Activity Theory. A framework for understanding the interrelations between users and workplace design.

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ACTIVITY THEORY

A framework for understanding the interrelations between users and workplace design

Maral Babapour, Antonio Cobaleda-Cordero, and MariAnne Karlsson*

1 Background

Activity theory (AT) has its origins in the sociocultural tradition of Russian psychology and psychologists such as Lev Vygotsky (in the 1920s) and later (in the 1970s), Aleksei Leont'ev. In contrast with theories which objectify the mind and consider activity as a response to a stimulus, activity theory was built on the notion that consciousness and activity are one and the same and that the mind develops through activity (Leont'ev, 1978) by interacting with the world and through the construction of artefacts. According to AT, humans have needs which lead them to carry out activities (that is, interact with objects in the world) to satisfy their needs. These objects, which may be tangible or intangible, motivate and direct activities. This is why understanding human activities necessitates an understanding of objects (Kaptelinin & Nardi, 2009). Humans may carry out activity as individuals or among and in collaboration with other humans as collective activity. However, the structure of the activity can only be considered and understood in a sociocultural context. This context comprises the motives and goals for the activity as well as its methods and tools (Leont'ev, 1978).

Human activities are organised into three hierarchical layers (Leont'ev, 1978), illustrated in Figure 20.1. The highest level, *activity*, is oriented towards a motive, corresponding to a need. The motive is that object which the human (or subject) needs to attain (Kaptelinin & Nardi, 2009). One activity may have more than one motive, originating from different areas of life. Motives are often tacit or unarticulated. This makes them difficult to elicit because without motive, there is no activity. Each activity is, in turn, conducted through *actions*, which are conscious processes with specific goals (and sub-goals). These actions must be undertaken to fulfil the object. One or more actions may contribute to the same activity, and a single action may contribute to multiple activities. However, even though actions have their own goals, it is the activity which gives meaning to the various actions. Actions are implemented through a series of *operations*, which are unconscious processes triggered by the specific physical and social conditions present at that moment. Although activity, action and operation form a hierarchy, the hierarchy is not fixed. Transformation takes place constantly.

Furthermore, human activity is *mediated* by one or more physical and psychological tools that shape the way a human being interacts with the world and through which they achieve

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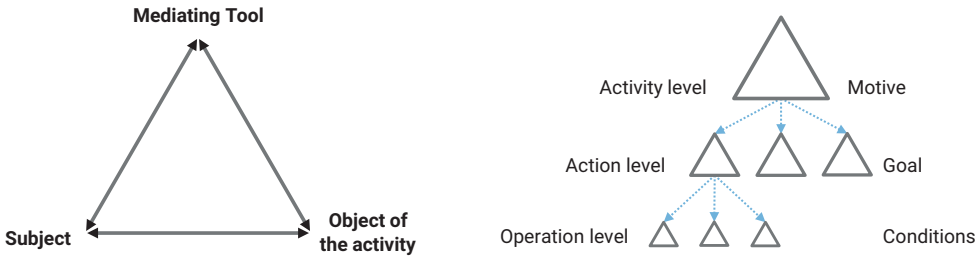

Figure 20.1 Constituents and hierarchical layers of activities

their goals. Examples of physical tools are hand tools, computers, furniture and so on. However, tools may also include place and space. A well-functioning mediating tool allows the user to focus on the object. Conversely, a tool that does not work well causes *breakdowns* and draws the user's focus towards the tool per se. Artefacts that are used regularly by users in a given activity constitute the current *artefact ecology* and shape the user's perception when appropriating new artefacts.

The basic unit of analysis in AT is the activity system. This has been defined as a collective, artefact-mediated, object-orientated system (Engeström, Miettinen, & Punamäki, 1999); a group of people sharing a common object and motive over time, plus the tools they need to act on the object (Kain & Wardle, 2014). In most complex situations, many dynamic interrelated activities form what could be seen as a system of activities. To understand activity systems, we need to consider how they have developed over time, their past and present and their dialectic character, in that changes to one aspect of a system may change other aspects in response.

Leont'ev played an important role in developing the original theory, adding to Vygotsky's ideas by arguing that activities were composed of actions and operations and, perhaps more importantly, depended on the division of labour. These ideas were later embraced by Engeström (1987) in his extended activity system, in which an activity is mediated, not only by tools, but also by a community, the rules of that community and a division of labour.

The use of AT has grown and is now applied within different fields, not least as an analytical tool in fields such as educational research (Scanlon & Issroff, 2002; Roth, 2004), in studies of organisational learning (e.g. Engeström, 2006) and studies of information systems (e.g. Bødker & Klokmose, 2011; Kaptelinin & Nardi, 2009; Kuutti, 1996). Common themes involve understanding collective work and tensions and contradictions within and between activity systems. More recently, other areas have also started to acknowledge the theory, for example as a tool for analysing the relationship between users and technical products as a basis for user-oriented product design (Engelbrektsson, 2004; Hiort, 2010; Karlsson, 1996; Rexfelt, 2008), for understanding barriers to, and enablers of, sustainable behaviour (Renström, 2019; Selvefors, 2017; Strömberg, 2015) and for workplace research, as described in this chapter (Babapour, 2019a; Cobaleda-Cordero, 2019).

2 Application to workplace studies

The main object of inquiry in activity theory is to understand human activity in natural situations and examine the role of tools in everyday activities. AT provides a holistic and fairly open view of human activities; it provides insights significant to workplace research, from both theoretical and applied standpoints. Applying an AT perspective in workplace research requires employees' everyday work situations and workplaces to be considered the main object of inquiry. From this viewpoint, employees are seen as users of workplaces and workplaces are seen as an

artefact ecology, with a constellation of different workstations, office furniture and technical equipment that mediates users' activities.

Organisations worldwide are increasingly implementing flexible workplace solutions that entail changes in employees' artefact ecologies. These changes are made in the hope of realising strategic goals such as increased collaboration, productivity and work environment satisfaction, plus reduced occupancy costs and energy consumption (e.g. Appel-Meulenbroek, Groenen, & Janssen, 2011; Rolfö, 2018; Van der Voordt, 2004). Activity theory has been applied in studies of flexible offices to investigate how well these innovations support employees' work and well-being. Several implementations of flexible offices in Sweden were thoroughly examined from an AT standpoint by the authors (Babapour, 2019a; Cobaleda-Cordero, Babapour, & Karlsson, 2020). This section describes the unique foci of AT, provides arguments for the relevance and benefits of applying AT in workplace studies and outlines how the authors have applied AT in workplace research.

2.1 Emphasis on the situatedness and contextual nature of employees' activities

Employee activities take place within, and as a part of, the local circumstances of an organisation and rely on exploitation of available tools and resources in the work environment. Workplaces and the tools which mediate employees' activities are culturally situated. They are the result of historical, economic and technological developments and follow societal trends, norms, values and governing policies. Similarly, the ways in which employees use workplaces are socially situated. They are developed during a process whereby employees are not isolated but, rather, belong to a workgroup that develops and shares routines (Daniellou & Rabardel, 2005). Sometimes the use of workplaces is formalised by information passed on between employees and internalised through, say, training, instructions or manuals. Applying an AT perspective in workplace research requires an understanding of the influence of the social organisation and the cultural context in which workplaces and their constituent resources and tools are developed.

In studying the implications of flexible offices, the authors identified a variety of organisational preconditions which influence employees' activity systems, both pre- and post-relocation (Babapour, 2019a; Cobaleda-Cordero et al., 2020). Examples include the quality of the physical and psychosocial work environment prior to relocation; the reasons and triggers behind the relocation; the resources available for implementing the office innovation and post-relocation improvements; the degree of employee involvement in decision processes when designing and improving the premises; and ongoing organisational changes. These preconditions influence the way employees experience and perceive the extent of improvement in their activity systems after relocating to a flexible office.

2.2 A simultaneously holistic and granular understanding of employees' activities

The hierarchical structure of activities encompasses different levels of abstraction: activity, action and operation levels (Leont'ev, 1978). This quality allows employees' activities to be approached as holistic systems of substantial complexity and with the prospect of analytical depth. Similarly, one may focus on individual or collective activities within an organisation (Engeström, 2000). The authors adopted this perspective to examine employees' activities in detail in several case studies of flexible offices (for detailed examples see Babapour, 2019a). Analysis of the hierarchies of employees' activities helped identify the goals and objects of the activities and the different

actions, as well as the new actions and operations introduced into employees' activity systems because of the new workplace solution. This granularity is beyond the otherwise general and reductive operationalisations of office work as a combination of 'meetings and concentrative work'. It allowed for understanding why, in which situations and for which actions and operations flexible offices work. In addition, analysis of typical activities of individuals with different roles and responsibilities allowed identification of workplace requirements on individual, group and organisational levels and the dynamics between them.

2.3 Understanding employees' experiences and subjective grasp of their contexts

In activity theory, the emphasis is on capturing the activities of individuals with different values, prior experiences, motivations, personal preferences, physical capabilities and limitations, skills and training (Leont'ev, 1978). These individual preconditions are an integral part of human activities; they are formed as a result of the interactions within and between individuals' current and former activities (ibid.). Applied to workplace research, AT accounts for employees' experiences using workplaces, subjectively and individually as well as collectively. The authors outline various personal circumstances, prior experiences, preferences and physical or cognitive capabilities and limitations among employees that influence their experience of working in flexible offices (Babapour, 2019a; Cobaleda-Cordero, 2019). These individual preconditions played an essential role in employees' activities and the way they experience the workplace with respect to different functional, social, emotional, symbolic and aesthetic qualities of the environment (cf. Babapour, Harder, & Bodin Danielsson, 2020). It is the employees, as workplace users, who give meaning to the tools and resources available in a workplace, based on their individual preconditions. Therefore, when studying workplaces, it is strongly recommended that the subjective experiences of employees should be accounted for.

2.4 Mediating roles that workplaces play as tools in employees' everyday activities

The resources and tools available in the workplace constitute an ecology of artefacts for employees. These artefact ecologies are analysed, not just as spaces or things, but also for the way in which they mediate employees' activities. Workplace solutions have different intrinsic qualities and constraints which contribute to employees' actions by defining a space for action possibilities; in other words, the activities, actions and operations which the workplace enables and allows for. The constraints in workplace solutions may lead to mismatches between either (i) possibilities or capacities of the workplace and what employees want to do or (ii) the workplace and employees' preconditions, preferences, physical conditions and training (see Chapter 2 Person–Environment Fit Theory). The analysis of how workplace solutions mediate employees' activities covers the hierarchical layers activities and may involve levels of abstraction varying from addressing a workplace as a technical system with various tools and resources to considering its tools or workstations in isolation.

Applying an AT perspective in the study of flexible offices showed that the office usage and the way it mediated employees' activities varied within and between different cases (Babapour, 2019a; Cobaleda-Cordero et al., 2020). The differences in usage related to sharing practices, the use and/or non-use of the different zones and workstations and the immediate tools such as data-entry devices. Three types of matches and/or mismatches were identified in employees' activity systems: Employee↔Office, Activity↔Office and Employee↔Activity (see Figure 20.2).

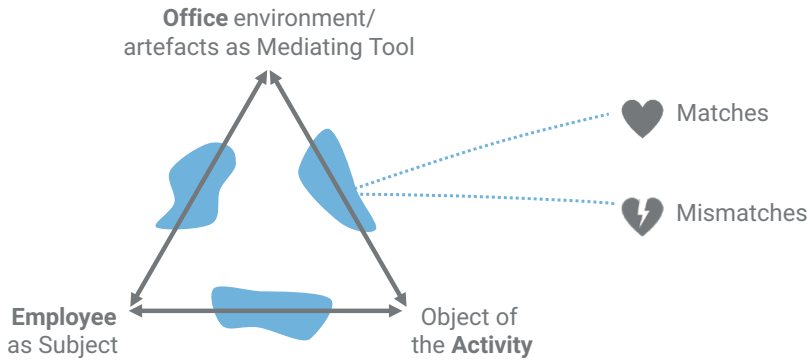

Figure 20.2 Activity systems in the office context

It is also important to note different matches and mismatches were identified on the activity, action and operation levels. In general, the abundance or lack of mismatches in the activity systems explained why some employees were satisfied with flexible offices while others were dissatisfied. Successful offices were designed to facilitate the activities of individuals, groups and the organisation on different hierarchical levels. They also supported the shared use of resources, whilst matching employees' personal circumstances and preferences for wellbeing and enjoyment.

2.5 Temporal aspects and the developmental process of appropriating new workplaces

Organisations continually improve and optimise their workplace solutions by introducing new tools or relocating to entirely new workplaces. The introduction of new tools into a given situation allows old problems to be solved, but it changes the nature of the activities and provides learning and improvement opportunities (Karlsson, 1996). The way individuals use tools may be seen as utilisation schemes, developed both individually, as repertoires or automated and well-mastered ways of doing things, and socially, as groups' common ways of doing things (Daniellou & Rabardel, 2005). Sometimes, the same usage schemes may be applied to a new tool or workplace. In situations which are very new to individuals, entirely new usage schemes must be formed; this temporarily makes the appropriation process predominant. AT allows the processes by which individuals (or groups) explore, interpret, use and transform new workplace solutions to be captured; this is a necessary condition for reaching efficiency in those individuals' activities.

Applying AT to the study of flexible offices helped describe the phases of, and differences between, employees' post-relocation appropriation processes. Flexible offices require employees to share resources such as desks, tables and data-entry devices. The sharing dimension and new workplace design in flexible offices entail a re-mediation of employees' activities, providing new functionalities and requiring new usage schemes. The different phases involved familiarisation, exploration and routinisation (Babapour, Karlsson, & Osvalder, 2018). However, these phases had different characteristics within and between the studied workplaces. Apart from changes within usage schemes, the appropriation process also involved changes within the workplaces. This allowed employees and organisations to improve the properties of the workplace, making them a better fit for the different levels of their activities (Babapour, 2019a, 2019b). Figure 20.3 shows that three types of appropriation were identified among the employees. These were

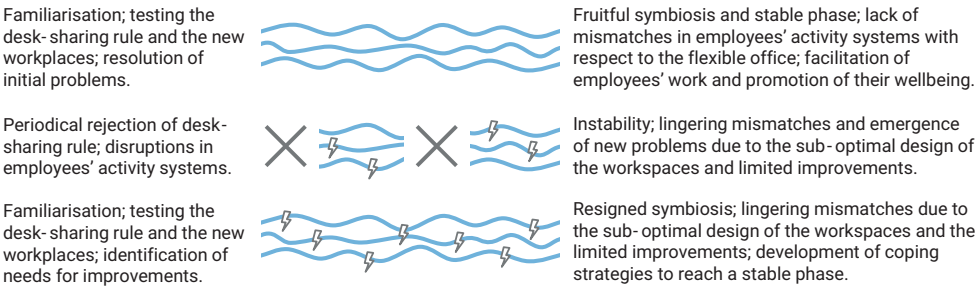

Figure 20.3 Different phases and types of appropriation after relocation to flexible offices

(i) an appropriation that led to a fruitful symbiosis and stable phase, in which the new office did not entail mismatches in the studied activity systems but rather supported employees' work and wellbeing; (ii) an appropriation that entailed lingering and emergent mismatches, without achieving stability in the studied activity systems; and (iii) an appropriation that led to a resigned symbiosis, in which employees had found ways to cope with the lingering mismatches in their activity systems.

2.6 Informing a use(r)-centred workplace design and development

Activity theory provides a framework for capturing users' needs in their everyday activities. Applying an AT perspective in design processes requires usage to be considered as an integral part of these processes (Ehn, 1989). Employees must often compensate for difficulties stemming from inadequate and sub-optimal workplace design solutions. The inadequacy of workplace design solutions is due to failure in, and difficulties with, anticipating the usage and specificities of a use situation. Using AT as a starting point in design processes allows the ongoing dynamics in use situations to be captured. It also allows the different levels of an activity system to be addressed to align the design solutions with users' activities (Bødker & Klokmose, 2011). This requires a dialogical, iterative process (rather than a linear one) to capture the users' expertise in, and knowledge of, use and their activities.

Analysing the implications of flexible offices from an AT viewpoint has led to the identification of successful and sub-optimal design features of such workplace solutions (Babapour, 2019a; Cobaleda-Cordero et al., 2020). The in-depth understanding of employees' activities and the mapping of matches and mismatches helped identify success factors and sub-optimal features relating to the design of workspaces, furniture and other tools in flexible offices. These insights are then used as design recommendations for consideration both during the design processes and after relocation, thus allowing the design of these work environments to be modified (Babapour et al., 2020). Adopting an AT view facilitates anticipation of usage dynamics relating to future solutions and may be used as a resource for workplace designers and decision makers.

2.7 The unique foci of activity theory

Activity theory provides a multidimensional system view with a rigorous set of concepts and a well-defined unit of analysis. This has fundamental implications for workplace research by addressing the otherwise neglected situation-based questions within workplace studies that relate to (i) the technological and sociocultural context influencing the development of workplaces

within an organisation; (ii) employees' goal-oriented actions and object-oriented activities and routinised operations; (iii) the different ways employees use available tools and resources in a workplace; (iv) ways in which the workplace mediates employees' activities and fulfils employees' needs; (v) the contradictions within and between activity systems and how they drive change and development of workplaces; and (vi) short- and long-term impacts of workplace changes on employees' activity systems.

As mentioned previously, the application of AT in the context of workplace research is limited to a few recent studies, mainly focusing on flexible offices such as activity-based offices and combi offices. AT has also been applied to investigate other workplace contexts and is recommended as a basis for the study of human work in the field of design and ergonomics sciences (Bedny & Karwowski, 2004). Examples of other areas of application are healthcare environments (Engeström, 2000) or manufacturing operations (Bedny, Karwowski, & Kwon, 2001). Therefore, the study of different office types or other types of work environments may also benefit from adopting this theoretical framework.

3 Research approach for adopting activity theory in workplace research

The study of office workplaces from an activity theoretical viewpoint involves a number of methodological considerations for data collection and analysis. The concept of mediation is central in AT and due to the "endless mutual transformation" of the activity and things in response to each other (Miettinen, 2006, p. 396), it is important to examine employees' activities in context. Therefore, contextual inquiries involving qualitative and ethnographical methods are recommended when studying the conditions of activities in real-world situations.

3.1 Considerations for data collection from an activity theoretical viewpoint

A variety of methods have been used to conduct contextual inquiries and capture the interrelations between different elements of employees' activity systems (Babapour, 2019a; Cobaleda-Cordero, 2019). Interviews and focus groups are commonly used in studies with an AT viewpoint, allowing a diversity of themes to be addressed in depth and the elicitation of user insights into cumulative experiences in the office. Activity and experience-mapping tools may be used during interviews and focus groups to acquire insights into employee experiences, activities and routines over specified timeframes (Babapour & Cobaleda-Cordero, 2020). Furthermore, observations of the office environment and spatial walkthroughs may be used to, say, collect data on the spaces which are most and least popular, or the artefacts and tools which people use (ibid.). In addition, collecting secondary data may provide complementary information about workplaces' configuration and design. Examples of secondary data include building documentation, organisations' protocols and workflows for facilities and occupational health management.

Evidently, the outlined data collection methods are not specific to activity theory. These methods may be used with specific questions that address and explore the different elements of employees' activity systems and their interrelations. Each method captures the elements and levels of activity systems to different extents (Figure 20.4). However, it is important to note that capturing the intentionality, motivations of activities and employees' experiences are essential from an AT perspective. This requires a commitment to comprehensively understand users' insights and context (Miettinen, 2006; Nardi, 1996). Therefore, methods which allow for a dialogue between researchers and the people they study and which enable people to reflect and

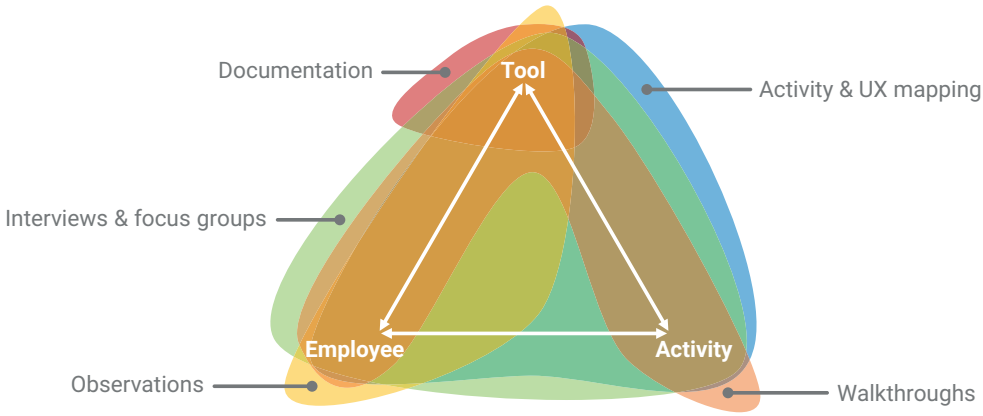

Figure 20.4 Coverage of the methods in relation to the study of activity systems

elaborate on their activities, preferences and experiences with their workspaces should be prioritised. A triangulation of multiple methods is recommended for a comprehensive and nuanced understanding of activity systems from an AT viewpoint.

3.2 Analytical considerations from an activity theoretical viewpoint

When conducting workplace studies using activity theory as an analytical framework, several steps and considerations should be considered, for both data collection and analysis. The authors propose a step-by-step guide for applying AT in workplace studies (see Figure 20.5), based on their application of the theory in various contexts. It is not necessary to follow the proposed steps in consecutive order. Rather, the application of AT requires an iterative and dialectic approach, and the process may vary depending on the context of the study.

The rich user insights, contextual data and methods triangulation help ensure confirmability and reliability of results when analysing activity systems from an AT perspective in workplace studies. The emphasis on qualitative methods requires researchers to closely examine the data to find trends, patterns and argumentations rather than correlations and causality. This implies that the diverse data inputs may converge, diverge, contradict or confirm each other and is the reason a sound ability to cross-interpret data is key. A suitable strategy for content analysis is to conduct both inductive and deductive coding processes involving at least two researchers, to enable discussion, avoid biases and ensure credibility of findings. Further, respondent validation strategies such as getting feedback from the participants are recommended to confirm findings and to ensure the quality and credibility of conclusions.

Activity theory provides a system view for the study of workplaces and may help address the otherwise neglected situation-based questions within workplace studies such as: What technological, social and cultural factors influence the development of workplaces within an organisation? What are the employees' goal-oriented actions and object-oriented activities and routinised operations within their roles and responsibilities? How do employees use workplaces? How do workplaces mediate employees' activities and fulfilment of their needs? What are the contradictions within and between different activity systems within a workplace and how do they drive change and development of workplaces? What are the short- and long-term impacts of workplace changes on employees' activity systems?

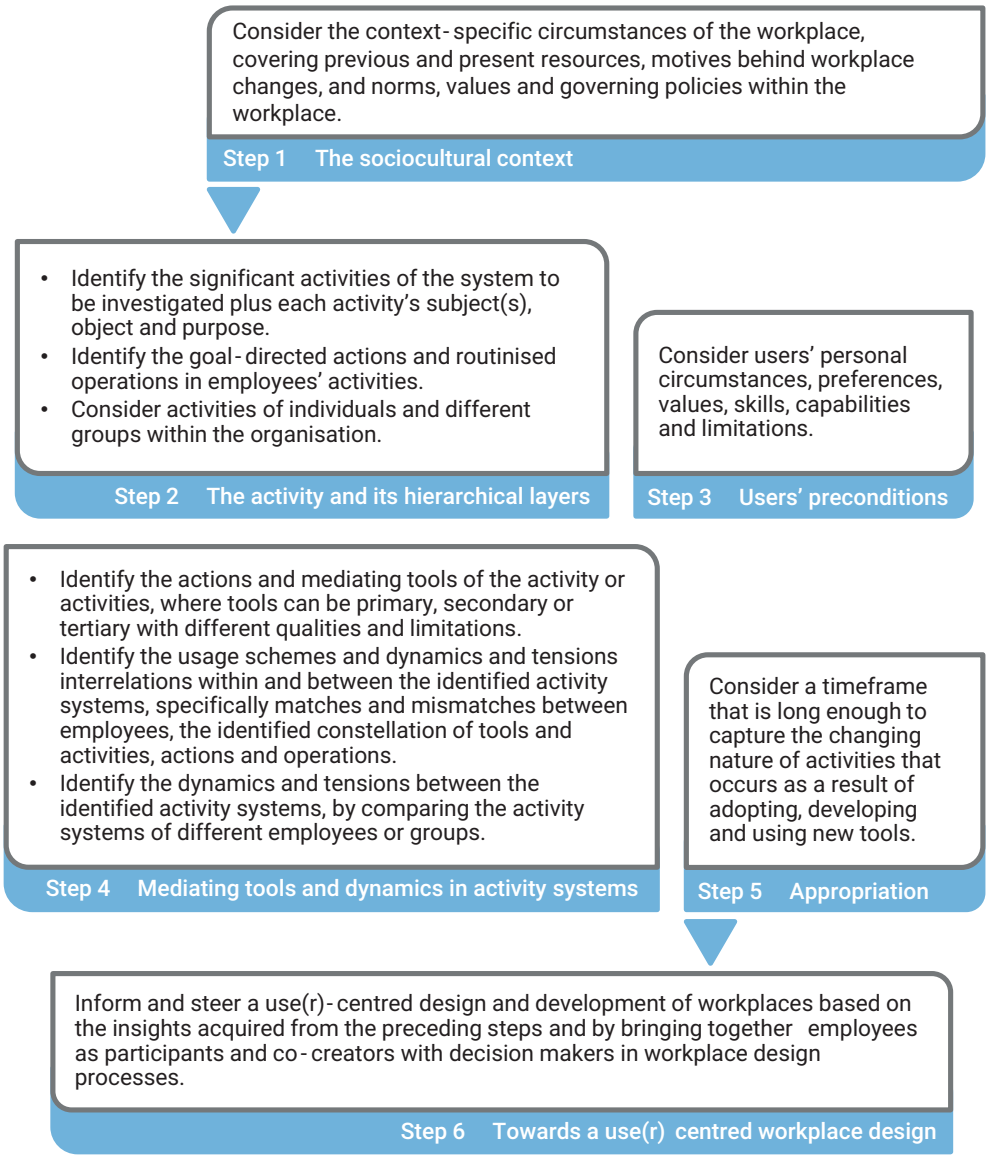

Figure 20.5 Guidance for application of activity theory in workplace studies

4 Limitations and challenges

The application of activity theory in workplace studies requires fieldwork which relies on gaining access to a particular organisation. This involves securing entry, ensuring that employees within that organisation will participate as informants for data collection and be able to return to the organisation to collect complementary data or present results. As outlined in the methodological implications, a triangulation of qualitative methods may be required to gain a thorough understanding of employees' activity systems. In this sense, both the data collection and the analysis of the subsequent datasets are costly and time-consuming. The three main challenges

in applying AT in workplace research concern access, time and resources. It is also important to highlight that AT is not a predictive theory and that its application does not reveal causality. Rather, AT helps find patterns and interrelations between the three components of an activity system and within different activity systems.

5 Relevance to practice

Activity theory as a framework takes peoples' practices as its starting point and enables practitioners to understand employees' activities, needs and preferences at work, as well as the reasons underlying the use of office spaces and artefacts. This knowledge is fundamental to informing and steering design interventions and innovations. A wide range of stakeholders may benefit from the insights provided by adopting an AT perspective, for example, (i) facilities managers, for planning and maintenance; (ii) architects and interior designers during the design processes; (iii) product developers, such as designers of furniture or computer equipment intended for office environments; (iv) procurement managers who influence the type of artefacts and tools purchased in workplaces; (v) administrative managers who may influence changes in the work environment; and (vi) occupational health and safety professionals who advise on changes and improvements in workplaces. AT has been used to (re-)design and evaluate the physical environment in workplaces, providing opportunities to bring together employees as participants and co-creators with decision makers in design processes.

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