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Identifying E-Learning capabilities and competences

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Abstract

This research asked the research question: what competencies and capabilities are required by HEIs engaging in e-learning? E-learning capabilities deployed in all of the cases studied in this research were a part of, or related to, existing capabilities. The findings also enable an analysis of e-learning competence. A competency is a capability performed relatively well, and confers competitive advantage. The study suggests that e-learning enables access to some student markets, and increases retention of students and student achievement, if this is the case then e-learning may well confer competitive advantage, and thus may well be a competence. Many of the interviewees believed that their organisation's core competencies lay around teaching and learning, but some believed geographic location, distance learning skills, or research to be core competencies. However it is possible to argue that e-learning may provide core competences.

Keywords: E-learning, resource based view, competencies, capabilities

1.0 Introduction

This study adopts a resource-based view (RBV) (Penrose, 1959; Prahalad & Hamel, 1990; Schumpeter, 1934), as a theoretical framework with which to understand e-learning exploitation. From this perspective the institutions being studied are considered to be in a dynamic process of building, re-organising, and deploying capabilities from organisational resources. The resource based view (RBV) of the firm proposes that organisations need to acquire capabilities and competences in order to enter new product/market areas (Duysters & Hagedoorn, 2000; Jarvenpaa & Leidner, 1998; Montealegre, 2002; Penrose, 1959; Sanchez, Heene, & Thomas, 1996; Walsh & Linton, 2001). HEIs will therefore need to acquire new capabilities and competences

to engage in e-learning because new skills are required (Laurillard, 1993; Salmon, 2000; Timmis, 2003; Ward & Newlands, 1998). This research examines e-learning in higher education and asks the research question: what competencies and capabilities are required by HEIs engaging in e-learning?

2.0 Context

E-learning can be defined as learning supported by information and communication technologies (Sambrook, 2003). There are many drawbacks to online learning, it is limited in engaging learners in deep learning, or developing self-disciplined and motivated learners (Lim & Yoon, 2008); and online students lack peer contact and social interaction, while there are high initial costs for preparing multimedia content materials, substantial costs for system maintenance and updating, as well as the need for skilled and flexible tutorial support (Wu, Tennyson, & Hsia, 2010). Blended learning is a mixture of traditional (or face-to-face) learning and online learning (Chou & Chou, 2011) which overcomes many of these disadvantages. This study examines the implementation of both distance and blended learning in Higher Education Institutions in the UK.

E-learning as a subject area is multidisciplinary crossing a number of discipline areas (Laurillard, 2001). In the broadest sense, the function of e-learning is using electronic technology for teaching and learning, but there are many sub-classes of e-learning. E-learning can be used to support distance learners, on- or off-campus learners in face-to-face education. Some researchers refer to e-learning as it relates to distance learning alone (Bjarnason et al., 2000), others to e-learning as blended learning (Ward & Newlands, 1998), others refer to e-learning as a means of enriching the learning experience without particular reference to the location or type of students (Laurillard, 2001; Milliken & Barnes, 2002).

A definition and categorisation of e-learning allows the description of e-learning by usage in terms of pedagogy, by timing in terms of synchronous or asynchronous, and by place in terms of distance of students: either face-to-face or distant. It can be categorized by its complexity, and its pedagogy and place (Table 1). This research

sets out such a definition, identifying different forms of usage, and the effects of that usage.

	Simple/static	Complex/interactive
F2F	E.g. PowerPoint replaces OHT, video replaces lecture	E.g. CMA, simulations, customised channel through learning programme
Distance	E.g. reading materials delivered on-line, replaces books and papers	E.g. synchronous and asynchronous discussion, CMA, video conferencing

Table 1 E-learning complexity vs. location

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2.1 Resource-Based View

The RBV suggests that organisations are made up of teams of resources working together to provide the capability to perform some task (Penrose, 1959). Resources, at their most fundamental level, are made up from the basic units of production from which all products and services are made. All goods and services can be viewed as bundles of the services provided by resources, and it is the interaction between human and material resources that determines the productive services available from any given resource (Penrose, 1959; Schumpeter, 1934).

The term capabilities refers to an organisation's capacity to deploy resources using organisational processes (Amit & Schoemaker, 1993). Amit and Schoemaker describe them as organisation specific, information-based, tangible or intangible processes developed over time. They are intermediate goods that enhance productivity by combining physical, human, and technical resources. Capabilities reside within members of the organisation, and are integrated into high-order systems (Teece, Pisano, & Shuen, 1997). Capabilities are the socially complex routines with which firms turn inputs into outputs (Collis, 1994).

Collis (1994) divided capabilities into three categories of possible sources of organisational heterogeneity. First, those with an ability to perform basic functional activities of the organisation, such as marketing, or brand management (Amit & Schoemaker, 1993); or operational excellence (Treacy & Wiersema, 1993). Second, those responsible for dynamic improvements to the organisation, such as product innovation (Amit & Schoemaker, 1993); the ability of the organisation to learn and adapt, or flexibility in product development (Hayes & Pisano, 1994). Third are "more

metaphysical strategic insights that enable firms to recognise the intrinsic value of other resources or to develop novel strategies before competitors" (Collis, 1994:145). They include capabilities such as strategic development, the ability to develop and deploy resources (Henderson & Cockburn, 1994). These are akin to Marshall's (1920) identifications of management as the fourth factor of production, Schumpeter's (1934) entrepreneurial function, and production of new production functions (Collis, 1994).

Dynamic capabilities consist of processes such as alliancing, product development, and strategic decision making, that create, integrate, recombine, and release resources (Eisenhardt & Martin, 2000). Dynamic capabilities can be defined as organisational processes that rearrange or acquire new resources in response to, or creation of, environmental change (Eisenhardt & Martin, 2000; Teece, et al., 1997). Other authors have used similar terms: combinative capabilities (Kogut & Zander, 1992), architectural competences (Henderson & Cockburn, 1994), or simply capabilities (Amit & Schoemaker, 1993). A number of authors focus on resources, capabilities and competences (Table 2).

Author(s)	Main concepts	Description or additional concepts
Wernerfelt (Wernerfelt, 1984)	Resources	Resource position barriers
Itami (1987)	Invisible assets	Information-based resources/dynamic resource fit
Dierickx and Cool (1988)	Strategic assets	Stocks accumulated through investments (flows)
Aaker (1989)	Assets and skills	Asset: something a firm possesses superior to competition Skill: something a firm does better than competitors
Akerberg (1989)	Competence	Organisational competence depends on individual competences
Prahalad and Hamel (1990)	Core competence	Strategic architecture Collective learning: production skills and techniques
Klein et al. (1991)	Metaskills	Metaskills generate core skills
Barney (1991)	Firm resources	All assets, capabilities, processes, attributes, information, knowledge controlled by a firm
Grant (1991)	Resources	Resources: inputs to the production process Capability: capacity of resources to pe4rform some task
Hall (1991, 1992)	Intangible resources	Skills or competencies: e.g. the knowhow of people Assets: things which are owned Intangible resources may be linked with a functional, cultural, positional or regulatory capability
Stalk et al. (1992)	Capabilities	Capability: more broadly based than core competence Key business process
Amit and Schoemaker (1993)	Resources	Stocks of available factors owned/controlled by the firm
	Capability	Capacity of firm to deploy resources using organisational processes, to effect desired end
	Strategic assets	Set of difficult to trade, imitate, scarce and specialised resources and capabilities

Table 2 A chronological overview of concepts used in the resource based perspective (Gary Hamel & Aimé Heene, 1994:p58)

The term competence is used to describe the capability to perform some task that an organisation can use to leverage into new markets (Penrose, 1959) and refers to the capability to perform activities exceptionally well (Grant, 1998; McGee & Peterson, 2000; Prahalad & Hamel, 1990). There is some consensus that core competences are those competences that are scarce, best in class, difficult to imitate, and provide competitive advantage (Grant, 1998; Garry Hamel & A Heene, 1994; Segal-Horn, 1998). Therefore a core competence is differentiated from a competence by its scarcity, quality and uniqueness; a competence is competitively unique. From this perspective for e-learning to be a core competence for an institution, it must perform e-learning activities exceptionally well, in a way that allows it to enter new markets

and derive competitive advantage, and for it to be a core competence e-learning must be performed in a way that few if any competitors could imitate.

Capabilities and competencies are not static, the services generated by resources change as knowledge about resources is acquired, as new routines are developed, or as they are combined with other resources in new ways. New resources and capabilities can be acquired that are related to, and complement, existing resources and capabilities. If the services that are required for e-learning are generated by existing resources in an HEI, or if the new resources that are required for e-learning are related to, and complement, existing resources and capabilities in an HEI, then it would be reasonable to expect that the HEI would be able to develop an e-learning capability, or even an e-learning competence.

Capabilities are created by the interaction of human and material resources (Penrose, 1959; Schumpeter, 1934), thus capabilities can be described as residing in the skills, abilities and expertise of individuals and groups of human actors within the organisation (Prahalad & Hamel, 1990; Rothwell & Lindholm, 1999).

3.0 Methodology

This research asks the research question: what competencies and capabilities are required by HEIs engaging in e-learning? It adopts a case study approach. Case study is a suitable research method when the researcher has little control over behavioural variables, and when there is a focus on contemporary events (Yin, 1994). It is also appropriate where the subject area is context rich (Bell, 1993; Cohen & Manion, 1989; Yin, 1994). This study fulfils each of these criteria: e-learning is an IS in an institutional setting, the real-world setting means that the researcher has little control over behavioural variables, and the subject area is contemporary and context rich. Case study will enable research within the case organisation, providing rich detail and the potential to reveal complex, embedded capabilities. Work by Walsh and Linton (2001) and Marino (1996) will be used to build an interview framework. Synthesising the Marino process and the Walsh and Linton approach allows the development of a case study protocol and interview questionnaire.

The unit of analysis in this research is an HEI. The case organisations are public universities in the UK, (grouped by commonalities such as funding sources, quality assessment regime, and student selection, but different from other HEIs such as private universities, higher education institutes, or university colleges). The case organisations are grouped into high and low performing organisations. The performance indicators chosen were the Times' Good University Guide and the RAE, used to rate universities by relative performance. As a result of common practice in the UK both of students using the Times' Good University Guide as a basis for choosing which university to attend, and of the Government using the RAE as a means of deciding research funding levels to universities, these two systems of performance measure are used to rate university performance.

Two cases in the sample were in the upper quartile of both the Times' ranking and the RAE, while two were in the lower quartile. Rouse and Daellenbach (Rouse & Daellenbach, 1999) argue that selecting out the central group allows a more stark comparison of differences. However, this study has also chosen three further cases for the sample. One is not in either ranking but is a renowned innovator and user of e-learning, another is in the middle of the ranking of both indicators. Case seven is not a traditional university, but an institute of higher education. It is e-learning active and used to add another perspective to the study since it derives little funding from research funding councils and is therefore teaching-led. The cases are in Table 3.

Case	Size	Research	E-learning	Distance / Local	Rankings
1.	Large	Active	Active	Distance not a focus, local e-learning delivery	Upper quartile
2.	Small	Active	Active	Distance not a focus, local e-learning delivery	Upper quartile
3.	Large	Active	Active	Mainstream distance courses, plus local e-learning delivery	Middle
4.	Large	Less active	Active	Delivers courses at a distance via partner organisations, plus local e-learning delivery	Lower quartile
5.	Large	Active	Active	Solely distance learning	Not ranked
6.	Large	Less active	Less active	Distance not a focus, local e-learning delivery	Lower quartile
7.	Small	Less active	Active	Distance not a focus, local e-learning delivery	Not ranked

Table 3 Selection of cases

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Identification of capabilities is difficult, but the RBV literature provides some tentative solutions. Walsh and Linton (2001) divide competences into managerial and technical, then further divide them into Knowledge-based competences, knowledge-embedded competences, fabrication and assembly competences, and materials competences. Management competences reside in the organising and control organs. Technical competences reside in the operations. Knowledge-based competences are those in which the value is derived from the skills and expertise of the service provider, an example of a knowledge-based management competence given by Walsh and Linton is curriculum design which resides in the skill of academics. Knowledge-embedded competences are those competences in which the value is embedded in the system or process, an example of a knowledge-embedded technical competence given by Walsh and Linton is the system of interaction between service user and service provider. In an e-learning context this could be the e-learning software or VLE. Fabrication and assembly competences are those required for the production of the good or service. In e-learning this might be the combination of publishing and distribution of educational materials, while the learning materials themselves Walsh and Linton describe as knowledge-embedded technical competence. Walsh and Linton suggest that in a non-manufacturing environment it is unlikely there will be materials competences.

Marino (1996) suggests capability and competency measures may be operationalised by interviewing stakeholders within the organisation. It is a practical suggestion for this research since access to individuals within the case institutions is possible.

Data was gathered from multiple sources from within each case to provide mutual verification (Glaser & Strauss, 1967). The contemporary nature of this research, and the availability of the key actors in each case, as well as documentation, meant that case study was a practical option. Following Marino an interview approach was adopted to gather data. The interview questionnaire Marino developed was synthesised with the Walsh and Lynton Framework (Appendix 1). Principal actors in each case were identified from analysis of staff directories, and interviews took place in each of the cases. The interviews were semi-structured, allowing freedom for discussion to develop. The objective for the interviews was to gather data that would aid in the identification of what competencies and capabilities are required for e-

learning in higher education institutions, which ones were new, where new competencies and capabilities were acquired, and when they were deployed. Several interviewees were chosen in each of the cases to provide multiple sources to support results.

Interviewees who were active in e-learning were selected, they were their web profiles indicated they held senior positions within the institution, were members of institutional decision-making committees, e-learning researchers with publications in the field, teaching e-learning, or learning technologists teaching academic staff how to use e-learning. Further interviewees were identified by snowballing. Interviews were tape recorded and transcribed, detailed notes were also taken at the time of interview. Documentation was gathered where available. Transcriptions were then coded and entered into NVivo, a qualitative analysis tool, to aid analysis.

The interviewees are numbered, as are the cases (Table 4 IntervieweesTable 4). The numbering of the interviewees is not contiguous because the actual interviews did not follow the planned course of interviews, nor were all of the potential interviewees eventually interviewed.

Case	Interviewee	Position in institution
1	1	Research Director and Acting Institute Director for a teaching and learning support department responsible for supporting academics in the use of educational technology and e-learning.
1	2	Manager of the teaching and learning support department, and Deputy Director of a Learning and Teaching Support Network (LTSN), a national online teaching and learning support network.
1	3	Professor of education, an e-learning user, and a member of various high level university committees.
1	4	Professor of education and a Pro Vice-Chancellor.
2	6	Learning technologist responsible for development of e-learning by supporting academic staff in the use of learning technology.
2	7	Interviewee six's co-worker and also a learning technologist.
2	8	Director of the learning technology support unit that interviewees six and seven worked in. Member of various high level committees within the institution, but not a member of the senate.
2	9	Director of a national information service, and a member of case two planning committees. Also with a technical role within the university computing services.
2	10	Director of a different national information service, and also a member of case two planning committees.
2	11	Dean of one of the faculties and Pro-Vice-Chancellor for Learning & Teaching.
2	12	Lecturer, an e-learning user, and a manager of IT projects for one of the faculties.
3	13	Lecturer who using learning technology, and a head of department.
3	14	Interviewee thirteen's co-worker and also a lecturer using e-learning.
3	15	Lecturer using learning technology, both teaching with it, and teaching how to use it.
4	16	Lecturer using learning technology, and creator of online content for a separate distance learning venture.
4	17	Lecturer using e-learning, and managing a distance learning venture run separately from the conventional F2F courses.
4	18	Lecturer using learning technology, a department head, and involved in institutional decision making.
5	19	Lecturer and sub-dean responsibility for all course production and electronic media developments in one of the schools. Also chair of an e-learning committee, as well as being on other committees and convenor of a case five institution-wide e-learning group.
5	20	Senior lecturer using e-learning, and a widely-published author writing about e-learning.
5	21	Senior lecturer using learning technology in teaching about the use of e-learning, and involved in institutional decision making.
5	22	Senior lecturer using e-learning.
5	23	Lecturer using e-learning, and was well as author writing about e-learning and involved in institutional decision making.
6	24	An associate head of department and lecturer using e-learning.
6	25	Learning technologist supporting academic staff in the development of e-learning programmes.
6	26	Lecturer using e-learning.
6	27	Lecturer using e-learning.
6	28	Senior research fellow developing e-learning programmes, and involved in the decision making of the institution.

6	29	Senior manager involved in institutional decision making.
7	30	Learning technologist supporting academic staff in the development of e-learning programmes, and involved in the mid-level decision making of the institution.

Table 4 Interviewees

All interviews lasted for at least 45 minutes and were guided by the interview protocol detailed above.

4.0 Findings and Analysis

4.1 Findings from seven cases

The findings from case seven completes the cross case analysis. The themes identified by all of the cases are presented in Table 5 below.

Defining e-learning
Defining e-learning, use technology in teaching and learning, automation of administration, developing an e-pedagogy, online learning, defining by uses for e-learning.
Strategy
Strategy: bottom-up, ex-post and emergent strategy, with academic autonomy, top down, classical approach, top down/bottom-up mixture.
Embedding
Embedding new routines and skills: buy-in, formal training and staff development, disseminating external practice, research and knowledge, support in using e-learning, sustainability through permanent funding of e-learning support, managing the acquisition and use of technology, widening participation, non-traditional students, automation of administration, cascading from enthusiasts.
Drivers
Drivers: cost savings, student expectations, increased enrolment, interest in using e-learning, recognising teaching and learning opportunities, digital divide, non-traditional students, student time and place constraints, requirements of professional bodies, government policy, recognising business opportunities.

Table 5 Themes from all cases

Defining e-learning

Interviewees were asked how they would define e-learning. The first statement illustrates that it can be very difficult to define.

"E-learning can encompass anything if you stretch it far enough." (C1R1S9)

Another problem is that many people equate it to distance learning:

"people's perceptions of e-learning I think probably vary between "Shock, horror, this university doesn't get involved in distance learning" and that's how people perceive it: e-learning equals distance learning." (C1R1S10)

At the other end of the scale e-learning can be merely the use of electronic presentation tools:

"Whereas others are at it looking from something as basic as including a PowerPoint presentation in their lecture, which I think is dropped out at the other end." (C1R1S11)

E-learning was also automating administrative tasks and making information available online:

"Some people in the university are using Blackboard .. for, in many cases, just copies of their handouts or PowerPoint slides and announcements about changes to rooms and things like that." (C1R1S13)

Interviewee three was somewhat ambivalent about defining e-learning, suggests e-learning is a broad area, but does not provide much specificity:

"Apart from the one that's an entirely on-line course, where I don't think there's much equivocation .. I'm not sure debating what it is, is particularly fruitful, because it's a contextual issue .. It certainly is not exclusively and entirely on-line mix." (C1R3S48 - 50)

The above statements suggest that e-learning is not just distance learning, nor is it necessarily online.

Interviewee six stated that defining e-learning was: *"quite a big question really"* (C2R6S37) and *"I think you can look at it from quite a few different angles, you can look at it from the technology .. you know it could be software .. the hardware that supports the software .. the different supporting structures, and technical support that you need to make all that happen .." (C2R6S41 - 43)*

From the technology comes the content that is delivered via the technology, and the pedagogical approach:

"you've got the content which could be anything from .. web pages and PowerPoint, and that sort of thing, then there's the techniques so for example over in electrical and electronic engineering .. they're doing something which we think's [a] very important part of progressing e-learning within the university .. a resource- based learning approach, and that is very important we think to the future of e-learning." (C2R6S59 - 72)

The next area for discussion was the theme of strategy. The following section presents statements from the interviewees which support the strategy theme.

Strategy

Starting off the theme of emergent strategy, interviewee six explains that e-learning started to be exploited by enthusiasts who are interested in using e-learning. This implies a bottom-up approach and a degree of autonomy for academic staff, but also that once these actors were using e-learning they required support:

"very much about getting the people who were interested and had the time, [and] enabling them and supporting them." (C2R6S251)

Interviewee six is also quite explicit that this did not happen as a result of organisational strategy:

".. it wasn't a strategy, but there was a paper, that was kind of like guidelines .. I forget the name, but officially it wasn't a strategy." (C2R6S277)

Interviewee eight also addressed the bottom up and emergent aspects of strategy, along with the role of academic autonomy and freedom, that other interviewees talked about:

"maybe that is why the creativity and the discoveries come, because people have this degree of freedom, and they fight to hold on to that degree of freedom .. That's the nature of the academic world." (C2R8S154 - 159)

The next area for discussion was embedding.

Embedding

Interviewee six talked about the importance of supporting academic staff in using e-learning:

"the support of the lecturers when they engage in e-learning when they come along and they say I want to do this .. we've had a lot very positive feedback from lecturers who've been involved." (C2R6S757 - 767)

Getting support right was very important to embedding e-learning skills and routines into case three:

"we could in theory sustain it, .. if we could get the support mechanism sorted." (C3R14S392)

There is a staff training component to embedding e-learning use in case four:

"it is [very] much centrally directed, there is good communication and encouragement, and in-service training on it." (C4R16S90)

Interviewee three talked specifically about staff development and the need to train staff in the use of e-learning:

"I think there ought to be something in there about professional development. I think you need people to facilitate tutors' skills because, if you simply leave tutors and lecturers to work out for themselves how best to apply e-learning, it's not only not very efficient, it's not very effective." (C1R3S69)

Interviewee three also pointed out that:

"It is only recently that it has become the norm for anyone to have any training in actually how to teach in higher education." (C1R3S69)

The drivers theme includes cost savings, student expectations, increased enrolment, teaching and learning opportunities.

Drivers

There is a perception that students have expectations of access to, and exploitation, of technology:

"One argument about technology driving the pedagogy would be that students want things online." (C1R2S96)

Student expectations drive experimentation with the use of new technologies:

"A lot of our students either arrive with computers or laptops and we have very good network access for halls of residence" (C1R2S123 - 124)

The statement below supports recognition of a business opportunity as driver suggesting that they are actively seeking commercial opportunities:

"we're in the process of becoming accredited by the Institute of Management, and they offer a diploma as well as a certificate, our vision is to develop the certificate, executive diplomas, which would then give direct access on to our MBA, [we] also would like to organise that for our local commercial market." (C4R17S95)

Large cohorts are also an issue, and e-learning may be used to alleviate teaching delivery demands that have come from increased enrolment:

"by using [the] communication facilities within Blackboard, .. [he] is able to .. [offer] a smaller on-line tutorial experience, ... he was able to take a step back [and] let them .. take responsibility for their own learning" (C2R7S57 - 58)

Teaching and learning opportunities also drive the exploitation of e-learning:

"They virtually did away with all lectures, terrific idea, much easier to implement in an electronic environment, very difficult to implement in a wet lab environment .. the whole idea of having more of a tutorial interaction rather than a lecture" (C2R11S96)

The capabilities identified by the seven cases are presented in Table 6 below:

		Knowledge-based	Knowledge-embedded	Assembly
Strategising and legitimising	Managerial	●		
	Technical			
Strategising and planning	Managerial	●		
	Technical			
Staff training	Managerial	●		
	Technical	●		
Buy-in	Managerial		●	
	Technical	●	●	
Experimentation	Managerial			
	Technical	●		
Perception of teaching and learning opportunity	Managerial	●		
	Technical	●		
Perception of business opportunity	Managerial	●		
	Technical			
Management of academic staff	Managerial	●		
	Technical			
Investment in, and management, of new ICT	Managerial	●		
	Technical	●		
Managing distance learning	Managerial	●		
	Technical			
Management of academic staff	Managerial	●		
	Technical			
Managing business process re-design	Managerial	●		
	Technical	●	●	
Re-engineering teaching & learning	Managerial			
	Technical	●		●
Identifying and managing external partners	Managerial	●		
	Technical			

Table 6 Capabilities from all cases

4.2 Capabilities

The determination of a capability or competence is difficult. It is difficult in respect of its identification: 1) in whose opinion is this a capability? 2) It is also difficult with respect to its identity: what do we call this capability? 3) It is difficult at the level of granularity: is a finding a capability, several capabilities, or a part of another capability? To answer the first question, a capability is identified by the interviewees during interviews, and by the researcher in the interpretation of statements made by the interviewees. In answer to the second question, a capability can be said to be a skill or set of skills (Prahalad & Hamel, 1990; Rothwell & Lindholm, 1999), so the term used to refer to the capability must express that skill or set of skills. To answer the third question is not straightforward, but a capability is at a higher level of the hierarchy of goods and services than the individual goods themselves. It is an ability

to produce some output, which is greater than the individual products themselves, and could be used in the production of several products (Grant, 1998; Garry Hamel & A Heene, 1994; Penrose, 1959; Schumpeter, 1934). Therefore, a capability must be an organisational ability to produce more than one service or good by the application of a skill or set of skills. Such a capability might be a part of another greater capability, but that does not detract from it being labelled as a separate capability where such labelling is a useful differentiator in terms of understanding organisational behaviour. For example, delivering higher education may be a capability, but as a part of that, at a lower level of granularity, curriculum design might also be a capability. Both abilities can be referred to as capabilities, but a need to differentiate between them occurs only when there is a need to address their resources or output at different levels of granularity of analysis.

There are fourteen capabilities identified, summarised by characteristic in Table 7Table 7. All have a knowledge-based element, only three have a knowledge-embedded element, and one has an assembly element. This would suggest that expert staff are the most essential element to e-learning, more so than technological hardware or software. This may explain why technology resources were largely outsourced. All but one of the capabilities had a management element, and all but five had a technical element. This suggests that management is crucial to e-learning exploitation, although self-managing professionals are a part of that picture.

Name	Managerial	Technical	knowledge-based	knowledge-embedded	Assembly
Perception of teaching and learning opportunity	●		●		
		●	●		
Perception of business opportunity	●		●		
Experimentation		●	●		
Strategising and planning	●		●		
Buy-in		●		●	
		●	●		
	●		●		
Staff training		●	●		
	●		●		
Management of academic staff	●		●		
Investment in, and management, of new ICT	●		●		
		●	●		
Re-engineering teaching and learning		●	●		
		●			●
Identifying and managing external partners	●		●		
Systems integration		●	●		
		●		●	
	●		●		
Managing distance learning	●		●		
Managing business process re-design	●		●		
		●		●	
		●	●		
Strategising and legitimising	●		●		

Table 7 Capabilities summarised by characteristic

Capabilities are summarised by case in Table 8. The presence or absence of capabilities is based on the statements of interviewees and the interpretation of the researcher, where there is data to support a presence that is indicated, and where there is no data to support an absence that is indicated. The table shows capability presence as P for present, or A for absent. Case seven is not included in this table because there was access to only one interviewee, and therefore no corroboration for the identification of capabilities.

	Ranking	High		Mid	Low		Not ranked
New/Existing	E-learning - local or distance	Local		Local and distance		Local	Distance
	Case / Capability	1	2	3	4	6	5
Existing	Perception of teaching and learning opportunity	P	P	P	A	P	P
Existing	Perception of business opportunity	A	A	P	P	A	A
Existing	Experimentation	P	P	P	A	P	P
Existing	Strategising and planning	A	A	P	P	A	P
Existing	Buy-in by academic staff	P	P	P	A	P	P
Existing	Managing academic staff	A	A	A	P	A	P
Existing	Staff training and development	P	P	P	P	P	P
Existing	Investing in and managing new technology	P	P	P	P	P	P
New	Re-engineering teaching and learning	P	P	P	P	P	P
New (for some)	Identifying and managing external partners	A	A	P	P	A	P
New	Managing systems integration	P	P	P	P	A	P
New (for some)	Managing distance learning	A	A	P	P	A	P
New	Managing business process redesign	A	A	P	P	A	A
Existing	Strategising and legitimising	P	P	P	A	A	P
		Capability presence: P for present, A for absent					

Table 8 Capabilities required for e-learning

5.0 Discussion and conclusions

The granularity of this study is at the level of capability, not of skill or resource. In answering the research question: what competencies and capabilities are required by HEIs engaging in e-learning, the findings show a set of capabilities required for e-learning (Table 7), differing according to institutional policy. Some are deployed by all cases, some according to institutional policy. All but one case acquired new capabilities, one case deployed a capability that may be newly acquired. In all cases e-learning capabilities deployed were a part of, or related to, existing capabilities. These

results confirm the RBV that in order to enter a new market or strategic area organisations require the capabilities to do so, and newly acquired capabilities are related to existing ones.

5.1 E-learning may enable new competences

The findings also enable an analysis of e-learning competence. The RBV literature suggests a set of criteria that enables capabilities to be differentiated from competences. Principal differences are that competency is a capability performed relatively well, and confers competitive advantage. Competitive advantage is difficult to measure. There are no available data for whether or not students choose a university because of e-learning capability, although there is anecdotal evidence from interviewees that students may choose not to attend a university that does not have e-learning. The study does suggest that e-learning enables access to some student markets, and increases retention of students and student achievement, if this is the case then e-learning may well confer competitive advantage, and may well be a competence.

5.2 E-learning competence

A competence is defined in the literature as a capability to perform activities exceptionally well, and confer competitive advantage. In considering whether or not e-learning was a competency it is necessary to consider whether e-learning confers competitive advantage. There was a perception on the part of interviewees in some cases that not having effective e-learning would deter student enrolment, and that having effective e-learning in place may increase student retention and achievement. If this is the case it can be implied that e-learning confers competitive advantage and therefore where it does, it is performed sufficiently well.

5.3 E-learning may become a core competence

The identification of core competence is difficult, and more so when the organisations being studied are not obviously motivated by profit maximising, but the findings suggest that e-learning may be a core competence for some institutions. A core competence must be scarce, best in class, difficult to imitate, and provide competitive advantage. Where e-learning is a competence and enables access to new markets, as is found in three of the cases, it may also be scarce, best in class, and difficult to imitate.

Indeed if entry to new markets is successful and sustainable it must be scarce, and difficult to imitate and therefore best in class. The argument is perhaps tautological. However, the criteria for identifying core competences enable the development of a hypothesis that e-learning may embody core competency, and this may be testable in further study.

E-learning as core competence

The questionnaire that was used was designed to help identify organisational capabilities and competencies, and from those define the institution's core competencies. The findings were quite clear in one regard, none of the interviewees believed that e-learning was itself a core competence. Taking the view that core competences are scarce, best in class, difficult to imitate, and provide competitive advantage, as well as enabling entry to new markets, they may well be mistaken. E-learning in of itself may not provide all of those benefits, but when deployed along with other institutional capabilities it could be argued that it does. Many of the interviewees believed that their organisation's core competencies lay around teaching and learning, but some believed geographic location, distance learning skills, or research to be core competencies. However, addressing each of the criteria for core competences one at a time, it is possible to argue that e-learning may provide core competences.

First, core competences are scarce. The ability to use e-learning is a combination of teaching and learning skills, educational technology skills, pedagogical skills, and quality assurance skills. An e-learning package of all of these together may be scarce in terms of availability to students in the UK, but also in terms of availability to distance students in other countries. There is a growing demand for HE in the UK as the government implements a widening participation agenda student numbers increase while the number of HEIs is relatively static. Internationally there is also growing demand as population growth outpaces the world's capacity to provide access to HE.

Second, core competences are best in class. The e-learning package as a whole may be best in class because it is derived from a university with a particular reputation for academic quality, or excellent distance learning routines, or a UK university benefiting from the general UK reputation for academic quality, or from a low fee

structure. E-learning from any particular university is a part of the offering from that university as a whole, and e-learning is built into that offering. Thus the e-learning may be best in class because it is used to extend an offering that is best in class.

Third core competences are difficult to imitate. While some aspects of e-learning are clearly not difficult to imitate, as evidenced by the preponderance of e-learning offered by universities around the world, a particular combination of capabilities in an e-learning package may be difficult to imitate because of the tacit nature of many of the routines, the nature of academic quality assurance, and the entry barriers for higher education.

Fourth, core competences provide competitive advantage. From the perspective of campus-based students the findings of this study suggested that few choose a university on the basis of the quality of the e-learning facilitates available, but many may choose not to attend a university with a reputation for poor e-learning facilities, thus e-learning may confer competitive advantage. What is more, ranking tables such as the Times' Good University Guide examine computing facilities, a requirement for e-learning, into their rankings. From the perspective of distance students e-learning may enrich the distance learning experience, and by enabling high quality distance learning, contribute to competitive advantage.

Fifth, core competences provide access to new markets. E-learning may provide access to new markets by enabling students to become on-campus students who would not otherwise be able to, enable traditionally excluded students to achieve because of the richer experience provided by e-learning, and by breaking down geographic and chronological constraints of conventional face-to-face learning. E-learning may also provide access to distance learning markets that are not available to a given institution by conventional distance methods, or indeed to some markets that may be accessed only by e-learning.

If e-learning fulfils these five criteria it could be that e-learning becomes a core competence for an institution.

5.4 Limitations

This research is interpretive, and used a small selection of cases, interviewing a limited number of interviewees. The approach and design leads to a set of limitations in generalisability, reliability, and validity. The findings are based on interview data and some researchers doubt that interviews can fully reveal the fundamental dimensions of competencies and capabilities (McGee & Peterson, 2000), point to a lack of agreement about how the relevant constructs can be operationalised, and interview bias is almost impossible to eliminate (Easterby-Smith, Thorpe, & Lowe, 1991).

The determination of whether or not e-learning is a core competence is not a primary objective for this research, and further study is required to satisfactorily determine whether or not it is. What is more, e-learning is a relatively recent phenomena and the cases in this research have only engaged in e-learning for about ten years prior to the start of the research. It is therefore possible that e-learning has not yet reached its full potential, and over time it may become a core competence even if it is not one now.

References

Amit, R., & Schoemaker, P. J. H. (1993). Strategic assets and organizational rent. *Strategic Management Journal, 14*(1), p33-46.

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management, 17*(1), 99-121.

Bell, J. (1993). *Doing Your Research Project* (2 ed.). Buckingham and Bristol: Open University Press.

Bjarnason, S., Davies, J., Farrington, D., Fielden, J., Garrett, R., Lund, H., et al. (2000). *The Business of Borderless Education: UK perspectives*. London: Higher Education Funding Council for England and Universities UK.

Chou, A. Y., & Chou, D. C. (2011). Course Management Systems and Blended Learning: An Innovative Learning Approach. *Decision Sciences Journal of Innovative Education, 9*(3), 463-484.

Cohen, L., & Manion, L. (1989). *Research Methods in Education* (3 ed.). London: Croom Helm Ltd.

Collis, D. J. (1994). Research Note: How Valuable Are Organizational Capabilities? *Strategic Management Journal, 15*(Special Issue: Competetive Organizational Behaviour), 143-152.

Duysters, G., & Hagedoorn, J. (2000). Core Competencies and Company Performance in the World-Wide Computer Industry. *Journal of High Technology Management Research, 11*(1), 75-92.

Easterby-Smith, M., Thorpe, R., & Lowe, A. (1991). *Management Research An Introduction* (2 ed.). London: SAGE Publications Limited.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic Capabilities: What Are They? *Strategic Management Journal, 21*(10/11, Special Issue: The Evolution of Firm Capabilities), 1105-1121.

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory*. New York: Aldine Publishing Company.

Grant, R. M. (1998). The Resource Based Theory of Competitive Advantage: Implications for Strategy. In S. Segal-Horn (Ed.), *The Strategy Reader*. Oxford: Blackwell.

Hamel, G., & Heene, A. (1994). *Competency Based Competition*. Chichester: John Wiley & Sons Ltd.

Hamel, G., & Heene, A. (1994). *Competency Based Competition*. Chichester: John Wiley & Sons Ltd.

Hayes, R. H., & Pisano, G. (1994). Beyond world class: The new manufacturing strategy. *Harvard Business Review, 72*, 77-86.

Henderson, R., & Cockburn, I. (1994). Measuring competence? Exploring firm effects in pharmaceutical research. *Strategic Management Journal, Winter Special Issue*(15), 63-84.

Jarvenpaa, S. J., & Leidner, D. E. (1998). An Information Company in Mexico: Extending the Resource Based View of the Firm to A Developing Country Context. *Information Systems Research, 9*(4), 342-362.

Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science, 3*(3), 383-397.

Laurillard, D. (1993). *Rethinking University Teaching*. London and New York: Routledge.

Laurillard, D. (2001). Gordon Pask memorial speech: contributions to educational technology. *Kybernetes, 30*(5), 756-759.

Lim, D. H., & Yoon, S. W. (2008). Team learning and collaboration between online and blended learner groups. *Performance Improvement Quarterly, 21*(3), 59–72.

Marino, K. E. (1996). Developing Consensus on Firm Competencies and Capabilities. *Academy of Management Executive, 10*(3), 40-52.

Marshall, A. (1920). *Principles of Economics*. London: Macmillan.

McGee, J. E., & Peterson, M. (2000). Towards the Development of Measures of Distinctive Competencies among Small independent Retailers. *Journal of Small business Management, 38*(2), 19-34.

Milliken, J., & Barnes, L. P. (2002). Teaching and technology in higher education: student perceptions and personal reflections. *Computers & Education, 39*(3), 223-235.

Montealegre, R. (2002). A Process Model of Capability Development: Lessons from the Electronic Commerce Strategy at Bolsa de Valores de Guayaquil. *Organisational Science, 13*(5), 514-531.

Penrose, E. (1959). *The Theory of The Growth of The Firm*. Oxford: Basil Blackwell & Mott, Ltd.

Prahalad, C. K., & Hamel, G. (1990). The Core Competence of the Corporation. *Harvard Business Review, 68*(3), 79-92.

Rothwell, W. J., & Lindholm, J. E. (1999). Competency identification, modelling and assessment in the USA. *International Journal of Training & Development, 3*(2), 90-106.

Rouse, M. J., & Daellenbach, U. S. (1999). Rethinking research methods for the resource-based perspective: isolating sources of sustainable competitive advantage. *Strategic Management Journal, 20*(5), 487-494.

Salmon, G. (2000). Computer Mediated Conferencing for Management Learning at the Open University. *Management Learning, 31*(4), 491-502.

Sambrook, S. (2003). E-learning in small organisations. *Education and Training, 45*(8/9), 506-516.

Sanchez, R., Heene, A., & Thomas, H. (1996). *Dynamics of Competence-Based Competition: Theory and Practice in the New Strategic Management*. London: Pergamon Press.

Schumpeter, J. (1934). *The Theory of Economic Development*. Cambridge: Harvard University Press.

Segal-Horn, S. (1998). *The Strategy Reader*. Oxford: Blackwell.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), p509-533.

Timmis, S. (2003). *Embedding Learning Technology Institutionally* (Briefing Paper): Joint Information Systems Committee.

Treacy, M., & Wiersema, F. (1993). Customer intimacy and other value disciplines. *Harvard Business Review, 71*, 84-93.

Walsh, S. T., & Linton, J. D. (2001). The Competence Pyramid: A Framework for Identifying and Analyzing Firm and Industry Competence. *Technology Analysis & Strategic Management, 13*(2), 165-178.

Ward, M., & Newlands, D. (1998). Use of the Web in undergraduate teaching. *Computers & Education, 31*(2), 171-184.

Wernerfelt, B. (1984). A Resource-Based Theory of the Firm. *Strategic Management Journal, 5*(2), 171-180.

Wu, J. H., Tennyson, R. D., & Hsia, T. L. (2010). A study of student satisfaction in a blended e-learning system environment. *Computers & Education, 55*, 155–164.

Yin, R. K. (1994). *Case Study Research Design and Methods* (Second ed.). London: Sage Publications Ltd.

Appendix 1 Interview questionnaire

Managerial capabilities and technical competencies		**Materials competencies and service competencies**
Step	**Question**	
What is e-learning	What are the different components of e-learning? Materials Fabrication and assembly (Computers, systems integration) knowledge-based services (Design layout, engineering services, accounting services, teaching, Course/curriculum design) Knowledge-embedded services (Software, management information systems, quality assurance, computer programming) Software Hardware Tools that make it happen technically Technical support Different supporting structures The techniques Content Resource-Based learning approach Organisational structure	Who are the principal actors? And who of them are the most critical? Lecturers Tutors Course/curriculum designers Software engineers Network engineers
Prepare current product/market profile	What are we selling/providing, to whom, and how are we doing?	Delineate the markets for each product line. Identify principal competitors. Establish the contributions of each segment to sales, earnings, and asset commitments. Review current growth, market share, and competitive position.
Identify sources of competitive advantage and disadvantage in the principal product/ market segments	Why do our customers choose our products instead of our competitors'?	Identify the cost, product, and service attributes that explain the current level of performance.
Determine organisational capabilities and competencies	What about our organisation gives us cost advantage, superior quality or reliability, after-sale support, or whatever it is that our customers value? Identify the physical and knowledge assets that contribute	Managerial capabilities Knowledge-embedded Resources scheduling Co-production planning Scheduling knowledge-based Teacher development Curriculum design

	to the competitive advantages enjoyed. Enumerate the organisational skills and abilities that create the cost, product, and service competitive advantages.	Expediting Technical competencies Knowledge-embedded Classroom materials Interaction mode knowledge-based Teachers and assistants Subject knowledge Knowledge transference Course design Fabrication and assembly Service infrastructure Communications Systems knowledge
Sort out the core competencies and capabilities	Which of our strengths and capabilities are most important for building the future of the organisation?	Apply the tests of: wide market access tangible customer benefits difficult imitation To the skills, assets, and capabilities identified in Step 3. Sort out core capabilities, i.e., Those most relevant for product/market decisions.
Synthesize and reach consensus on core capabilities	What are the organisation's core capabilities?	Combine, restate, challenge and debate the results of Step 4. Arrive at a reduced set (generally 2-5) of core competencies and capabilities
Assess future conditions in existing served markets	How relevant are current core capabilities to meeting these future requirements.	Evaluate likely changes in customer demands in the next 3-4 years.
Identify emerging markets related to our skills	Are there market opportunities in which our skills and capabilities might afford sustainable competitive advantage?	Do our skills and capabilities put us in a favourable position to serve our customers' future requirements?
Formulate development plans	Develop plans to meet the needs of future capabilities, asset requirements, market opportunities, and product extension opportunities.	What characterizes markets in which our skills provide: substantial value to the customer and opportunities to earn margins that exceed our costs of capital?
Additional interviewees	Would you recommend anyone else I should interview about e-learning.	