

## CHAPTER 3

# Activity Theory

### 3.1 INTRODUCTION

The previous chapter identified areas of difficulty with research into online learning which have prevented us from gaining a reliable picture of institution-wide adoption of technologies and of their uses in higher education. What had become evident from multiple studies is that the use of the virtual learning environment (VLE) is predominantly for sharing of course materials and lecture notes. However, a broader examination of the literature indicated that it could not be concluded from these studies that VLEs in campus institutions were underused, nor that they have failed to trigger changes in teaching practice. Research is still limited and subject to a number of methodological constraints. Researchers have also been calling for more system-wide or institution-wide research. Such studies could help to explore reasons for the limited use of technology or gaps in the process of adoption across an institution. It was also highlighted that assertions of the underuse or limited use of technologies should be questioned. Some researchers have called instead for a renewed focus on the context in which teaching takes place and the activities involved. In this chapter, I will take this discussion forward and examine a theoretical framework which has potential value in examining the issues highlighted already.

### 3.2 WHAT IS ACTIVITY THEORY?

Activity Theory (AT) proposes that any human activity can be described and analysed and that activities have a structure, are undertaken under certain conditions and mediated by particular tools, instruments or artefacts, and are performed to meet a purpose. AT regards individual human activities as units for analysis (Kaptelinin & Nardi, 2006a) and it is concerned with the intentional use of tools, or mediating artefacts, by human beings to accomplish things (Cole, 1999).

Activities are not regarded as fixed or permanent, and they may change depending on change in the “social matrix” (Nardi, 1996b, p. 8) in which they are undertaken. Cole and Engeström (1993) comment that

*activity systems are best viewed as complex formations in which equilibrium is an exception and tensions, disturbances and local innovations are the rule and the engine of change.*

**Cole and Engeström (1993, p. 8)**

**Nardi (1996a)** opens her influential book on AT with the following statement:

*Activity theory ... is concerned with **understanding the relationship between consciousness and activity** and has labored to provide a framework in which a meaningful unity between the two can be conceived.*

**Nardi (1996a, p. xi, emphasis added)**

This statement is critical because it points to the underlying psychological basis for AT: that consciousness and activity are not independent of each other; one shapes the other. Activities are defined by intention: a mechanical or automatic action is not an activity, since there is no conscious intention. Consciousness is the carrying out of socially situated activities, or as **Nardi (1996a, pp. 7–8)** puts it, “you are what you do”. Artefacts are used purposefully by humans, setting us apart from animals, and among the tools or artefacts used, language may be one. Language is the specific “tool” that is transformative of culture (**Nardi, 1996a**). **Nardi (1996b, p. xi)** comments that AT is “pertinent” to how we design and use technology because of its “emphasis on artifacts, of which computers are a particularly interesting example, as crucial mediators of human experience”. AT therefore seeks to describe the relationship among the individual, tools or artefacts, other individuals, and the conditions under which a purposeful activity is undertaken with an intended or desired outcome. It does not seek to prescribe changes to the activity, nor does it predict outcomes based on any change to the activity system. It is not aligned with any specific research methods.

Several writers have pointed out that AT is not a theory in the strict sense of the word (**Blin, 2004; Kuutti, 1996; Wali, Winters, & Oliver, 2008**). Perhaps for this reason, it is difficult to identify a single clear definition of AT, although theorists do make statements of their own definitions in the literature. Kuutti’s description is helpful:

*activity theory is a philosophical and cross-disciplinary framework for studying different forms of human practices as development processes, with both individual and social levels interlinked at the same time.*

**Kuutti (1996, p. 25)**

However, **Engeström and Miettinen (1999)** describe the theory much more loosely, highlighting its historical background in the cultural–historical school of Russian psychology. Its proponents there in the 1920s

and 1930s included L.S.Vygotsky, A.N. Leont'ev and A.R. Luria. The literature reflects difficulties in drawing a boundary between the concepts of AT and the works of Vygotsky, Leont'ev and Luria more generally. This may explain some of the difficulties in the uptake and application of the theory. AT provides a conceptual framework for the analysis of particular undertakings in specific scenarios. Its usefulness is in prompting the observer or researcher to address the full context in which something is happening, and the relationships between different people and things in an activity. The concept of mediation is crucial, and is regarded as “revolutionary” by Engeström (2001a, p. 134), since it linked the action of the individual with his or her surroundings. Activities are mediated by particular kinds of tools, and also by our interactions with other people (Nardi, 1996b), and both the artefacts and the people using them are themselves influenced by the process. Attending to the nature of mediation has potential value for people working with and evaluating technology, but AT has also been applied widely in other settings to observe how professional practices work, to examine problems in project management, and in educational settings (Blin, 2004; Engeström, 1987, 1993, 2001a). It has offered insights into areas of practice that might be improved or enhanced, and it can reveal why projects do not succeed, by going beyond what may appear to be the apparently obvious reasons for this (Engeström & Escalante, 1996).

### 3.2.1 A Short History of Activity Theory

AT originated in Marxist philosophy (Wertsch, 1981) and the work of Soviet psychologists in the 1920s and the 1930s (Blin, 2005; CRADLE, 2011; Engeström, 1987, 1993; Jonassen & Rohrer-Murphy, 1999; Kuutti, 1996; Russell, 2002). The theory was developed by A.N. Leont'ev from principles originally put forward by Lev Vygotsky in *Thought and Language* (1986). Vygotsky, A.R. Luria and Leont'ev sought new approaches to psychology, viewing behaviourism and psychoanalysis as inadequate (Vygotsky, 1986), and drawing on Marx's critique of social theory (CRADLE, 2011). Their proposal was “the concept of *artifact-mediated and object-oriented action*” (CRADLE, 2011) and they rejected behaviourist ideas of activity as the response to a stimulus. Vygotsky had proposed that learning was social and situated: the infant comes to understand the world through interacting with it (Bellamy, 1996), and through construction of artefacts. Consciousness and activity were one and the same, and human activities were mediated by cultural tools including language and signs. For Vygotsky, the use and construction of artefacts were part of human development: the mind was not an objective entity but was developed through activity (Vygotsky, 1978).

It is not always clear where the distinction lies between the cultural–historical school and the development of AT in particular (Bannon, 1997), and as a consequence AT is often referred to as CHAT or “cultural–historical activity theory” (Kaptelinin & Nardi, 2006a, p. 36). While recognising the value of this discussion, and the links from AT to its heritage in cultural–historical psychology, “Activity Theory” will be the term used in this book, drawing on the application of the theory particularly in online learning in recent years.

Vygotsky’s original visualisation of his theory is explored by Russell (2002). It shows behaviourism as the response to a stimulus while in contrast, the simple mediational model has three nodes: The human **subject** uses **tools** to achieve an **object**. The object is the motivation for the activity, and the activity is mediated by an artefact or artefacts, sometimes called tools, instruments, or technologies. The process of Subject working towards an Object using an Artefact brings about an Outcome. It is possible for the Outcome to be unintended and even undesired, and it may be qualitatively different than the Object.

Vygotsky’s model was subsequently extended by Leont’ev, to take account of the socially mediated nature of activity, and the roles of other individuals in the activity (CHAT-DWR, 2011; CRADLE, 2011). Leont’ev proposed that activities also depended on a division of labour between individuals (Kaptelinin & Nardi, 2006c). Vygotsky had proposed that human activity was analysable as “object-oriented action mediated by cultural tools and signs” (Engeström & Miettinen, 1999, p. 4), but it was Leont’ev (1981) who made the extension to considering the place of individual activity in a group. Engeström and Miettinen (1999) point out that other theoretical writings by John Dewey and G.H. Mead had addressed the nature of activity and have been linked with Leont’ev’s work. However, according to Engeström and Miettinen, other theorists did not make the connection between all of the “nodes” in an activity system: **individual, mediating artefact, object, community, rules** and **division of labour**. Leont’ev also accounted for the place of “automatic” or unconscious aspects of the activity. He theorised that activities were composed of actions and operations (CHAT-DWR, 2011; CRADLE, 2011; Kuutti, 1996). Thus, there is the overall **activity**, “driven by an object-related motive” (CHAT-DWR, 2011), the level of **action** which is goal-oriented and contributes to the activity as a whole, and finally the level of **operation** (Leont’ev, 1981). Operations are automatic and determined by the conditions under which the activity is undertaken.

As has been widely documented, much of the work of the Soviet school was unknown outside the Soviet Union until it was translated and made more widely available in the 1970s. Engeström and Miettinen (1999) suggest that the historical development of the theory has often been overlooked—perhaps because of its first origins in Marxist philosophy. It may be that, for political reasons, it was not often discussed by theorists in the West. It is likely that the historical roots of AT also contributed to its strong criticism in Russia in the 1990s, following the collapse of communist regimes in Eastern Europe and political change. Engeström and Miettinen (1999), tracing the development of AT since the Second World War, say that it was employed mostly in child psychology, and in studies of language acquisition, as well as the study of instruction. However, the domains in which it is used have become much more numerous since the 1980s, influencing education, human–computer interaction (HCI) and discussion of situated learning, distributed cognition and communities of practice.

### 3.2.2 Engeström's Extension of the Activity Theory Framework

It was not until the 1980s that Leont'ev's work was represented diagrammatically by Yrjö Engeström, whose *Extended Activity System* is commonly used in AT writing and research, and is shown at Fig. 3.1. AT has been the focus of much recent developmental work in Scandinavia, where Engeström and his colleagues have conducted extensive research at the Center for Activity Theory and Developmental Work Research in the University of Helsinki (<http://www.edu.helsinki.fi/activity/>), now the Center for Research in Activity, Development and Learning (CRADLE) (<http://www.helsinki.fi/cradle/>).

Engeström's Extended Activity System builds on Vygotsky's earlier simple mediational model and incorporates visually the extensions to the

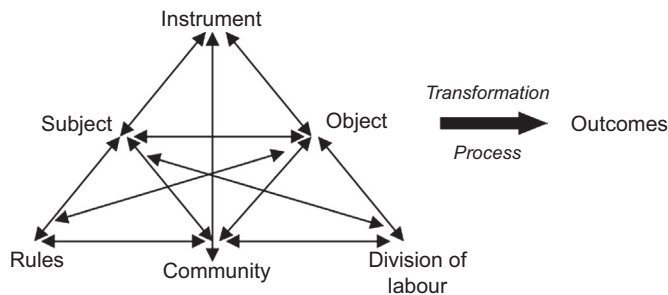


Figure 3.1 Engeström's Extended Activity System (1987).

theory developed by Leont'ev. The individual, the Subject, pursues an Object, using Mediating Artefacts, sometimes labelled tools or Instruments (Fig 3.1). The activity is also mediated by a Community, the Rules of that community (which may be laws, conventions or tacit conditions), and a Division of Labour which sees the activity shared among members of the community. Engeström's system also suggests interactions between all of these nodes, indicated by the bidirectional arrows. This reflects the concept of the activity as unfixed and constantly changing:

*There is also incessant movement between the nodes of the activity. What initially appears as an object may soon be transformed into an outcome, then turned into an instrument, and perhaps later into a rule.*

**CRADLE (2011)**

If conditions change such that the Object is no longer being met or cannot be met, then a break or **contradiction** occurs in the system. The Object is shown to be separate to the Outcome which is an important distinction: contradictions in a system may be one reason why the Outcome is not the one anticipated or even desired. [Blin \(2004\)](#) says of Engeström's model that it:

*goes beyond a mere description of the relationships between the different constituents of an activity system. Activity systems are multivoiced formations where different subjects, whether individual or team, bring their own histories and construct the object in different ways, through their status in the division of labour and their level of familiarity with the mediating tools available.*

**Blin (2004, p. 383)**

Engeström's ([Cole & Engeström, 1993](#); [Engeström, 1987, 1993, 2001a,b](#)) work in AT articulates a set of principles and a means of application of the theory which have been widely adopted. For [Engeström \(2001a, p. 137\)](#), activities are always:

- goal-directed;
- multivoiced;
- historical and changing over time;
- subject to contradictions which are sources of change and development;
- subject to the possibility of "expansive transformation".

Expansion is an important concept in Engeström's work. Activity is an "expansive" process for [Engeström \(1987, p. 8\)](#) integral to learning, but not confined to formal settings. For Engeström, "[a] theory is a potential instrument for dealing with practice" ([Engeström, 1987, p. 23](#)), and using theory can help show how learning can take place in organisations and work settings.

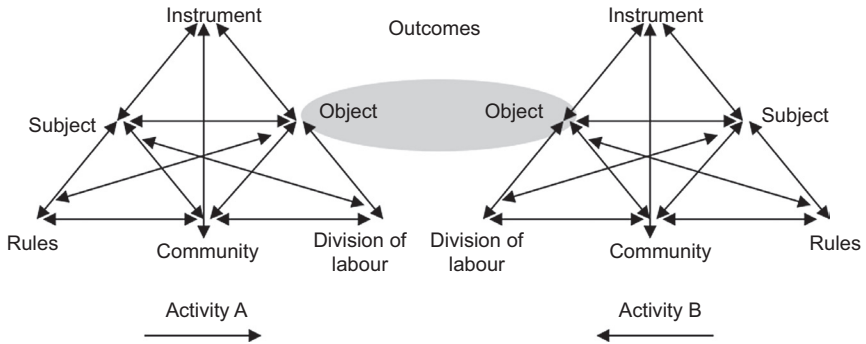


Figure 3.2 Potentially shared and unshared Objects (CRADLE, 2011).

Third generation AT is concerned with identifying the connections between activity systems. Engeström proposes in this regard that there are potentially shared or unshared Objects between activities. Fig. 3.2 shows Activity A and Activity B, and the diagram indicates in the central high-lighted area that there are two Objects which may or may not be shared between these systems. Researchers will often present this diagrammatically with Activity B being read from right to left, rather than the conventional left to right reading as in Activity A.

### 3.3 IMPORTANT CONCEPTS IN ACTIVITY THEORY

#### 3.3.1 Consciousness, Context, Activity Are the Same

AT posits that consciousness, context and activity are one and the same. There is no context *for* an activity—the activity *is* the context, and the participants act consciously. As Nardi (1996a, p. 7) puts it, “you are what you do”. For example, an activity theorist would say that it is not possible to design a computer system with a fixed notion of the user: their intentions and consciousness are going to influence the system. For activity theorists adhering strongly to this principle, the mind itself is the production of particular activities and the relationship between the Subject and the Object.

#### 3.3.2 Internalisation and Externalisation

AT does not regard the human mind as something separate, objective or distant from an activity. Its concepts of **internalisation** and **externalisation** describe the ways in which Subjects negotiate their paths through activities. For Vygotsky, an individual (Subject) undertaking activities, who came to understand aspects of the external world by virtue of such activities, could

then internalise this understanding. This would in turn enable the understanding to be externalised later on, to undertake a new activity. The use of the mediating artefacts leads to understanding of how these perform in the activity, and in turn to the creation of other artefacts. The relationship between the activity and the person is bidirectional (Kuutti, 1996). Engeström and Miettinen define internalisation and externalisation in the following way:

*Internalization is related to reproduction of culture; externalization as creation of new artifacts makes possible its [culture's] transformation. These two processes are inseparably intertwined.*

*Engeström and Miettinen (1999, p. 10)*

### 3.3.3 Activities Are Object-Oriented and Lead to an Outcome

Issroff and Scanlon (2002b), working from first principles in their description of AT, suggest that humans have intentions, consciously considered because of human cognition. Activities are distinguishable from other actions in the world by the fact that they have an Object, which can be defined as an objective or as a thing demanding activity (Engeström, 2001a, 2001b; Kaptelinin, 1996b; Nardi, 1996b), a “problem space” (CRADLE, 2011). The activity is motivated by the Object, and focused on transforming the Object into an Outcome. Kaptelinin and Nardi comment on object-orientedness, returning to first principles:

*All human activities are directed toward their objects. When people design, learn, or sell, they design, learn or sell something. Their dreams, emotions and feelings are also directed toward something in the world.*

*Kaptelinin and Nardi (2006b, p. 66)*

Engeström's (1993, 2001a) work analysing activity systems in health centres quite often leads him to define a number of different Objects within the same organisation: for example, a sick child is a different case than that of someone with a chronic condition, but the health centre must treat both. Activity theorists argue that analysing “Objects” is essential to gaining an understanding of people and what they do, whether alone or in groups. Objects can be distinguished from Outcomes as they are the kernel of the activity: they instigate and steer it, and Kaptelinin and Nardi (2006b, p. 66) say that in Objects, “activities are crystallized in a final form when ... complete”. But while these Objects have such an important role, it is also well to remember “objects do not unilaterally determine activities: it is activity in its entirety, the subject–object relationship, that determines how both the subject and the object develop” (Kaptelinin & Nardi, 2006b, p. 66).



According to AT, Objects are “transformed” by activities into Outcomes. This has proved to be an area of some difficulty in AT, and it may be challenging for theorists and researchers to differentiate between Objects and Outcomes. Davydov (1999) offers some helpful insights here. He comments that transformation implies an “internal” change to the object, “making evident its essence and altering it” (Davydov, 1999, p. 42). To help resolve this, he identifies two kinds of transformation. One is “formal”: humans transform things by classifying them into a certain category, for example, a shoe is placed in the category of footwear. This is evidence of “cognitive activity” (Davydov, 1999, p. 40) and therefore transformative. The shoe itself is not physically changed, but its organisation and categorisation are a transformation brought about by the activity. The second kind of transformation is “dialectical” (Davydov, 1999, p. 40): finding resources and “creating conditions” (Davydov, 1999, p. 40) for change, for example, locating and planting seeds, to produce food. In this case, there is a physical change to the seeds and a different material item is produced when the seeds have grown. Therefore, transformations and changes may be cognitive as well as being physical or material.

### 3.3.4 Activities Are Mediated and There Are Mediating Artefacts

Luria asserted that what set humans apart from animals was our ability to make tools and use them with intention (Cole & Engeström, 1993). Engeström (1987) regards this as a fundamental change: making and using tools marked the beginnings of social order and the division of labour among humans. Developing and using tools allows us to fulfil our intentions, but we are also influenced by the process of tool use. AT contends that activities are undertaken using, or are mediated by, artefacts/tools. The mediating role of artefacts has been discussed extensively in AT literature. Kaptelinin and Nardi comment:

*Human beings seldom interact with the world directly. An enormous number of artifacts has been developed by humankind to mediate our relationship with the world. Using these artifacts is the hallmark of living the life of a human being. Tools or instruments—physical artefacts mediating external activities—are easy to recognize, and their impact on the everyday life of every individual is obvious.*

*Kaptelinin and Nardi (2006b, p. 42)*

Cole (1999) discusses this further, commenting that artefacts evolve to include the modifications of the individuals using them in previous times, and the symbolic value of such modifications. The artefact may be altered by its mediating role, and will have invested in it the changes or adaptations

associated with its use in that time and place by that individual or group. The person using the artefact will also be changed by the process (Bannon, 1997; Bødker, 1996; Kaptelinin, 1996b; Kuutti, 1996). Mediation is therefore “reciprocal” (Kuutti, 1996, p. 27). Kaptelinin (1996a, p. 109) comments, “Tools are thus the carriers of cultural knowledge and social experience”. Engeström (1993, p. 68) expands on this viewpoint to suggest that the whole activity “always contains sediments of earlier historical modes, as well as buds or shoots of its possible future”. Tools may be enhanced or changed if contradictions or difficulties are found in the system, and have the potential to enable an activity or limit it (Kuutti, 1996). Importantly, Kuutti suggests that the subject will undertake the activity using the tool, but will not see beyond that activity to other potential uses of the tool. Artefacts can be enabling to activities, but they can also limit them (Wali et al., 2008). Blin (2004, p. 383) comments that tools can also “restrict the interaction between the subject and the object”. The introduction of a new artefact/tool will affect the processes of the activity, while social practices and Objects will influence how the artefact is used (Bellamy, 1996).

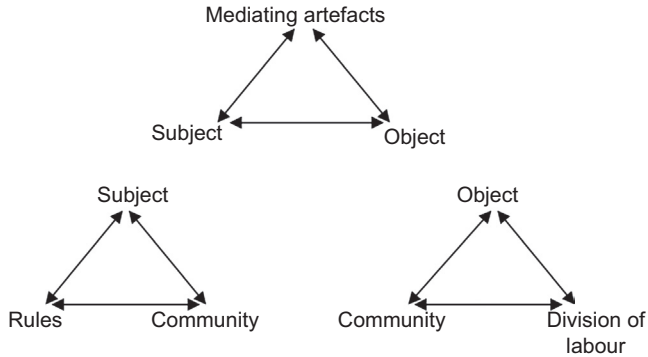
Artefacts are the tools or instruments mediating the individual’s activity towards a goal. Artefacts may be real things, such as machines, or can be symbolic systems or signs including language, numbers, mnemonics and visual symbols (Wertsch, 1981). The artefact may be altered by its use in the activity, and using the artefact will influence the person undertaking the activity (Blin, 2004). The terms artefacts, instruments and tools are often used without any distinction being made between them (Thorne, 2003), and in this book they will be used interchangeably.

### 3.3.5 Activities Have Rules and a Division of Labour

Activities are also mediated by the Rules of the Community and by the Division of Labour among that community. Kuutti (1996) discusses this and suggests a framing of three mediated systems within one activity system, represented diagrammatically in Fig. 3.3. It is important (as discussed previously) not to regard this as a limiting structure, since all nodes within the activity system are connected, and can influence each other.

### 3.3.6 Rules

Leont’ev’s work, and subsequently the Extended Activity System proposed by Engeström, suggests that the individual’s activity is mediated by the community of which he/she is a member, and by the “rules” of that community. Rules may be stated and documented—for example, regulations associated with practice in a professional sphere. However, Rules may also be tacit and



**Figure 3.3** Three mediated systems within one activity system as suggested by Kuutti (1996).

undocumented, and relate to what is acceptable in the culture of that community. When we seek to model activity systems, it is therefore important to examine and document both tacit and explicit rules. Kuutti (1996) suggests that Rules mediate the relationship between the Subject and the Community, and are represented in this way in Engeström's Extended Activity System.

### 3.3.7 Division of Labour

Leont'ev's development of AT proposed that activities were also mediated by the Division of Labour within the Community for that activity. Kuutti suggests that Division of Labour mediates the relationship between Community and Object, and is so represented in Engeström's Extended Activity System. Division of Labour in a workplace context would follow the designated roles of individuals there (Engeström, 2001a). In the context of a classroom, the Division of Labour will be among everyone: teachers, students, assistants. It is not only the role of the authority figures or leaders to take on the activity. The realisation of the Object is shared.

### 3.3.8 Operations and Actions Contribute to Activities

Leont'ev's (1978, 1981) conception of the activity system is hierarchical in nature, with the Object-oriented activity at the top of the hierarchy (Bannon, 1997; Kaptelinin & Nardi, 2006b). But other tasks and actions feed this activity and are clearly defined in Leont'ev's model, and by the theorists who followed (particularly Kuutti (1996)). The system has three levels: **Activity**, **Action** and **Operation**:

1. **Activity**: this is the overall system, in which an individual seeks to transform an object into an outcome.

2. **Action:** this is goal-oriented and contributes to the overall activity.
3. **Operation:** this is an automatic process which contributes to the actions associated with the activity.

A change of conditions at any of these levels can interrupt the activity or cause a break in the system. In the case of Operations, which do not normally require conscious effort, these may be returned to the level of Action and require conscious effort once more. Kuutti states that

*actions consist of chains of operations, which are well-defined habitual routines used as answers to conditions faced during the performing of the action. Initially each operation is a conscious action, consisting of both the orientation and execution phases, but when the corresponding model is good enough and the action has been practiced long enough, the orientation phase will fade and the action will be collapsed into an operation, which is more fluent.*

*Kuutti (1996, p. 31)*

The new action comprises the operation which has become automatic, but if there is a change in conditions, this situation may be reversed and the operation “can again ‘unfold’ and return to the level of conscious action” (Kuutti, 1996, p. 31). It is possible for any of the levels to have backward or forward movement and change: at the topmost level, it is possible for an Activity to become an Action if it loses its specific motivation, the Object. Leont’ev (1978) gives the tangible example of changing gears in a car. For someone who knows how to drive, gear changing is an Operation and can be undertaken without conscious thought. But in a new car, this process may return to the level of Action as the individual becomes accustomed to using the gear mechanism. Similarly, Actions may become Operations over time: if the Action is performed sufficiently well that it no longer requires conscious effort, it can be subsumed into the Operations. This may open up the scope for new Actions to become part of the Activity. The system overall may then change: it could have a new Object or desired Outcome as a consequence.

Kuutti (1996) describes Actions as potentially the technical processes or the reuse of something, or the location of resources or materials that will contribute to the activity. Actions are consciously undertaken, and have goals, but their goals are not the same as the Object of the activity. It is also possible for the same action to contribute to different activities “in which case the different motives of activities will cause the action to have a different personal sense for the subject in the context of each activity” (Kuutti, 1996, p. 31). For example, Kuutti says, if a person is asked to report on the progress of a project at work, that action will be very different if the

activity is internal team-working, or as part of a competition for promotion. Both activities involve preparation of a report (for example) but the completion of that action will then feed into two very different activities. Actions are planned in consciousness using a model. The model is used to carry out the action in what is termed orientation (Kuutti, 1996).

Levels of the activity are one area in which machines and computers may have a very obvious role. Nardi (1996b) discusses this, saying that computers may automate actions (which then become operations), or they may open up the scope for new actions within an activity, or they may generate new activity systems in which they perform some of the actions or operations.

### 3.3.9 Contradictions in Activity Systems

**Contradiction** is an important concept in AT. Kuutti describes contradiction in the following terms:

*Because activities are not isolated units but are more like nodes in crossing hierarchies and networks, they are influenced by other activities and other changes in their environment. External influences change some elements of activities, causing imbalances between them. Activity theory uses the term contradiction to indicate a misfit within elements, between them, between different activities, or between different developmental phases of a single activity.*

*Kuutti (1996, p. 34)*

For Engeström (1987), contradictions are useful indicators of points for development and expansion in the activity. To support analysis of contradictions, he proposes that they can be broken down according to four types (Blin, 2004; Engeström, 1987; Yamagata-Lynch & Haudenschild, 2009):

1. **Primary contradictions:** these affect all nodes in the activity system, and occur when there is more than one value system at play for the Subject. Engeström gives the example of the physician who wishes to heal patients, but must also run the medical centre as a business.
2. **Secondary contradictions:** these occur when something new is introduced to the activity, and adaptation or absorption of this change causes conflict. This could be seen in a change of procedure or instrument.
3. **Tertiary contradictions:** the adoption of a new method for achieving the Object causes problems with other parts of the activity. This might occur, for example, when there is enforced change to a process.
4. **Quaternary contradictions:** these are changes to an activity that result in conflicts with other activities.

Using Engeström's Extended Activity System (Fig. 3.1), activity theorists have modelled activities and identified where breaks in the system—contradictions—may occur. AT regards these breaks as opportunities for development (Bødker, 1996; Kuutti, 1996). Remediating tools may be devised to resolve the break, or the Rules or Division of Labour changed. These will enable the activity to continue towards its Object, or for a new Object to be identified.

Although contradictions are the means for developing activities, they have also led to criticisms of AT as a diagnostic for failure, highlighting problems, but offering no prescription for how to solve them (Issroff & Scanlon, 2002b). However, modelling the activity using the Extended System and identifying contradictions where they may exist can yield unexpected or unanticipated information and not the “obvious” or “common sense” answers. This may facilitate remediation or enhancement of the activity in ways that would not otherwise have been possible, or help to explain the failure of a project. (For a fascinating example of this, see the study by Engeström and Escalante (1996) of the cancellation of the *Postal Buddy* service by the United States Postal Service in the early 1990s.)

### 3.3.10 Activities Are Constantly Changing

Activity theorists frequently emphasise that, although researchers may attempt to model activities to analyse them, it should not be assumed that we are describing fixed and immutable entities. Notwithstanding the potential usefulness of Engeström's Extended Activity System, it is important to highlight that the diagrams are “for the sake of representational simplicity and convenience” (Kuutti, 1996, p. 33). In fact, activities are constantly changing (Kuutti, 1996).

Development may be uneven and intermittent, and some of the old aspects of the activities may remain as new ones develop. This implies that the historical context of the activity may need to be examined to understand it. Russell (2002) comments that AT is a “lens” through which we can view activities at different times. We can also choose to view different systems. For example, he says, we might look at students in the activity system of the university, or within their discipline area, or within one module of a subject. They may have quite different Objects depending on which system they are working in: to obtain grades for their progress through university, rather than to gain an understanding of a particular concept in a subject.

### 3.3.11 Activity Theory: Limitations and Strengths

While much has been made of the strengths of AT as a possible “unifying theory” for a range of disciplines (Nardi, 1996d), it has a number of inherent challenges and limitations which remain unresolved. It is also important to differentiate it from a number of similar theoretical approaches, which activity theorists have addressed in their discussions.

### 3.3.12 Issues in Modelling Activity Systems

Working with AT presents a number of challenges which are discussed in detail by Engeström, Miettinen and Punamäki’s (1999) edited book, and later by Kaptelinin and Nardi (2006a). In the first instance, it can be difficult to model an activity system because of the interconnected nature of the nodes. Determining the Object is essential in modelling the activity and in discovering potential contradictions in the system, and differentiating between Objects and Outcomes can be very difficult. Identifying the Mediating Artefacts in the system is also challenging, as they are often wide ranging. For example, Yamagata-Lynch and Smaldino (2007) include budget as one of the tools in activities associated with teacher professional development, yet costs and finances might not readily be associated with an activity as tools.

### 3.3.13 Individual and Collective Activities

Researchers have also highlighted the tensions between individual and collective activities in AT. Davydov (1999) suggests that insufficient attention has been paid to this in some theoretical discussion thus far, and that it is an unresolved issue. Reflecting the place of the individual adequately, his or her personality or motivation, and reasons for engaging with the activity system can be difficult. The Extended Activity System seeks to convey equal importance of all elements of the activity: all nodes are integral to the activity being undertaken, and therefore Subject and Community are recognised equally. The criticism has also been made that the activity “system” is deterministic, reducing the role of the human actor as subservient to a system. However, the Object is determined by the human actors and argued to be the motivator for the activity (Kaptelinin & Nardi, 2006b). Moreover, as Lektorsky (1999) points out, the principle of externalisation in AT implies that humans also change things by their actions and effect change in the system—they are not subjugated by it. The identification of contradictions in the system may point to areas where individual and community are not working towards the same Object. The analysis of Actions contributing to

the activity may also reveal that there are tensions between individual and community in an activity. It is therefore important to bear these potential contradictions and tensions in mind when applying AT.

### 3.3.14 Limited Scope to Take Account of Cultural Diversity

A significant challenge for activity theorists is how to take account of cultural diversity in their analysis. While AT has a clear concept of the culture of an activity system in terms of the Community, Rules and Division of Labour, it is arguably not well enough developed to take account of a culturally diverse real-world community. Engeström and colleagues (CHAT-DWR, 2011) regard this issue as a defining challenge for third generation AT. They credit Cole (1999) with raising this issue as an important area for further development.

The possibility of potentially shared and unshared Objects between activity systems (Fig. 3.2) is proposed as one means of analysing cultural differences. However, an example from Goodfellow and Hewling (2005) highlights the complexity of this issue when mediating artefacts are also considered. They examine the issue of students' ethnicity in the VLE, but suggest that it may be more appropriate to look at the culture of participation in the VLE in distance/online learning. They argue that institutional cultures and a "culture of interaction" (Goodfellow and Hewling 2005, p. 355) in the VLE contribute to how it is used. This challenges the view that culture in terms of a national or linguistically constructed identity is articulated through the VLE. Instead, this research suggests that online environments are themselves socially constructed. There is a culture of that cohort of students using the VLE. The argument made by Goodfellow and Hewling is useful in returning the discussion to the Object of an activity: in their example, students are participating online to learn as part of their formal course. This Object determines their use of the VLE as a mediating artefact, and their personal backgrounds and ethnicity are internal to them. Nonetheless, the effects of cultural factors on how people perceive and use mediating artefacts, how they interpret Rules in a new community, and in turn contribute to an activity may be very complex. Thorne's (2003) research develops these ideas too, suggesting that "cultures of use" of artefacts are developed, and that other cultural factors will be embedded in these.

### 3.3.15 Activity Theory Does Not Have an Explicit Methodology

A perceived limitation of AT is its lack of a clear description for how it should be applied, and its lack of proposed methods for analysis



(Bannon, 1997). Blin (2004, p. 387) comments that AT “does not provide precise guidelines on how to define what actually constitutes this unit of analysis”. However, this lack of prescription has encouraged activity theorists to be eclectic in the methods they use to collect and analyse data to model activity systems. It has also facilitated useful interactions between AT and other theories and methods. Bannon (1997) suggests that people may be reluctant to use a complex theory without adequate guidance in the form of prescribed methods. It may also be difficult to generate a consistent body of work using common methods that can point to the value of AT without commonly shared methods. It may simply be difficult for activity theorists to communicate the value of the theory in the absence of detailed methods for its application and use, and there is a view of the theory as a best kept secret in research.

### 3.3.16 Strengths of Activity Theory

Given that AT also lacks a definitive set of methods for its application, a reader might be somewhat daunted by the prospect of using it, as indeed Bannon (1997) has pointed out. It is important, then, to highlight the strengths of AT in analysing complex activities. Russell (2002) makes a simple case for AT, saying that “it’s a framework for asking good questions: don’t use it without a problem you are trying to solve or you will be running in circles or triangles in this case.” This statement somewhat humorously draws attention to the issue of trying to represent activities according to the Extended Activity System. In Russell’s view, the point is to identify people’s *perceptions* of what is happening, rather than using AT to try to describe what *is* happening. Committing to the Subject’s point of view allows the researcher to work with people’s perceptions of an activity, which may well differ from what is happening, or what was intended to happen. This is a key strength of the theory as it provides a heuristic for identifying what might need to change. AT is not a research method nor a predictive theory, and therefore offers the researcher the opportunity to decide and determine the most appropriate methods:

*I would like to state clearly that AT explicitly rejects endorsing a specific method .... I know of no other theoretical framework that provides such a powerful means of sorting out methods and suggesting when it is appropriate to use them, making clear that the object of study must determine the method.*

(Nardi, 1998, p. 260)

This is a strong statement emphasising the capacity of the theory to inform research designs, and potentially to enhance them. AT can be a

powerful heuristic in the context of a broader investigation. It does not offer prescriptions for fixing something, although it may contribute to our understandings of activities and thereby inform next steps. Advocates of AT suggest instead that it guides the researcher: first in clarifying the object of study, and then in revealing how to investigate that object and why certain contradictions or breaks have occurred in a system. Engeström (1993, 2001b) asserts that the contradictions are points of development and change, and as such present opportunities to the researcher to make informed recommendations.

A further strength of AT is its capacity for application at different levels in a large system or organisation. Engeström and Miettinen (1999, p. 8) suggest that AT is useful in being able to connect “macro and micro levels of analysis”. It offers the possibility of examining individual cases or overall organisations, since the same mediating artefacts may be used in both, or even by all of society. Third generation (Engeström, 2001a) AT supports the investigation of the connections between activities in larger systems (Bødker, 1996). Activity systems might be modelled across any or all of the divisions of an organisation. The challenge is to address what the systems have or do not have in common. The concept of the potentially shared object is a way of examining the interaction between systems (CRADLE, 2011; Engeström, 2001a). Researchers have focused on the relationship between the shared and the unshared Objects and Outcomes: all of the elements in the activity system might be supposed to be working towards the same Object, which is shared among systems. Objects might not be shared for a number of reasons: there may be different understandings of the Object in different parts of the organisation. There may be misapprehensions about what actions are being taken to meet the Object, and people may be unaware of different understandings of what is at issue:

*These different constructions of the object may be converging or conflicting and the subjects may not be aware of the object of the activity until it has been transformed into an outcome. The awareness of the actual object of the collective activity is often gained through a **retrospective analysis** of the subject's own practice.*

*Blin (2004, p. 383)*

This is one of the key strengths of AT. It has the potential to be a unifying theory for the examination of human activities in a wide variety of disciplines (Engeström et al., 1999).

### 3.4 WHAT IS THE RELATIONSHIP OF ACTIVITY THEORY TO E-LEARNING?

#### 3.4.1 Activity Theory and Technology

Over thousands of years, humans have interacted with their world in different ways and with different purposes in mind. Evidence of those interactions is still visible today through the artefacts and mediating artefacts that have been left behind, for example, in the ancient artefacts uncovered by archaeologists and historians. In my own locality, visitors to the Neolithic passage graves at Newgrange in County Meath are invited to interpret carvings on an entrance stone to the monument. Experts are no more sure of what the carved stone represents than any of the tourists visiting the site (Stout, 2002). We can all think of similar examples from our travels or from what we have learnt about the past. Because of the complexity of human activity and technological change, meaning we do not use the same tools as our ancestors, we are often forced to speculate as to the nature of historical activities and their intended goals. AT provides a lens through which we can examine how technologies mediate *current* human activities, seeking to describe and understand them. AT is connected with technology in two ways (Nardi, 1996c): first, technologies are often the mediating artefacts in activities, leading to the production of other artefacts as part of the outcome of the activity. Second, technologies can contribute at the action and operation levels of the activity: they may automate actions which can then be subsumed into operations. They may in turn open up the possibility of adding new actions to the activity to enhance it, and may ultimately change the activity overall, leading to a new activity (Kuutti, 1996).

The potential of technology to automate certain processes, thus opening up the possibility of change in various activities, means we have complex responses to technology, often reflected in popular media. We may experience excitement but also anxiety about which elements of human activity will be automated. Such changes may be convenient for us, or be perceived as a threat depending on our points of view. However, the discourses surrounding technology will tend to foreground the tools in the first instance. Technology was emphasised in discussions of *computerisation* in the 1980s, and the *Information Superhighway* in the 1990s. In these terms, technology is centre stage, and its benefits and threats are discussed often as part of some imagined future, rather than in interaction with current social contexts and activities. Confident

predictions are made based on the functionality of the technology, but in practice mediating artefacts may be used quite differently than the ways anticipated. For example, the enormous uptake of short message service messaging or “texting” with mobile phones was unforeseen, but appealed to users as a way of communicating effectively with a minimum of disturbance caused to the recipient of the message (Markett, Arnedillo Sánchez, Weber, & Tangney, 2006). Technology can also fail to automate certain processes and actions, which it appears must remain at the level of conscious human action. Engeström (2001b) reported examples from medical centres where the quality of patient care had been compromised through the inappropriate use of technology to manage the allocation of doctors’ appointments, leading to discontinuity of care.

AT can provide an alternative analysis of situations in which technology has been viewed as having failed, or has been used in unexpected or unforeseen ways, because the artefact is examined *as an integral part of the activity system*. From an activity theoretic perspective, the issues for consideration are not “computerisation”, the potential of technology, or the development of new activities *for* that technology. Instead, an activity theoretic perspective regards the technology as being bound into activity. The nature of the activity is examined, rather than the technology *per se*. The relationship between e-learning and AT, therefore, should be a fruitful one in helping to analyse areas of work in which technology is being introduced, assessing the use of existing technologies, and accounting for issues or problems which might be resolved to enhance this. AT has the potential to challenge dominant trends in research in online learning. If analysis were focused on activities—rather than describing technologies and what they can or cannot do—AT would cast much e-learning research in a critical light. Despite the best efforts of many researchers, and the conscious awareness that their field has too often focused on technology (or has even been technologically deterministic), it appears that most research is indeed focused on technology, with limited consideration of the activities in which it is being used. As in the examples discussed by Engeström and Escalante (1996), many e-learning researchers may be at risk of “falling for” the technology as the Object, rather than looking at the Object of an activity for which technology is being used. AT has been widely adopted by researchers in HCI. While space precludes a full discussion of its use in this discipline, its adoption in HCI is articulated in HCI literature as supporting a unified approach to the examination of technology in use, and the place of the human actor within systems (Kuutti, 1996). AT appeared to offer the

potential to address theoretical problems in HCI research. [Kaptelinin \(1996b, p. 61\)](#) suggests that AT is a useful framework for HCI because it “integrates multilevel perspectives on human activities within a single conceptual framework”. It offers the same potential to researchers in online learning.

### 3.4.2 Activity Theory and Educational Change

The work of Vygotsky and his colleagues has influenced constructivist thinking, supporting the idea that learning is social and collaborative in nature, and that authentic contexts and artefacts will be effective in teaching and learning ([Bellamy, 1996](#); [Laurillard, 1993, 2001](#)). AT has been used extensively to research learning ([Cole & Engeström, 1993](#)) and aspects of this work have relevance to the research presented later in this book. For example, [Miettinen’s \(1999\)](#) activity theoretic analysis of educational theory and formal schooling identified that formal educational systems continue to rely largely on memorisation and reproduction of texts by students, rather than learning through activities which will have meaning in society after formal education. This, he suggests, has been the principal activity of many education systems for over a century—but it has been critiqued for almost as long. The mediating artefact in the activity of formal learning is the text, which has been disconnected from societal practices. This line of argument, [Miettinen \(1999, p. 327\)](#) says, is visible all the way through to the 1980s and the 1990s, and there are “numerous studies suggesting there is a surprising disjunction between the intuitive knowledge individuals have about the physical world and the kind of knowledge acquired in school”. [Engeström \(1987, p.101\)](#) characterised school learning from an AT perspective as “the strange reversal of object and instrument”. In other words, as [Miettinen \(1999\)](#) points out, the object of learning was the reproduction of a text which was itself the tool for learning. Having reviewed this history, [Miettinen \(1999\)](#) concludes that large numbers of studies support the conclusion that transmission and testing were still the predominant modes of learning and teaching in formal settings, and this is paralleled in the work of [Barnes \(1971\)](#).

For some researchers and activity theorists, technology appears to offer the means to change this reliance on text and testing. Earlier in this book I discussed research in e-learning which anticipated changes in educational institutions and in teaching methods, prompted by new technologies. However, [Bellamy \(1996\)](#) comments that although we see evidence of change

apparently caused by technologies in history, it does not follow that new technologies prompt educational change. Taking the perspective of AT, Bellamy and Miettinen discuss instead what else needs to change in order for the activity of learning to change. Miettinen (1999, p. 328) suggests that there are two possible explanations for the persistence of the transmission mode in education: from an activity theoretic perspective, the view that students need to be prepared to be obedient participants in society; and secondly that “frame factors” determine what the teacher can do. Frame factors are “institutional and physical factors such as curriculum, time, number of pupils, and the classroom as a physical space.” Curriculum, particularly state-centralised curriculum, and its artefacts (such as textbooks and workbooks) also affect the activity. AT suggests that the only way to change the activity of school learning is to reexamine its Object (Miettinen, 1999). The current Object of school learning is, Miettinen (1999, p. 342) argues, “the school text, now mainly in the form of grade-specific standard textbooks and packaged materials”. The solution is to introduce different activities: authentic activities, collaborative learning and the use of knowledge in a “network of learning” (Miettinen, 1999, p. 342). He sees some signs of this starting to happen, and a reconception of curriculum “as ongoing, multivoiced discourse and experimentation in a network that brings together actors representing various interests, types of expertise, and cultural backgrounds” (Miettinen, 1999, p. 342). Bellamy’s (1996) discussion concludes that the introduction of a technology to an educational setting will be affected by psychological factors as much as by the technology itself. Teachers must feel at ease with using the technology and not threatened by it, and must have easy access to the technology as well as good support. Leaders should also be comfortable with it, she argues: they must support the change and not fear any loss of power or control due to the technology (Bellamy, 1996).

These discussions, concerned though they are with school level, have important implications: they highlight that the transmission model has been persistent, and is not easily altered without a reconsideration of the whole nature of the Object of learning. This challenges some of the literature discussed earlier, in which it was imagined or assumed that technology alone could be the catalyst for change from a behaviourist/transmission-based model towards a constructivist one. Second, it should not be assumed that technology will trigger any change—or at any rate, any predictable change—to an activity. From an activity theoretic perspective, the adoption and use of technology will depend on its role as a mediating artefact, and

that in turn will be influenced by the “frame factors” (Miettenen, 1999, p. 328) of the teachers working in the current activity system of teaching and learning.

### 3.4.3 Activity Theory and Online Learning: Some Examples From Research

There are several examples from e-learning research where AT has been used to examine teaching and learning with technology in different settings. The work of [Issroff and Scanlon \(2002a\)](#) represents an early example of the application of AT to examine the uptake and use of a website to support a History course at the university level. Later, [Scanlon and Issroff \(2002\)](#) used AT to examine evaluation practices in e-learning, finding that there were some contradictions in the activity of evaluating e-learning for higher education. They suggest that widely used frameworks such as the CIAO framework ([Scanlon, Jones, Barnard, Thompson, & Calder, 2000](#)) and the Evaluation Toolkit ([Harvey, 1998](#)) do not take adequate account of interactions in the classroom. These frameworks also appear to focus on the goal of increasing the use of technology, which they question as a valuable outcome of evaluation, although they account for it by saying that evaluations are often required to show that technology has value and will support learning as effectively, or more effectively, than traditional media. They argue that evaluation criteria need to be extended, and that AT can play a valuable role in the analysis of evaluation findings. Reanalysing the evaluative research of [Breen, Lindsay, Jenkins, and Smith \(2001\)](#), they suggest that many of the findings of this work could be traced back to contradictions in the activity system: changes to the rules of an activity brought about by the introduction of a technology, or changes to the division of labour. For Scanlon and Issroff, AT proved useful in helping to identify areas for further analysis or investigation. However, they report that AT was less useful in identifying fine-grained problems in interactions, and it did not provide any guidance on how to resolve these.

The potential of contradictions is discussed in [Murphy and Rodriguez-Manzanares \(2008\)](#), who argue that contradictions have the power to direct e-learning research. AT is useful since it “shifts from a focus on tools themselves to tool use” [Murphy and Rodriguez-Manzanares \(2008, p. 445\)](#) but also because contradictions are the triggers to expansion and development of the activity. However, they signal the difficulties in working with contradictions as difficult to pinpoint and articulate, and therefore difficult to resolve ([Murphy & Rodriguez-Manzanares, 2008](#)).

Margaryan and Littlejohn (2008) used AT to analyse the uptake and use of Learning Object Repositories (LORs), interviewing curators and users of three LORs in their research. They discuss a number of contradictions which they have been able to address through constructing guidelines for people developing or enhancing LORs. Working with university programmes in the United States, Kahveci, Gilmer, and Southerland (2008) examined the use of technology by two Chemistry professors. Their focus was on the potential for technology to support a student-centred, active learning approach to their subject—something advocated by US national guidelines. They used qualitative methods, including participant observation, in-depth interviewing and artefact analysis. Their analysis revealed that, although both professors found email useful, and both were questioning the educational value of PowerPoint, they otherwise had very different approaches to the use of technology in their teaching. One felt that his own abilities and communicative skills were inherently better than any teaching aid, while the other adopted a “bricolage” approach: he used technology in a variety of ways to blend activities inside and out of the classroom, and made extensive use of the university’s VLE, Blackboard. Kahveci et al. (2008, p. 342) suggest that two very different views of good teaching emerged, with one of these coming from the viewpoint of the professor’s own “powers” rather than any agreed strategy for teaching. This, they say, is evidence of a contradiction in the department’s response to national guidelines, and that this in turn led to a contradiction in the activity system between the Subject and the Mediating Artefact. This is a carefully made distinction: it is not a contradiction between Subject and Object, but the analysis suggests that depending on the Subject’s starting point there may be different and even contradictory uses of the technology. They found that there was a further contradiction between Subject and Division of Labour, since there had not been adequate discussion of good teaching practice at the departmental level. The institutional decision to set up large groups for lecturing (Rules) further contradicted the Object of teaching for understanding. Finally, a poorly designed teaching space—even if well equipped—was a Mediating Artefact that could contradict the Object, according to their data. Thus, the “frame factors” (Miettinen, 1999, p. 328) of these teachers were affecting their Objects in teaching Chemistry. Interestingly, Kahveci and colleagues suggest that one way to resolve these contradictions would be to look at pedagogical background and teaching in the subject, to persuade people away from a model of teaching as they were taught themselves. The authors concluded that



there was a need for the subject department to reflect on and evaluate its approach to teaching, and potentially to support professional development for people teaching in the subject.

In relation to one of the key concerns of this book, adoption of the VLE, Karasavvidis (2009b) used AT to examine the use of Moodle at the University of Thessaly. The research focused on the extent to which the students were using online resources. The students were inexperienced in using blended learning, and were required to learn to use a variety of digital formats to produce an educational multimedia application. The course was for one semester and used group-working techniques. The Moodle environment provided materials, additional weblinks, lecture notes, assignments and Forums for the blended components of the course. Use of the blended learning space was measured with pre- and postsurveys, semistructured group interviews with students, analysis of server log files, field notes from informal observations, discussions and remarks about the course. The data were analysed to try to identify what supported or hindered student use of the VLE. At the end of the semester, 18% of the resources had not been accessed at all. The Forum accounted for nearly 50% of resource views, but students had been required to use it for group formation and submission of work. Some resources for which the researchers had anticipated heavy use were rarely used. These findings led Karasavvidis and colleagues to identify a number of contradictions in course activity, which he describes. Two approaches were seen: students engaging on a deep level with the course, and students working to pass the course. Students taking a deep approach viewed more resources than those just focussing on passing the exam. There was a contradiction in students' attitudes to blended learning: they were positive about it, but when asked why they did not use it extensively, they felt that there was a lot more material in the blended course than for their other courses. It called for too much time and effort. Going online to read the material was not always convenient for them. Visiting Moodle on a regular basis was a burden for them, and they had other deadlines for other parts of their course. Timely visits to the course space were disrupting their other activities. Asking questions via the Forum was not always useful either: the Forum was used in a limited way and they found it easier to ask the teacher or tutor. Only 36% of students could access the web from home. Groups were formed by the students on the basis of existing social relationships but even with this, there was not always fair distribution of labour between them. This was linked with the different goals students had for the course overall (deep or strategic approach).

Later, Karasavvidis (2009a) reported on the use of blended learning in a teacher professional development course. AT was again used to analyse computer-supported collaborative learning (CSCL) in Moodle, specifically the use of a discussion Forum. The activity theoretic analysis suggested that time was the main barrier for the group of teachers involved. This was shown to be a justified concern, rather than being a proxy for other issues blocking teachers' use of technology. Karasavvidis concludes that lack of time is a valid reason for teachers to make limited use of technology in Greece: it is their responsibility to teach an extensive national curriculum. Technology would not only demand time to learn, but potentially take away time if it failed in the classroom. This analysis leads him to suggest that the literature has failed to look at the contextual world of the teacher in sufficient depth. In these examples, Karasavvidis finds AT useful in helping to explain why there was limited use of resources in the blended learning course for undergraduates, and why teachers used CSCL to a limited extent. The way learning activities were undertaken in other courses affected the undergraduates' use of the blended learning space in Moodle, and pressure to meet real-life demands on their time influenced the teachers. These studies are useful, although they have some limitations. They focus on small groups using the VLE, and there are no details of the institutional adoption of the VLE, any e-learning strategy, or the overall working practices of the institution.

Research published by Blin and Munro (2008, p. 475) asks directly, "Why hasn't technology disrupted academics' teaching practices?" and they used AT as a lens to try to understand this. They argue that e-learning should be a disruptive force in higher education, and suggest that it should now be easier for academics to use technologies as there is no longer the need to learn to author software or to program. They suggest that disruption "manifests itself through the construction and adoption of new curricula, assessment procedures, teaching methodologies, resources and tasks" (Blin & Munro, 2008, p. 477). Referring widely to the literature, they argue that e-learning presents opportunities for education to be altered radically—and yet, overall the use of technology remains marginal, enhancing existing practices rather than transforming them. Blin and Munro (2008, p. 480) model the use of the VLE using AT with a two-layered approach, "semiotic" and "technological". For example, the Subject, a Lecturer, has a semiotic presence in the activity system as the teacher of the course. But he/she also has a technological presence, as the owner of a Moodle space for that course. The discussion also treats activity in the VLE at different levels, noting that

some operations are facilitated by the VLE (including correction of quizzes), some actions (setting up activities that contribute to learning in the course) and the activity overall (learning in the course). They argue that the VLE can enable activities that were not possible before, such as creating interactive online exercises. It therefore “can be seen as a disruptive technology” (Blin & Munro, 2008, p. 480). The use of the VLE is conceptualised as a separate activity defined as the “technological layer” of the activity, with its own mediating artefacts, rules and conventions, and division of labour. The distinction is based on their interpretation of functional organs, a concept discussed by Kaptelinin and Nardi (2006a). They cite Kaptelinin and Nardi’s definition:

*functional organs combine natural human capabilities with artefacts to allow the individual to attain goals that could not be attained otherwise.*

**Kaptelinin and Nardi (2006a, p. 218)**

The concept of a functional organ implies that the Subject is an expert user of the mediating artefact, knowing not only about the ways in which the tool is used but also how it *could* be used, and what might be accomplished if it were used in this way. There is also a notion of metafunctional competency, relating to the Subject’s competency in using the functional organ. Blin and Munro argue that lecturers need this degree of competency both in teaching and in the VLE, to use the VLE in a fully integrated way as part of their practice. Although they can avail of technical training in the use of the VLE, most will not have equivalent professional development in teaching, although they may have “metafunctional competencies” (Blin and Munro, 2008, p. 481) from dialogue with colleagues and through accumulated experience. Moodle, they suggest, is not yet a functional organ of their university. It could even be having a negative effect at the semiotic level, by appearing to suggest to students that attendance at lectures is not necessary because lecture notes can be obtained from the VLE.

The extent to which these arguments convince depends on the extent to which the conceptualisation of the VLE as a functional organ is convincing. It might equally be possible to say that the activity of the lecturer changes over time, as particular uses of the VLE change from Actions to Operations, and new actions and activities become possible. But the argument that a lack of professional development for university teachers could be influencing the effective use of technology is important: whether this might be argued to exist as a contradiction in the activity of university teaching, or as part of the discussion of functional organs in the university,

is not clear. Blin and Munro conclude that training in the use of the VLE needs to model desired outcomes in practice, and become less transmission based. Training may not be reflecting actual needs of the staff, emphasising tool-related competencies rather than task-related competencies. But this conclusion is based on the assumed Object of Lecturers, as modelled throughout the paper, and the Object of Lecturers' activity is not questioned, nor are such issues as "frame factors" (Miettenen, 1999, p. 328) considered. More importantly, "disruption" (Miettenen, 1999, p. 475) is assumed to be desirable, when an activity theoretic perspective might challenge this assumption from the outset.

Blin's (2004, p. 387) earlier activity theoretic analysis of learner autonomy in language learning led her to suggest changes to the criteria for best practice in computer-assisted language learning, notably that the Object of CALL should be "language use and learner autonomy" rather than "language learning". As a further example from a subject discipline, this suggests a strong insight gained from the application of AT and one which has a range of implications for language teachers and those designing software or packages to support language learning and teaching. Thorne (2003, p. 38) has developed activity theoretic perspectives on disciplinary learning and teaching, focussing on the nature of the artefact itself and specific "cultures of use" of an artefact. This work emphasises the bidirectional nature of mediation made explicit: the material nature of the artefact affects human communicative practices, and opens up discussion around how new technologies might differ from those going before. For example, it is a commonplace for people to say that we have for many years distributed lecture notes to students on paper, whereas now they can be obtained in electronic form from the VLE, and it might be said to be no different in terms of the end result. Thorne's argument suggests that the technology *is* different and will have its own culture of use. This could be exacerbated by the fact that most people learn to use technology outside formal settings like school, but then have to use it within formal settings. This supporting role is not adequate: technologies in education are no longer used merely to support activities—they are of value in themselves and facilitate new kinds of activity (Thorne, 2003).

This argument must be balanced against those of Miettenen (1999) and Bellamy (1996), discussed earlier in this chapter. They suggested that technology would not of itself trigger changes in formal teaching and learning, and that other factors were important. The Object of activity in formal learning settings may itself be in need of redefinition, according to

Miettinen (1999), Thorne (2003) and Thorne and Payne (2005) suggest that cultures of use of technology evolve, and that we cannot assume transfer of skills from informal settings to educational ones. Cultures of use demonstrate that mediation is a two-way process: people use technologies, and then begin to shift their own practices, choosing to use some technologies rather than others for their new purposes. The implications of these arguments are that technology alone will not change classrooms, but neither will it leave them untouched. It will potentially cause contradictions in the activity of formal learning where cultures of use are not recognised, and technology is used to support traditional methods of learning and teaching. This may be visible in concerns over issues such as information literacy (Senn Breivik & Gee, 2006) and digital literacies (Jones & Lea, 2008), and the differences between the uses of technology in formal and informal contexts.

Much research in online learning has focused on the uses of technology in particular settings, rather than the activities already going on in those settings. Scanlon and Issroff (2005), analysing evaluation studies in e-learning, found that the focus of much evaluation had been on increasing the use of technology rather than activities in which it is used. Since cultures of use of new technologies are likely to influence activities in the classroom, AT may well have a useful role in helping to analyse these changes and identify points of contradiction.

## 3.5 OPERATIONALISING AND APPLYING ACTIVITY THEORY

### 3.5.1 Rationale for Using Activity Theory

Previous discussion in this chapter has highlighted the potential of AT to serve as a unifying theory (Nardi, 1996d) which provides a means of analysing systems and processes that take account of individual, community, social practices and technologies. For these reasons alone, it appears to offer potential to examine activities in an organisation such as a higher education institute (HEI). Engeström's (1987) extension of the theory, and its application to work settings, is particularly valuable. His suggestion that AT can potentially connect macro- and microsystems is useful. Scanlon and Issroff (2005) comment that it is possible to use AT to model a system for a whole community such as an HE, or for groups within that community, such as departments or participants in a module. AT can be used to examine a large system or smaller systems within it. The identification of tools and technologies as having a mediating role in activities led to its use by specialists

in HCI. The origins of AT in Vygotsky's work connect it with educational theory too. It therefore presents a potentially useful theoretical model for research in online learning in higher education. The examples discussed earlier tended to be at the microlevel in e-learning research, and it is more difficult to identify studies in e-learning connecting both macro- and microlevels using AT. AT has the potential to facilitate examination of the adoption of the VLE on an institution-wide or even sector-wide basis.

Returning to the issues raised earlier in this book, and particularly the “literature of disappointment,” AT has the potential to help account for results that might otherwise be called disappointments, or failures of strategy, or the underuse of a particular technology. Analysis of the adoption of the VLE might help to identify contradictions in the activity systems at the macro- and microlevels, and account for some of the patterns of use reported. The aspirations for e-learning, and the strategies and funding it had in the late 1990s and early 2000s, may be indicative of activity based on intention rather than completion, something “tentative” (Jonassen & Rohrer-Murphy, 1999, p. 65). Therefore, researching the adoption of the VLE could lead to insights about the nature of institutional strategies as tentative, or alternatively as completed activities. By undertaking a study of the adoption of the VLE from the perspective of AT, it could be possible to obtain insights into institutional systems, the practices of people in departments, central supporters and students, and to model these to identify possible contradictions or to account for the ways in which the VLE has been used. It may then be possible to propose changes or enhancements to practice that could improve future strategic decisions in relation to online learning, and their implementation.

### 3.5.2 Operationalising Activity Theory in This Study

AT is not a theory in the conventional sense of the word. It does not have guidelines as to how it should be applied, nor does it explicitly favour any specific research methods. Although Engeström's diagrammatic model (Fig. 3.1) can be used to support the application of the theory, it is not merely a question of labelling each of the nodes from one's impressions of a situation. For Nardi, these challenges and the lack of a defined set of research methods are strengths of AT. She argues that the “methodological implications” (Nardi, 1996c, pp. 94–95) of AT are that researchers need to take sufficient time to come to an understanding of the objects of people involved in activities; that they look at the overall patterns of activity (rather than small episodes, as in situated action), and use a wide range of

data-gathering methods “including interviews, observations, video and historical materials without undue reliance on any one method” (Nardi, 1996c, p. 95). For Nardi, the important aspect of researching from an activity theoretic perspective is a “commitment to understanding things from the users’ points of view” (Nardi, 1996c, p. 95). Use of historical documents, observation and interviews is also supported by Christiansen (1996). Jonassen and Rohrer-Murphy (1999, p. 68) state that activity theory may not have prescriptive methods associated with it, but there are nonetheless some “generally accepted practices”. These are:

- that the activity should be studied in the real-world context;
- researchers should be part of the activity and not outside it;
- qualitative methods should be used;
- the researcher needs to refocus his or her questions regularly, to reflect different points of view of participants;
- sufficient time should be given to researching the activity to obtain a clear picture of the object, and how it might change over time;
- the broad shape of the activity should be identified first before specific episodes are analysed;
- a wide range of data collection techniques should be used, and different perspectives of the participants explored;
- it is necessary for the researcher “to commit to understanding the activity system from all of these different perspectives” (Jonassen & Rohrer-Murphy, 1999, p. 69).

In this case, I sought to study multiple instances of the same case—the adoption of the VLE at different levels within HEIs (Cohen, Manion, & Morrison, 2007; Stake, 1994). AT, as has already been discussed, proposes that activities are socially constructed and the use of artefacts is mediated by the rules of the community in which people are acting. This implies a particular ontological viewpoint: that there is no one definition of the activity, but potentially many different constructions of the same process. This epistemological stance implies that a set of methods must be used which attempt to reflect the complexity of the world (Cohen et al., 2007; Kvale & Brinkmann, 2009; Silverman, 2010). Activity theorists call for researchers to *commit* to the Subject’s point of view in using AT (Jonassen & Rohrer-Murphy, 1999). This discussion and those of Silverman (2010), Kvale (1996), and Kvale and Brinkmann (2009) emphasise the value of qualitative methods in analysing and attempting to improve important areas of human activity. Researching fields of activity calls for naturalistic and even ethnographic methodologies. Qualitative methods have

potential in enabling modelling of activity systems from the perspectives of different Subjects. However, adopting a pragmatic mix of methods would support validation of the data given that some “Subjects” were likely to be few in number, for example, the person responsible for making decisions in relation to the strategic development of e-learning at a particular site. Potential “Subjects” were identified through examination of HEI structures, with these levels being identified across the potential participant institutions:

- Management, including senior management as well as heads of services;
- Subject departments: in this case language subjects were chosen as the researcher had a background in this area, to include lecturers and students;
- Central support services such as academic development units inclusive of e-learning support teams.

A mixed methods (Cohen et al., 2007) approach was taken to operationalise AT in this study. Interviews with key informants would help to provide the Subject’s point of view, while logs and journals of their work might also have potential. Quantitative data gathered through questionnaires could support and validate the qualitative data, and help to interpret “breaks” or “contradictions” in the system which would otherwise have been difficult to treat based on the views of interviewees or focus group participants. In keeping with the activity theoretic framework, no a priori models of the activity were constructed. Instead, the research was designed such that data would be gathered and analysed through mixed methods before modelling of the systems. Four phases of data collection were designed, to be undertaken simultaneously. The research design and data gathered are shown at Fig. 3.4 and detailed below:

1. A *Survey Phase*: Online questionnaires were administered to gain a snapshot of languages students and lecturers’ use of their VLEs, which could be used to contextualise and validate (or potentially challenge) the detailed data to be gathered elsewhere. At completion of the questionnaire, lecturers and students at one site (where the researcher was located) were invited to participate in the *Observation Phase* of the research.
2. An *Observation Phase* involved participation from lecturers and students over the course of one semester, when they would log their use of the VLE in a secure online space dedicated to the research. Methods such as reflective diaries and illustrated interviews were included here, to gain additional data about the use of the system. Examples from research



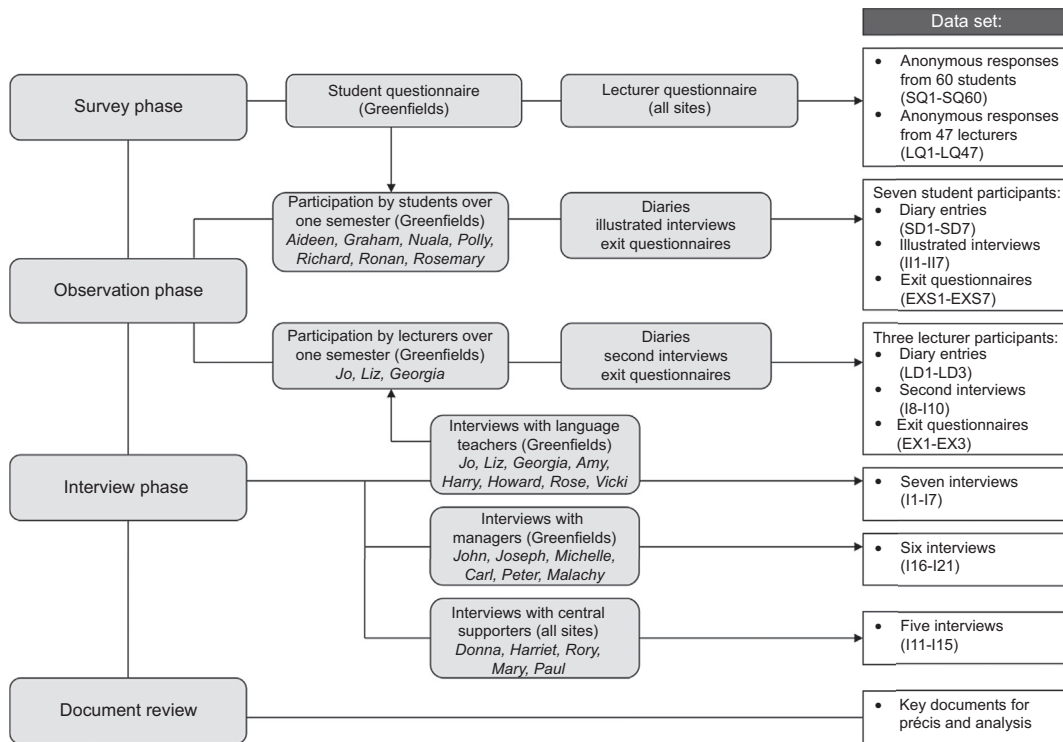


Figure 3.4 The research design and data set.

indicated this to be an effective method of obtaining rich qualitative data about the experiences of people using a particular technology (Breen et al., 2001; Jefferies & Hyde, 2009).

3. An *Interview Phase*: Interviews were the principal data-gathering instrument with Managers, Central Supporters and Lecturers (Cohen et al., 2007; Kvale & Brinkmann, 2009).
  - a. Interview schedules for the **Managers and Supporters** focused on the nature of their roles, their involvement in the mainstreaming of the VLE at their institutions, their concepts of mainstreaming and support, and their sense of how the VLE was now being used by lecturers and students. They were also asked to discuss future developments and the strategic direction of e-learning within their institutions.
  - b. **Lecturers** were asked to discuss their use of the web in teaching generally, experience with the VLE, their sense of students' use of the VLE and other resources, their own training and support requirements. Some of the lecturers volunteered to participate in the *Observation Phase* over one semester. For these lecturers, a second "exit" interview was conducted to review this experience, what would influence their further use of the VLE or other educational technologies, and whether support could be provided to facilitate them. All gave a second interview at the end of the semester.
  - c. Individual **students** opted into this research, limiting the scope for focus groups or video observation of groups using the VLE. Observation has been used by researchers in HCI and in educational research settings, and video recordings are frequently made of teaching events for further analysis (Harford & MacRuairc, 2008; Watson, Mong, & Harris, 2011). Instead, following the example of recorded diaries in Jefferies and Hyde (2009), brief "illustrated interviews" took place with the participating students. Students were provided with a computer and asked to make a "typical" visit to the VLE, which was video-recorded and then discussed. This method, although with its own limitations, addressed a significant problem identified in research using questionnaire and diary data (Cotton, Stokes, & Cotton, 2010): there would be direct capturing of the use of the VLE on camera, rather than the indirect accounts which are given by participants via other research instruments.
4. Finally, the *Document Review* phase involved retrieval and review of documents pertaining to the introduction of the VLE at one institution

(for example, Committee minutes in the public domain). These were compared with the reported interview data from the equivalent formal decision-making processes at the other sites, and the data were aggregated for analysis.

### 3.5.3 Participation and Resulting Data Set

Participation in this research came from eight institutions in total, which have been given randomly selected pseudonyms bearing no resemblance to their actual names or geographical features (Vogel & Oliver, 2006). Ireland's higher education sector includes 13 Institutes of Technology, some of which were involved in this research. To preserve the anonymity of all institutions, whether universities or institutes, the term "university" is used in all of the pseudonyms here, and the text will tend to refer to the name only, eg, "Greenfields" for "Greenfields University":

- Greenfields University
- City University
- Central University
- Lakeside University
- Quayside University
- Regional University
- Riverside University
- Valley University

No additional details of these institutions have been provided, because the purpose of this research is not to compare institutions or institutional data. Rather, the data were gathered from a number of sites to support validation and reliability of the key findings. The *Observation Phase* with lecturers and students was implemented at Greenfields, although the data analysis in all phases drew on the wider data sets to support and validate interpretations. Finally, the VLE brand used at each site will not be named in reporting the data: this is a complicating factor in reporting an activity theoretic analysis where specific technologies mediate activities in particular ways. However, the VLE brand would have enabled the institutions to be identified in a small study such as this. To mitigate this, VLE features supporting particular activities will be described where relevant to the analysis without naming the specific system.

In relation to the student participation, it is worth noting that these students were taking combined undergraduate Arts programmes. Students were in very large classes for some of their first year subjects. All of the lecturers and students confirmed that they were using the VLE during the semester in which data were gathered (Table 3.1).

**Table 3.1** Students Participating in This Study (table shows age range and year of study)

Polly	Richard	Ronan	Rosemary	Aideen	Graham	Nuala
18–21 First year	18–21 First year	26–30 First year	18–21 First year	31–35 Third year	18–21 Second year	18–21 Second year

None of the participants said that they had any disability affecting their use of the VLE or computers generally. All of the lecturers and students confirmed that they were using the VLE, and all but one student confirmed that they had used it for their language subject(s) during the semester in which data were gathered.

**3.5.4 Analysing Data to Model Activity Systems**

Suitable methods of analysis were sought whereby the data could be reliably categorised, and from this the activity systems constructed. Such analysis would also support short narrative accounts of the results, reducing the data to manageable levels without compromising the quality or richness (Silverman, 2010). Many of the approaches to qualitative data analysis (for example, those outlined by Gibbs, 2011) conflicted with AT. Others were too prescriptive, requiring the construction of matrices of data which would then have predetermined the activity modelling. Means were sought to analyse the qualitative data which would not preempt the activity theoretic analysis, but which would also facilitate the sketching of the Activity Systems. Grounded Theory (Strauss & Corbin, 1998) appeared to offer a good fit for this project, since it is concerned with theory generation and offers a well-disseminated and widely used set of processes for data analysis. However, Grounded Theory implies that the project in its totality takes this methodology, and it is not only deployed at the data analysis stages. Purposive sampling was used to gather the data, based on the research design, and for practical and ethical reasons. However, Grounded Theory has focused much attention on the development of robust ways to analyse qualitative data, since it emphasises the generation of categories and themes, rather than sorting of data into predetermined categories. Because it forces the researcher to begin with the data, and to allow themes and concerns to emerge through constant comparison of the codes assigned, its methods have been drawn on extensively by researchers using it in combination with other methods and theoretical frameworks. Strauss and Corbin’s (1998) three-stage process to the analysis of data has been widely applied by researchers even if their

research overall is not a Grounded Theory design. For this study, Strauss and Corbin's definition of the analytical process was examined for its suitability in analysing the data set to link analysis with an activity theoretic approach. There are precedents for this in the literature: the activity theoretic research of Yamagata-Lynch and colleagues (Yamagata-Lynch, 2003a,b; Yamagata-Lynch & Haudenschild, 2009; Yamagata-Lynch & Smaldino, 2007) uses Strauss and Corbin's (1998) methods of coding and constant comparison for analysis of previously transcribed data. This process supports identification of the activity units and themes, which can then be organised chronologically to show the historical development of the activity. Contradictions may also be identified at this stage. Yamagata-Lynch and colleagues used AT in combination with these methods of analysis in a variety of settings, including analysis of a professional development programme for teachers using technology in the classroom (Yamagata-Lynch, 2003b), evaluation of a school–university partnership (Yamagata-Lynch & Smaldino, 2007), and an exploration of contradictions in teacher professional development activity (Yamagata-Lynch & Haudenschild, 2009). These examples were relevant to the current research since they examined the introduction of technologies to established activities. Building on this research, the analytical steps were derived. It is proposed here that analytical methods derived from the work of Strauss and Corbin (1998), adapted to support the identification of activities and in turn the nodes of these activities, have value in constructing activity models of the use of educational technologies in higher education and can accommodate mixed methods designs.

### 3.5.5 Analysis and Interpretation of Data

The following process of analysis was undertaken, and is documented here to assist practitioners who may wish to implement similar research:

#### 1. Data Management:

- a. All sources of qualitative data were imported to the qualitative data analysis software NVivo ([www.qsrinternational.com](http://www.qsrinternational.com)), including the interviews, illustrated interviews (transcribed to include on-screen actions undertaken), diary data from lecturers and students (recorded in the VLE), and responses to open-ended questions from the online questionnaires.
- b. All quantitative data from Teacher and Student questionnaires were imported to the quantitative data analysis software SPSS, and coded for analysis. Descriptive analysis was undertaken, with some cross-tabulation of results, to provide a full description of the quantitative

data for the reporting of overall results. The purpose of this analysis was to validate the analysis of qualitative data.

- c. Hard copies of the transcripts and questionnaire results were reviewed (Gibbs, 2011), with one reading for broad themes or notable issues or events, and a second reading to make brief notes suggesting possible codes.
2. **Open coding:** Data were reviewed and systematically open-coded in NVivo. Coding was undertaken following the guidance from Gibbs (2011) and Strauss and Corbin (1998). Codes were compared intermittently during this process, and some were combined or new codes created, reflecting the constant comparative approach in Grounded Theory.
3. **Thematic coding:** Codes were grouped into themes for further analysis. A narrative report was written for each participant group (Lecturers, Students, Managers and Central Supporters) to create a working narrative of the results and validated by the quantitative results from the survey of lecturers and students.
4. **Activity theoretic coding:** Activity theoretic nodes (*Subject, Object, Instruments, Rules, Community, Division of Labour*) were used to reorganise the open codes. Tentative Objects were identified, and used as the basis for this process. This process continued until all of the open codes could be associated with activity theoretic nodes, or alternatively coded as potential Actions, Operations, Outcomes or Contradictions. Drafts of the Activity Systems were sketched and discussed with a critical friend. The Activity Systems, thematic codes, and narratives were compared, and the presentation of results was drafted.

Implementation of these steps led to the modelling of activities associated with adoption of the VLE, and the activity theoretic analysis which will be presented in the next three chapters. The advantages and also the constraints of this process will be discussed later in this book.

### 3.6 CONCLUSIONS

This chapter has explored and discussed AT as a theoretical framework deployed in a range of fields, including educational research and online learning. AT can be considered as a unifying theory, since it supports the investigation of an activity undertaken by an individual with a defined purpose but taking account of the community in which he/she acts, the rules and culture of that community, and how activities are divided among

members of that community. It has been shown through the examples given in this chapter that AT can be used to inform research in large organisations as well as small groups like the cohort taking a particular taught course. It has been usefully applied in university settings, and in investigating VLEs as mediating artefacts. The chapter presented a mixed methods design for operationalising AT, and drawing on constant comparative methods to analyse data to model activity systems. The following three chapters will present the activities mediated by the VLE which were identified in this research, enabling us to view from different perspectives the adoption of technologies by different groups within HEIs.

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