

# Chapter 19

## Understanding Cloud Computing in a Higher Education Context

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### ABSTRACT

*Cloud computing has become prevalent in many sectors today, including higher education. The chapter is premised on the assumption that despite the popularity of cloud computing in higher education, research within this context remains limited. The study, which is qualitative and exploratory in nature, involved an innovative methodological approach, drawing on interviews with three groups of participants: (1) members of a global, Fortune 100 technology company supplying cloud solutions; (2) members of a selected UK university's IT department implementing cloud solutions; and (3) students from the same UK university using cloud solutions. The findings improve understanding around cloud solutions in the higher education context by unpacking—through a qualitative thematic analysis approach—relevant themes that inform the extant information systems literature. Finally, the study provides recommendations for future researchers, cloud suppliers, universities, and students.*

### INTRODUCTION

This chapter explores cloud computing (CC)—an internet-based type of computing which allows users to share resources which are provided to computers or other remote devices (Hasan, 2011)—within a higher education (HE) context. The study is premised on the view that university students increasingly rely on online resources, electronic media and computing applications for nearly all their work, which has been seen as improving the quality of university studies (e.g. Robinson & Schlegl, 2005). Given the limited number of studies in this area—reviewed in the next section—this chapter aims to advance understanding of CC in HE by adopting an innovative methodological approach involving suppliers,

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implementers, and end users of CC in a selected HE context. The study—which is qualitative and exploratory, and draws on interview data—informs the extant literature and offers recommendations for researchers, practitioners, and universities. In what follows, the authors discuss the extant literature and then move on to present the research study.

## BACKGROUND

CC is a relatively new phenomenon in the technology industry, developed from traditional hosting, which is becoming pervasive in numerous sectors (Armbrust, 2010). Mell and Grance (2011) consider it “*a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction*” (p.2). It is not clear when the term CC was officially coined, because it has been used for many years in network diagrams to depict an area of uncertainty (Stevenson, 2009). It is believed the term was coined in 2006 when large companies such as Google and Amazon Web Services started naming their hosting services as CC (Regalado, 2011). CC has been viewed as a disruptive technology; as Krikos (2011) puts it, “*CC has all the markings of a disruptive technology—those that change the game as it’s currently played both by traditional software licensing companies and by private, on-premises datacenters*” (p.2). A disruptive technology often begins by only satisfying a niche segment of the market—for example CC being best suited to businesses ‘*born on CC*’—and later expanding to other sectors (Danneels, 2004).

From a technical perspective, the extant CC literature posits different CC service models:

- **Infrastructure as a Service (IaaS):** When the customer is able to provision processing, storage, networks, and other fundamental computing resources.
- **Software as a Service (SaaS):** Which allows the consumer to access the provider’s applications running on a **cloud solutions (CS)** but cannot manage the underlying infrastructure.
- **Platform as a Service (PaaS):** Where the customer can control the applications but not the infrastructure (e.g. Mell and Grance, 2011).

Further, CC types may also vary; from ‘*Private Cloud*’ (a high cost option but also the most secure, often preferred by banks and governments), through to ‘*Community*’ (shared by multiple organizations), ‘*Public*’ (allowing pay-per-use) and finally ‘*Hybrid*’ (a mix of the previous) (Chou, 2015).

However, this chapter is interested in CC in the HE sector in particular. Within this context, Sultan (2010) discusses the reasons that it adds value for universities: Firstly, the rapid amount of change in the technology industry puts a lot of pressure on universities to keep up with the ever changing software and hardware; this is not always easy for institutions as they are often under governmental pressure to reduce spending. Therefore, investing in CC prevents universities from having to purchase hardware, which is costly (Wheeler & Waggener, 2009). In turn, it also means that universities can reduce labor costs relative to the management of information technology (IT) systems. Moreover, it is difficult for universities to develop their own premise infrastructure to achieve the economies of scale that a CC provider can achieve, which also leads to cost savings (Katzan, 2010). By allowing a CC provider to maintain the infrastructure, the pressure is also taken off the IT staff at the institution (Ercan, 2010). Further, moving staff away from the low skill tasks can potentially allow them to be reallocated to more value adding activities

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