2009). However, several studies report that ABW increases noise, inhibiting concentration (Gorgievski *et al.*, 2010; De Been and Beijer, 2014). All papers mentioning concentration reported adverse effects (Muhonen and Berthelsen, 2021; Berthelsen *et al.*, 2018; Parkin *et al.*, 2011; van der Voordt and van der Klooster, 2008; Häne *et al.*, 2020; Vitasovich *et al.*, 2016; Nooij *et al.*, 2022): employees found it harder to focus on their work in ABW spaces. Several papers report users mentioning decreased productivity due to excessive, unwanted interruptions (Berthelsen *et al.*, 2018; Boge *et al.*, 2019; Francis, 2019).

Although ABW does allow for moving to quieter places, employees do not like to move around during the day as paperless work is not yet standard. Many users prefer to work with papers, books and teaching materials (Muhonen and Berthelsen, 2021) which makes changing locations daunting. As a result, many choose to work at home, as Gorgievski (2010), Muhonen and Berthelsen (2021) and Nooij (2022) report via low occupancy rates after the implementation of ABW.

Productivity. Self-reported productivity shows positive and negative results. Some studies report increased productivity due to easy contact with colleagues (Vitasovich *et al.*, 2016; Pinder *et al.*, 2009), whereas other papers report declining productivity due to noise and lack of concentration (Nooij *et al.*, 2022).

The perceived space is evaluated positively if it supports the work processes. For instance, several studies reported increased satisfaction relating to teamwork (Parkin *et al.*, 2011; Vitasovich *et al.*, 2016). Vitasovich (2016) further reported increased interaction, collaboration and knowledge sharing among colleagues, possibly because it is easier to start a conversation with colleagues in shared spaces (Vitasovich *et al.*, 2016; Pinder *et al.*, 2009).

In conclusion, our review demonstrates that the ABW concept in higher education fails to adequately support employees' work processes. Most tasks require long periods of concentration, which is disturbed by frequent noise-related disruptions. Although the formalization of the teacher-student relationship as a result of the growing distance in time and space is considered an unwanted consequence of ABW, no study could reconcile the need for access to staff workplaces and confidentiality, contradictory needs that may prevent an integrated solution. To support the perceived space, like Sandstrom (2020), we argue that users' work processes, including teaching activities, should be prioritized in the conceived space.

3.5 Lived space

The lived space is the symbolic use of space. It directly relates to how people experience and value the workplace. Negative and positive effects of ABW on the lived space are reported, see Table 6.

Aesthetics. In general, workers indicated that they valued the architecture of ABW, describing the new space as beautiful, spacious, transparent, full of light and clean (Brunia *et al.*, 2016; De Been and Beijer, 2014). It was not always clear whether they were expressing appreciation for the newness of the workspace (the fresh paint on the walls, for example) or a genuine preference for the ABW format.

The vast majority of the literature reports workers' negative experiences with ABW regarding the lived space. After negative effects on satisfaction, the literature reports negative effects on safety (Sandström and Nevgi, 2020), a sense of belonging (Sandström and Nevgi, 2020), privacy (Parkin *et al.*, 2011; Berthelsen *et al.*, 2018), confidentiality (Wilhoit *et al.*, 2016; Gorgievski *et al.*, 2010), commitment (Muhonen and Berthelsen, 2021; Nooij *et al.*, 2022), autonomy and professional identity (Baldry and Barnes, 2012).

First author	Year	Code	Described as	Direction
Baldry	2012	Professional identity	Feeling like an academic/teacher	Negative
		Autonomy	Decreasing professional discretion	Negative
De Been	2014	Aesthetics	Describing the new space	Positive
Berthelsen	2017	Privacy	Seclusion	Negative
		Safety	Confidential conversations	Negative
Brunia	2020	Aesthetics	Describing the new space	Positive
Candido		Sense of belonging	Emotional well-being	negative
Gorgievski	2010	Privacy	Working on confidential cases	Negative
Muhonen	2021	Commitment	Affective feelings toward organization	Negative
		Professional identity	Feeling like an academic/teacher	Negative
Nooij	2022	Commitment	Affective feelings	Negative
		Professional identity	toward organization	Negative
		Satisfaction	Feeling like an academic/teacher	Negative
			Meeting expectations	
Parkin	2011	Privacy	seclusion	Negative
		Safety	Confidential materials	Negative
Pinder	2009	Satisfaction	Meeting expectations	Negative
Sändstrom	2020	Safety	Private conversations are overheard, confidentiality,	Negative
		Sense of belonging	feeling alone	Negative
		Professional identity	Feeling like an academic/teacher	Negative
Wilhoit	2016	Privacy	Working on confidential cases, seclusion	Negative
		Professional identity	Feeling like an academic/teacher	Negative

Table 6. Overview of the papers describing the lived space

Satisfaction. In most studies, satisfaction is measured as the ultimate experience regarding spatial characteristics. Physical space is believed to support satisfaction (De Been and Beijer, 2014). The process of reification underlying this approach means that spatial attributes are credited with creating satisfaction, while, in reality, users seek higher-order abstractions, i.e. not white or colored walls, but aesthetics or hospitality.

Users' satisfaction, thus, is not a straightforward reflection of space, but a reflection of the extent to which their expectations have been met (Pinder *et al.*, 2009; Oliver, 2010; Nooij *et al.*, 2022). This means that, while reviewing users' spatial satisfaction, researchers should consider their expectations and needs from the space: Not the space itself but how users' expectations are met or not generate satisfaction or dissatisfaction (Nooij *et al.*, 2022)

Safety and privacy. Safety refers to multiple aspects: feeling safe to:

- leave personal materials unsupervised;
- work with confidential materials;
- have confidential conversations with students; and
- have confidential conversations with co-workers.

At many universities, most ABW areas are behind closed doors attempting to improve safety and reduce the risk of theft of IT devices, personal belongings and confidential materials. This creates the problem that was discussed in the perceived space section: it formalizes and decreases student-teacher contact (Van Marrewijk and Van den Ende, 2018; Muhonen and Berthelsen, 2021; Nooij *et al.*, 2022). Working with confidential materials was perceived as safer before ABW, as offices could be closed (Parkin *et al.*, 2011). This also relates to an overall lack of privacy (Berthelsen *et al.*, 2018) that generates stress for employees when they work on exams or with non-anonymous data (Park and Gabbard, 2018). Finally, confidential

conversations with students and co-workers become more superficial, although substantive talks are essential (Muhonen and Berthelsen, 2021; Nooij *et al.*, 2022).

Students need to experience a certain degree of personal safety before having open conversations with their instructors (Berthelsen *et al.*, 2018). In addition, scientists sometimes fear that others publish their unpublished ideas, results or theories (often referred to as "being scooped" see Park and Gabbard (2018). As other people can constantly observe employees' work, ABW may increase this fear.

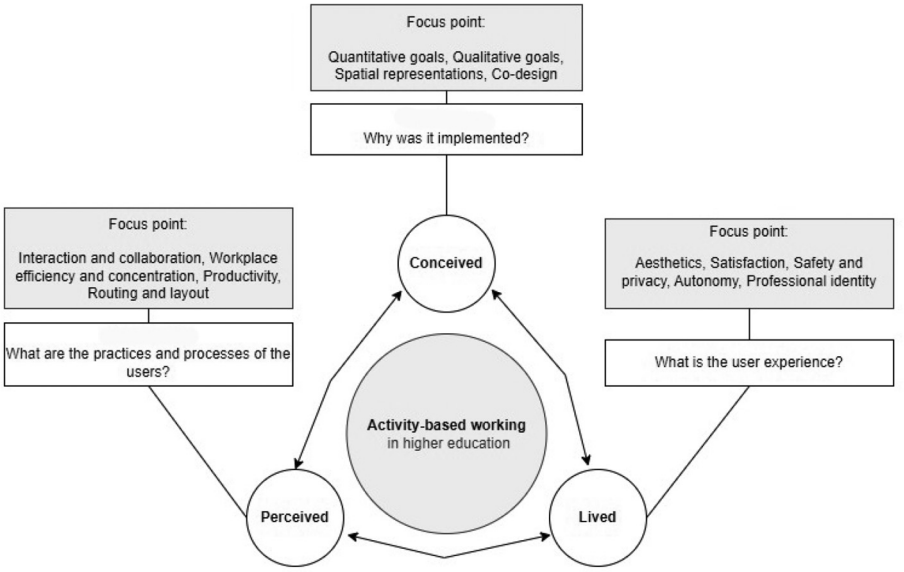
Autonomy. Autonomy decreases by the rules associated with ABW (Baldry and Barnes, 2012). Although ABW is intended to give workers more control by allowing them to choose a workspace according to their tasks, the opposite seems true. Control over one's workspace is reported to decrease in an ABW context because workers do not decide where they work; work tasks determine where they sit. For instance, they cannot have conversations with students or meet with colleagues in their offices anymore and must go to spaces designed for interaction (Pinder *et al.*, 2009; Muhonen and Berthelsen, 2021; Baldry and Barnes, 2012; Hopland and Kvamsdal, 2020). In addition, there is often no control over noise because doors cannot be closed to exclude it.

Professional identity. Professional identity is connected to workspaces (Baldry and Barnes, 2012). ABW creates spaces that look like offices (e.g. through a clean desk policy) instead of academic workplaces (Sandström and Nevgi, 2020; Muhonen and Berthelsen, 2021), that are often characterized by piles of papers and books (indicators of knowledge work). In other words, ABW facilitates a one-size-fits-all principle. In addition, it fails to inspire students as the space does not feel like an academic environment (Sandström and Nevgi, 2020). Rather than signaling a university context, ABW is anonymous and abstract, which can harm employees' perception of being academics (Baldry and Barnes, 2012) and relates to decreased feelings of belonging (Sandström and Nevgi, 2020) and organizational commitment (Muhonen and Berthelsen, 2021). The latter aligns with Nooij *et al.*'s (2022) findings that affective organization commitment became continuance commitment, in which the term of employment gained more weight than the content of the work. The lived space should allow workers to express their identity and to appropriate the space (Lefebvre, 1991; Wilhoit *et al.*, 2016)

We conclude that ABW in an academic setting does not support expressing an employee's identity. Moreover, the reported negative aspects of ABW are interconnected and related to the perceived space. When workers' practices are not supported, their lived space becomes negative, which harms their personal and professional values. Therefore, when planning to implement ABW in higher education, planners should carefully consider these findings and relate the results to their goals.

3.6 Proposed framework

Grounded in our findings, we developed a model to guide further research. To understand the workplace, all three spatial perspectives should be studied as they are interrelated (Lefebvre, 1991). Grounded in our findings, we developed a model to guide further research. To understand the workplace, all three spatial perspectives should be studied as they are interrelated (Lefebvre, 1991). Therefore, we placed ABW in the middle and around the three perspectives. The themes that emerged from the coding process have been placed in the perspectives as focus points for further research. From the review, we derived a main research question for each perspective and noticed that the perceived and the lived space in particular have received attention. Academic interest in the conceived space, containing norms, standards and underlying ideals reflected in quantitative and qualitative goals, remains modest, which leads to an incomplete understanding of the ABW in higher education. The model presented in Figure 1 includes a visual presentation of the main



Note: The focus points are suggestions to focus on if a researcher wants to study ABW
Source: Author's work

Figure 1.
Visual presentation of the proposed framework including the spatial triad (Lefebvre, 1991) connected with ABW in higher education

questions regarding the spatial perspectives and focus points that can be studied to answer them. Although one perspective can be focused on, we emphasize the importance of studying all three perspectives in conjunction to develop a comprehensive view of ABW.

4. Discussion and conclusion

Our literature review of ABW in higher education has yielded several insights, including that:

- users should be included in the first design stage to make ABW successful (Pinder *et al.*, 2009; Gorgievski *et al.*, 2010); and
- ABW is perceived as positive if the new workplace supports the production process.

For example, as teacher–student interaction is a key concept in academic work, the spatial layout should also support this, which is not always the case (Muhonen and Berthelsen, 2021; Marrewijk and Van den Ende, 2018; Nooij *et al.*, 2022). The diversity of findings apparent in our review emphasizes the need for more work to explain why certain effects do or do not occur. Building on Lefebvre's (1991) spatial theory, we sought to contribute to such an understanding by proposing a model with three categories (conceived, perceived and lived space) that can explain the results of ABW.

4.1 Concluding remarks

Our main contribution is the insight into the importance and, simultaneously, excessive focus on the conceived space. Societally, professionals focus overmuch on the conceived space. Academically, the conceived space is overlooked.

First, we noticed that professionals often discuss space in terms of abstract and objective goals (conceived space), disregarding their subjective perspectives underpinned by assumptions about how the workspace will be used (lived space) and viewed (perceived space). This results in a workspace where employees try to use a space that was designed according to professionals' vision of the conceived space. We recommend that professionals consider their subjective perspectives about the use of space and take the time to understand the users' fundamental values. Collaborative design is considered an essential strategy as it leads to better workspaces (Woolner, 2010). Planners and architects must be willing to include user needs and expectations in their designs, or user participation will lead to collaborative design illusions (Woolner, 2010).

Second, our results suggest that the conceived space receives comparatively little academic attention. And if academics consider the conceived space, they primarily focus on more organizational strategic goals, such as enhancing education, collaboration and communication, disregarding the other elements of the conceived space: reducing costs and gaining spatial efficiency. Knowledge regarding these key drivers for implementing ABW lags significantly, so the success of implementation remains unclear. Therefore, we recommend an increased academic focus on this aspect of the conceived space.

The perceived space generates positive and negative results, emphasising the latter. Academics have a wide variety of tasks, including conducting research, grading, preparing classes and reading, all of which are individual tasks that require concentration. Employees prefer to avoid moving their materials (paperwork and books, in particular) to new spaces, so they mostly remain at a single workstation (Muhonen and Berthelsen, 2021). Leesman's (2017) findings show that employees with various tasks requiring different spaces and workstations benefit the most from ABW. Despite their variety of tasks, academics and teachers perform primarily concentrated desk work. We question whether the concept of ABW might be inappropriate in higher education as it fails to facilitate employees' work processes. To support the perceived and lived space, therefore, users' work processes should be the priority when designing the conceived space.

In the literature, the lived space receives the most attention. We conclude that the reported negative aspects of ABW are interconnected with the perceived space. If employees are not supported in their practices (perceived space), their lived space receives pressure, which can lead to unwanted consequences such as reduced commitment to the organization (Nooij *et al.*, 2022; Muhonen and Berthelsen, 2021) and the loss of professional identity (Baldry and Barnes, 2012).

Moreover, studies focusing on ABW generally adopt exploratory approaches to the phenomenon. First, the current literature provides a rather one-sided view of the workplace, in which the conceived space is rarely assessed or questioned. Studies mention goals such as cost reduction, increased interaction between users, increased collaboration and increased spatial efficacy, but scholars rarely reflect on whether the main goals have been achieved. By operationalizing these goals, researchers can use quantitative methods to measure the results. This would illuminate whether the motives underlying the implementation of ABW are factual or assumed. In addition, we found that the concept of satisfaction was rarely operationalized.

The lived space is based on self-reports of satisfaction that incorporate several components. "Satisfaction" is neither defined nor theoretically grounded. The underlying assumption, moreover, is that there is a direct relationship between space and satisfaction. The literature on satisfaction reports that users want certain expectations to be met when they use a space, which means that users compare their expectations against the performance of that space (Shin, 2016). Therefore, understanding the satisfaction response

can be instrumental in understanding a workspace. Expectations are grounded in internal values, such as professional values. If their expectations are not met, users are unlikely to be satisfied. In other words, the perceived (physical space) cannot be studied without the lived space, showing the value of connecting ABW with the spatial triad (Lefebvre, 1991). We advise researchers to examine whether ABW increases satisfaction to measure user expectations to understand the satisfaction response.

4.2 Research limitations

All of the selected papers were conducted in a Western context. The non-Western context could be a valuable addition, as the relevant needs, tasks and values might differ from those in the Western context. This limits the generalizability of our review, and we advise caution when applying our results outside of this study's context.

The phenomenon of ABW has been studied using multiple research strategies and with various research goals. We conclude from the selected papers that working in the academic context is challenging, given the principles of ABW. We advise a holistic approach to studying ABW as our review reveals interrelatedness between the three spatial perspectives we highlight: all three perspectives are equally important in creating new workspaces.

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Appendix

Table A1.
These are the search terms for the selection approach in the first round

Main search terms	Activity-based working, higher-education
Additional search terms	Academic workplace, activity-based-flexible-office, ambient conditions, collaboration, communication, enabling workplace, facilities, facility management, flexible office, flexible work, innovative ways of working, innovative workplace, new ways of working, non-territorial office, open-plan office, paperless office, paperless working, physical workplace, post-occupancy, prior-occupancy, satisfaction, Lefebvre, conceived space, lived space, perceived space

Note: The additional search terms were used in connection with one or two of the main search terms, resulting in a total of 116 papers