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Economies of Scale and Scope in e-Learning

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Economies of Scale and Scope in e-Learning

Abstract

Economies of scale are often cited in the higher education literature as being one of the drivers for the deployment of e-learning. They are variously used to support the notions that higher education is becoming more global, that national policy towards e-learning should promote scale efficiencies, that larger institutions will be better able to compete in the future and that there should be substantial investment in the development of e-learning materials and online courses. These claims are discussed but it is argued that the evidence is mixed. In particular many of the supposed benefits of economies of scale derive from the related concept of economies of scope and that an understanding of how economies of scale and scope interact is important in analysing the future development of e-learning. The paper argues that economies of scope need to be identified, better understood and planned for if we are to realise the potential economic benefits of e-learning.

Key words:

e-learning; online learning; economies of scale; economies of scope; technological change.

Introduction

The drivers for e-learning and the benefits to be derived from its introduction and progressive deployment have moved away from simplistic discussions of monetary costs and benefits towards emphasising the potential pedagogic gains and the positive impact on the student learning experience. The surveys undertaken by the Observatory on Borderless Higher Education (OBHE) of online learning among their member universities provide useful evidence, revealing that “cutting costs” ranks only tenth among the drivers for online learning (Garrett and Jokivirta, 2004). Indeed it has proved impossible, despite many years of experience with e-learning, to identify the costs associated with it, let alone quantify the benefits in financial terms. Despite this lack of evidence for the positive economic effects of e-learning, “economies of scale” are sometimes cited as a potential justification for investment in it. For example the Higher Education Funding Council for England (HEFCE) press release announcing the e-University stated that it would “...provide economies of scale by spreading the costs of the expensive tools and services needed for global internet delivery among all providers” (HEFCE, 2000a). The debate in the education literature has undoubtedly been well-meaning but the economic argument for expanding e-learning has suffered from a lack of discussion of where economic gains might spring from and, indeed, whether the supposed benefits are due to scale effects at all. In particular economies of scope are rarely mentioned, even though many of the examples given in the name of economies of scale are more correctly examples of economies of scope.

There is little merit in making this point purely as an academic nicety; the e-learning world does not need or deserve nitpicking interventions from microeconomists. However, this paper attempts to offer some clarification in order to promote a clearer analysis of what e-learning can offer higher education. If we move beyond the thinking stage, a clearer understanding of the differences between scale and scope effects may help in developing future policy towards e-learning and guide investment. This paper takes an explicitly economic view. This is not to deny that e-learning is a very complex phenomenon or that non-economic dimensions of it might be more important. However it does rely on the proposition that economic analysis can lend some understanding to the wider issues and perhaps even help to avoid policy approaches such as those which resulted in the UKeU's establishment and ultimate rapid demise.

Scale, Scope and Size

Economies of scale are savings which accrue from falling average (unit) costs as output volume expands. Declining unit costs are a function of fixed costs being spread over more units (course units delivered) and longer production (course delivery) runs resulting in a smaller proportion of staff time being used up in redevelopment activities. A further important source of economies of scale derives from learning by doing and this adds a dynamic element to an otherwise essentially static concept. "Learning by doing" (or perhaps more precisely learning by repetition) reduces costs as practitioners progressively fine tune production by developing solutions to operational problems, eliminate unnecessary processes and develop the specific skills needed for efficient operation. Economies of scale are most often associated with manufacturing activities although they

have substantial applicability in industries more relevant to education, such as information and communications. For example, the initial business plan for the e-University (which became the UKeU) stated that a core objective should be to:

“...secure **economies of scale** – in three senses. First in terms of target markets, to justify the levels of investment needed, there should be a reasonable expectation of a high volume of demand before a significant investment is made to develop an offering. Second, economies of scale in development costs could be secured insofar as learning materials were developed in ‘component’ form so that some components could be re-used in more than one set of material. Third, there would be benefits to individual HEIs in using a common technology platform and e-tools framework and so sharing development costs, experience and expertise.” (HEFCE, 2000b: 10).

As pointed out below, sharing of experience and expertise are sources of economies of scope rather than scale. Importantly they can be realized through sharing a common technology without that technology being embodied in a specific platform. Similarly economies of scope can be realized in development activities without the need to pursue re-use of components in a number of different end-products (which is a source of economies of scale at the component level).

However, the definition of economies of scale begs the question “output of what?” In conventional textbook discussions focusing on mass production the answer tends to be a single product produced at a single location. This restriction is relaxed when more flexible production systems are considered and the ‘what’ becomes a given range of related products and variants produced by a single enterprise. In such cases there can be two sources of economies of scale. The first relates to the production of a given product,

known as product-specific scale economies, realised by increasing the output of a single product, for example a particular course. Overall economies of scale arise when the output of a collection of products which share some joint inputs, for example teaching staff, and are jointly produced by, say, an academic department. However move much beyond a fairly narrow range of closely related products and we leave behind discussions of scale per se (or reduce the concept to a broad generalisation) to ask whether or not size is the most important variable in determining costs. Size can, of course, be achieved without scale simply by undertaking more and more unrelated activities. Note that exploiting economies of scale may have negative aspects, for example courses becoming more and more out of date as production runs lengthen. This phenomenon is a familiar feature of any conventional publishing operation.

There is also an important distinction between internal and external economies of scale. When an organisation increases production and thereby reduces unit costs, internal economies of scale have been achieved. External economies of scale occur outside of a firm, within an industry. Thus, when an industry's scope of operations expands due to, for example, the creation of a better communications network, resulting in a subsequent decrease in cost for an organisation working within that industry, external economies of scale are said to have been achieved. With external economies of scale, all firms within the industry will benefit. A value for money study of the activities of the UK's Joint Information Systems Committee (JISC) provided evidence of very substantial external economies of scale in the provision of authentication systems, inter-university network

infrastructure and bibliographic services including the distribution of and access to e-resources. (JISC, 2006).

The best known sources of economies of scale are the spreading of fixed costs (that is costs which do not change as output is increased), use of specialised assets (including people) and the division of labour. Higher education fixed costs include items such as course development and the provision of IT infrastructure. Some inputs, such as research and development, marketing and recruitment, managerial expertise and professional labour are expensive, but because of the possibility of generating increased efficiency with such inputs, their use can lead to a decrease in average costs. As the scale of production increases, a company can exploit the use of specialized labour resulting in greater efficiency. This is because workers would be better qualified for a specific job and would no longer be spending extra time learning to do work not within their specialization. If an organisation is able to spread the cost of such inputs over an increase in its level of output (somehow measured), economies of scale can be realised. For example a small college might not be able to afford to hire specialist staff to undertake functions such as developing and running an e-learning system, the job might be done by someone who has additional responsibilities. Large universities may well have specialist units undertaking the work, however as the number of students increases the size of the unit does not need to increase proportionately. In both cases (small college and large university) a common resource is shared, but greater economies of scale may be available to the large university via greater specialisation of staff inputs. Centralization of common resources may also lead to economies of scope.

Economies of scope are the cost savings which result from the sharing of inputs, including knowledge, across the processes used in the production of different, but related, product lines. Examples are the ability to manage production and other processes effectively, the exploitation of knowledge-based components (for example digital assets), spreading the impact of successful brand images and reputations, and economies gained from sharing research and development. In addition there could be synergies between products such that offering a complete range gives the consumer a more desirable offering than a single product would. Substitute “courses” or “subjects” for products and “student” for “consumer” and we have a familiar justification for the notion of promoting universities at the expense of monotechnic institutions.

The concept of economies of scope does not suffer from the same problem of defining “units of output” as is prevalent with economies of scale. However, economies of scope are easily confused with economies of scale. Indeed many economists (following the classic discussion of Baumol et al., 1982) use the term “economies of scope” in a limited way to mean overall economies of scale as defined above. However in this article we are taking a broader and hopefully more useful view of the concept. Whereas economies of scale primarily refer to efficiencies associated with increasing the scale of production of a single product type, economies of scope refer to efficiencies associated with increasing demand for a range of diverse but related products. “Related” products do not need to have similar (undergraduate and postgraduate teaching in a particular area) or complementary (teaching and research) functions, but may be derived from the same

knowledge base or dependent on the same technologies. However the volume of production of each product required to exploit economies of scope need not be so high as would result in significant economies of scale.

Of course economies of scale and scope can exist side-by-side. Economies of scale are a volume-related effect; economies of scope are variety-related. Growth is usually a product of both increasing volume of some products and, at the same time, promoting additional demand through extending the variety offered. This may well be the reason why the two concepts are often conflated into one, usually labeled 'economies of scale'. The difficulties of defining "units of output" meaningfully in modern multi-product organisations (of which universities are prime examples) compound this trend. However the route to success in e-learning, as in many other situations, may be in exploiting both economies of scale and scope where they each provide potential advantage and gain. Such a strategy is not helped by confusing the two, but intelligently applied may allow organisations to reap the benefits of increased size, a product of both greater scale in some specific activities and greater scope gained from broadening the range of activities undertaken and services offered. Exploitation of economies of scope may also permit large organisations to serve smaller market niches effectively since realizing economies of scale ceases to be the prime driver of cost efficiency. Amazon, for example, does not rely on "best sellers" to generate the bulk of its profits (Brynjolfsson et al; 2006).

However it is important to recognize that increased size may also bring problems for higher education institutions. Firstly, it is important to analyse the cost behaviour of all elements of the value chain, not just production, as output expands. In particular it may be that diseconomies of scale in marketing and recruitment could outweigh economies of scale in production. For example, as a university or college expands by enrolling more students on the same programmes it will have to recruit from more dispersed market segments both in terms of geography and demography and, possibly, ability. This increases average costs resulting in diseconomies of scale. Courses delivered online are affected in that the wider the online net is cast the greater the diversity of individual learning environments (including client workstations) which may need to be catered for. This can be seen in China where the spread of online higher education to the more remote and rural areas is seriously inhibited by low bandwidth and lack of suitable facilities for study (Zhao et al., 2006).

Even where substantial economies of scale can be realized at one point in the production chain, exploiting them may result in diseconomies of scale appearing elsewhere. For example there is little argument that application of VLEs and similar software systems can result in economies of scale in the distribution of course materials. However if these are then printed off locally in what might be termed micro production environments, then diseconomies of scale at the printing stage occur. Of course there are other effects at work here which explain or possibly even justify the use of centralized technology in this way. One is that it substantially improves access to course materials and may reduce the

costs associated with obtaining them for the user. Secondly there is an element of cost-shifting going on such that the diseconomies of small print runs on low capacity machinery are spread across many users. It is important to consider “end-to-end” costs from a wider perspective in order to avoid potentially unintended consequences of policy change.

Increasing student recruitment by offering a wider variety of courses increases complexity, may reduce enrolment on existing courses via displacement effects and could stretch the expertise of staff beyond where they feel comfortable. Complexity costs, at least in theory, tend to rise exponentially as adding additional options in a particular category (for example a new field of study within a “combined” course scheme) has a multiplicative effect on the total number of variants available. The same argument could be applied to extending the range of research activities. Complexity factors can result in diseconomies of scope and higher average costs without any corresponding gains in quality of output. Diseconomies of scope can also outweigh economies of scale. For example, whilst it may be possible to share some inputs across a university and thus spread some costs, the additional labour skills needed to design and develop new subject areas and/or market them to new student groups may add to overall costs at greater rate than costs are reduced by input sharing. The potential existence of diseconomies of scope has been one of the principal economic arguments for supporting smaller monotechnic colleges since, at a smaller scale of operation, it is argued, specialist production may be cheaper than joint production. In the UK at least specialist colleges are being progressively merged into larger more diverse institutions (witness the history of colleges

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of education, agriculture, music etc. over the years) suggesting the balance of the cost argument has, over time, changed in favour of larger, more diverse institutions.

The Evidence for Economies of Scale and Scope in e-Learning

It is useful to look at the evidence at a number of different levels. In broad terms, economies of scale through the use of e-learning have variously been used as an argument for an assumed trend towards the globalization of higher education via exploiting IT, in defence of national policy interventions to promote e-learning, as a means of improving cost-effectiveness within institutions, and finally, for the development of units of study targeted at large student audiences. Each of these claims, although there are overlaps between them, are worthy of comment. However many of these claims for the influence of economies of scale are more correctly attributable to economies of scope.

The “Globalisation” of Higher Education

The term “globalisation” has been thoroughly debated in many arenas. However a common theme is that globalisation is not determined by the geographical spread of activity (“being everywhere”) but by the development of an organizational strategy which stresses common global elements (not simply being “all over the place”). Here it is taken to embrace any move towards significant internationalisation of the activities of higher education institutions. This includes establishing a physical presence in other countries, engaging in cross-border trade, “flying faculty” and other modes of overseas delivery and student mobility. The issue here is whether or not the cost characteristics of e-learning

provide incentives and opportunities for increased international activity by higher education institutions. Of course there are other drivers towards globalising higher education, for example the convergence of student needs, government exhortations, regulatory effects and growing competition driven by the greater interdependence of markets that technological change promotes (Yip, 2003). Move beyond market drivers and there is “the character of university education, the curriculum, and the community” (Duke, 2002:97).

The most obvious business attraction of providing online higher education in a global market is its size. The downside is that very substantial investment is needed to create a curriculum robust enough and attractive enough to have widespread appeal. Add in the realization that global volume can only be achieved at fee levels which reflect incomes in local markets even if different fees are charged in different countries (first degree price discrimination in economists’ terms), and the only way out is to exploit economies of scale. However the track record of institutions or consortia trying this approach is not good. Universitas 21 is not fulfilling the expectations of its partners (OBHE, 2004a) and the e-learning venture set up by Oxford, Yale and Stanford universities (AllLearn) has been wound up (Guardian, 2006). In both cases it appears that both demand and development times were underestimated. Other failures include Scottish Knowledge and Michigan Virtual University (OBHE, 2004b). A small number of market players might be successful through a combination of rapid growth and a fairly restricted course offering thereby achieving economies of scale within a manageable period of time (Wolf, 2005; Swenson and Myer, 2005). Of the major global competitors only the University of Phoenix Online appears to be consistently profitable. However this may be due in large

point to it being part of a larger group embracing face-to-face and blended as well as on-line delivery with a consequent ability to exploit economies of scope across the different operations (see, for example, Garrett, 2004; Lindquist 2006).

Some have identified a “New Economy” of “individualisation and globalisation” in higher education (Collis and Gommer, 2001; Duke, 2002). This combination of learner-centric education conducted in a (virtual) global transactions space can only be effectively achieved by exploiting economies of scale to reduce delivery costs and simultaneously developing economies of scope to generate the variety consistent with individualisation. In particular this new economics of e-learning does not rely on exploiting economies of scale in the production and delivery of “world” modules in supposedly universal topics such as “Introduction to X-ology”. The new economy strategy is by no means easy to achieve, however, and there seems to be little evidence that the new economy is emerging at the expense of the more traditional “global campus” model (delivering an existing institutionally determined curriculum across a wider range of locations) and the more cautious “stretching the mold” approach which adapts and extends the existing curriculum to fit the diverse and different needs of learners in other locations (Collis, 2003). The global campus model relies heavily on exploiting economies of scale in the production and delivery of courses, ‘breaking the mold’ exploits economies of scope.

Economies of scale derive from the nature of production of the given activity or product and not from the market. The ability to exploit economies of scale profitably may be

limited by the size of the market (that is actual buyers rather than the total of potential buyers). Potential economies of scale in e-learning do not create global markets despite what some writers (e.g. Wilson, 2005) have suggested.

National Policy Interventions

Within the UK there has been a marked switch in national strategies for e-learning away from funding centralized initiatives (such as the UKeU and the National Health Service University, NHSU) to de-centralized activities with funding allocated to individual institutions. In the case of the UKeU there seems to have been little attention given to the economic arguments for its creation beyond an appeal to the existence of economies of scale. Conole et al. (2005) confine themselves to observing that the UKeU believed that producing e-learning materials was costly; however this fact alone is insufficient to justify investment in a centralised initiative without understanding the nature and behaviour of those costs. A major justification for centralized funding initiatives is the presence of strong external economies of scope and scale which outweigh other diseconomies of centralization such as increased bureaucracy, monitoring and compliance costs, whether centrally or institutionally incurred. However, the existence of external economies of scale is a necessary but not sufficient condition for centralised initiatives to work. In addition the gains from exploiting such economies must be large enough to overcome the natural tendencies of partners to want to retain local control and must not be attainable in any other way, for example looser forms of collaboration. The original consultations on the role of the UKeU recognized this to some extent. For example, "...The main debate on the proposed model for the e-University was the balance that should be struck between collaboration and competition. The majority of

respondents wanted to see a reasonably inclusive model.” (House of Commons, 2005a). Another example is the failure of Scottish Knowledge (an e-university owned by the Scottish Universities and other investors) where “...Scottish Knowledge sources blamed the company’s closure on rivalry from the very Scottish Universities with which it had partnered, whose independent efforts (they claimed) had driven them out of the market”. (Bristow, 2004). A similar point was made by Slater in suggesting that “..a simple explanation for the failure of the eUniversity is that no-one had a primary overriding interest in its success” (Slater, 2005: para.15).

South Korea’s “cyber universities” initiative illustrates the problems of national initiatives competing with institutional ones especially in a market where competition for students is fierce (OBHE, 2003). The combination of economies of scale in production and excess capacity can create a race where competitors try and grow too rapidly in a bid to survive. Sometimes excess capacity can be created by “me too” market entry driven by a fear of missing out. Common consequences are lowered quality, falling prices and excessive product differentiation as competitors seek a larger share of the dwindling pool of new customers. Indeed this phenomenon is endemic in productive systems where both competition and significant economies of scale are present.

The House of Commons Education and Skills Committee, in its inquest on the failure of the UK e-University (UKeU) argued that future policy on e-learning should make a clear distinction between system-level (across education as a whole) and sector-based (within, for example, higher education) actions. In the latter case “...sector-based actions will

seek economies of scale through a collective framework in which partners and agencies in a particular sectorshare good practice and ensure the right solution for that sector.” (House of Commons, 2005b: para. 23). In terms of the definitions given above such a strategy is based on the idea of promoting and exploiting external (to any given institution but internal to the sector) economies of scope (rather than scale). This emphasis is reflected in the aims of the major UK higher education funding initiatives in teaching and learning. For example the Teaching and Learning Technology Programme (TLTP) was launched in 1992 with the aim of “achieving productivity and efficiency gains” (Tiley, 1996) whereas its 2005 successor, the Centres for Excellence in Teaching and Learning (CETL) initiative, aimed “to reward excellent teaching practice, and to further invest in that practice so that CETLs funding delivers substantial benefits to students, teachers and institutions.” (HEFCE, 2005a). The E-learning Benchmarking and Pathfinder programmes (see HEA, 2006) have an overt emphasis on collaboration and the development and sharing of good practice rather than the more conventional activities of courseware and software tools development.

The Institutional Level

The study of US universities by Laband and Lentz (2003) did not look at e-learning specifically but concentrated on the three outputs of undergraduate education, (post-) graduate education and research. Where public universities were concerned they found little evidence for the existence of product specific economies of scale for undergraduate education (indeed diseconomies set in at below the average undergraduate population),

but that economies of scale did exist at all output levels for graduate education and research. Economies of scope between the three outputs were also present at all levels. The economies of scale in research and graduate teaching coupled with the economies of scope were sufficiently large to offset the diseconomies of scale in undergraduate education. These findings suggest that economies of scope are non-trivial in university operations in general. Whilst we should be wary of generalising them too far, the potential existence of economies of scope between face-to-face teaching and on-line delivery would enable conventional universities to compete with wholly on-line universities in virtual education.

The evidence for economies of scale in e-learning at the institutional level is thin despite the early predictions of many that information technology developments would play into the hands of the larger, stronger universities. Discussion among twelve UK universities as part of the recent HEA/JISC funded Benchmarking Pilot programme revealed that the only consensus concerning the economics of e-learning was that the costs and benefits could not currently usefully be measured (see the discussion on inputs and outputs of e-learning in the HEA Benchmarking blog: HEA, 2006), thus an essential prerequisite for understanding the behaviour of e-learning costs as output (or use) expands is not present. This conclusion might even be seen by some as a backward step from that of Fielden who argued that whilst it might be possible to cost e-learning, the resources expended in doing so were probably not worthwhile, particularly if we accept that the application of IT to teaching and learning is now a “must”. (Fielden, 2002).

Units of Study

For many e-learning is most prevalent and perhaps relevant at a smaller scale than the institutional. Most students and tutors encounter e-learning as part of a course of study or sub-unit of it. The number of students undertaking entire programmes of study entirely through e-learning is growing but is still only a small proportion of the total higher education population. The economies of scale argument is widely deployed to support a range of activities from the development of individual study modules (taken here to be the first order sub-unit of a course) to producing quite small “learning objects” which can be re-used (or re-purposed) as components of modules or even teaching sessions.. The basic economic argument is that the fixed costs of development of e-learning materials are high whilst the variable costs of delivery are low, relative to those of face-to-face teaching. Thus when the fixed costs are spread across larger and larger use volumes average costs will eventually fall below those of conventional delivery methods (see, for example, the exposition by Jewett, 2000). This basic model is capable of useful extension, although the fundamental principles remain the same. For example several types of delivery (presentation) cost can be identified, some of which may be lower with e-learning, for example distribution costs, and some which could be higher, including student support. Weller (2004a,b) and Laurillard (2007) both provide some more sophisticated analysis based on this recognition. Their work suggests that the realization of economies of scale in e-learning at the level of the course and its sub-units is far from

automatic and depends on the way in which the course is designed, especially where student support and assessment is concerned.

Counterbalancing this is the possibility that reusability of learning objects could reduce course development times and, where such objects are digital, may lend themselves more easily to re-use in an e-learning environment. Given that such re-use spreads production costs over more and more students then there will be economies of scale present. Course production is often accomplished in a series of sequential tasks. To the extent that these tasks are based on the same substantive knowledge, then their repeated execution will lead to economies of scope. In simple terms, course production costs may not be as fixed as has generally been assumed in the past. Obviously in a product specific sense they are fixed and economies of scale are the natural consequence. However it is more useful to look at the course production process in a wider way and recognize the importance of economies of scope by developing strategies and incentives for exploiting them. In particular economies of scope can be generated through the creation and exploitation of digital assets (Rayport and Sviokla, 1995). In education generally the development of digital learning object repositories is rapidly reducing the costs of discovering, evaluating and modifying re-usable course materials. Discovery costs are reduced through linking repositories together thus making it possible to search a number of repositories simultaneously. Evaluation costs are reduced by using democratic peer-based systems rather than relying on “experts”. Modification costs are lessened via the spread of

standards requiring learning objects to be packaged in agreed and more widely applied ways.

The behaviour of costs as output varies also depends on how output is defined and measured. If output is measured as initial student enrolments then differential retention rates between modes of delivery will not enter the equation. If, on the other hand, output is defined in terms of successful completions then low-support low-retention modes of delivery (such as much large scale e-learning) will begin to look less economically attractive. It is here that economic concepts meet the pedagogic debate surrounding e-learning head on. In very terse terms we can draw a link between economies of scale and the content heavy, instructivist pedagogy sometimes found in large-scale applications of e-learning. At its potential worst this may lead to the “commoditization of learning” (Visser, 2005). On the other hand, e-learning based around a constructivist pedagogy may be more expensive to deliver than its face-to-face counterpart (Weller, 2004a; Laurillard, 2007). However, if courses are re-designed to exploit the opportunities that e-learning offers, quality can be improved and, at the same time, costs reduced, even for courses with large numbers of students (Twigg, 2004). If deploying e-learning simply means that capital expenditure (in the form of information technology) is simply bolted-on to existing course development and delivery methods then it is far from surprising that educational outcomes are now better than they were before (Twigg 2002; 2003).

Another way of expressing the same idea is to highlight the tension between content-heavy and communication-heavy forms of delivery. For example an Australian case study of a number of wholly on-line courses (DEST, 2003) pointed to the difficulties of accommodating diverse staff and student preferences within a content-heavy on-line delivery mode without substantial investment in the kind of staff intensive communication activities which would help build student engagement and retention. On the other hand there are excellent examples of e-learning initiatives which cater for quite small audiences but are nevertheless highly successful. These courses tend to build communities of practice rather than rely heavily on content engagement. Some of these market niches may previously have been unserved simply because the technology was not available to provide the rich communication needed to support effective communities of practice which are highly geographically dispersed. These initiatives exploit economies of scope by using common capabilities to serve multiple (formerly discrete) market niches. Perhaps the most obvious enabling technologies are low cost but reliable web conferencing and meeting systems and video and other rich content streaming which facilitate the kinds of communication which tutors and students are used to and value in the face-to-face environment.

The “New” Economics of Scale and Scope

The new economies of scope are based on the ability of an organization to share knowledge across its sub-units, subsidiaries and partners to create new products and services. Universities that can stimulate and exploit collaboration will be better able to exploit the diverse knowledge resources and capabilities spread across its partnerships.

Such partnerships need not be solely geographically dispersed, by their very nature universities have always been diverse partnerships of faculties, departments, colleges and so on. Universities can realize the benefits of collaboration in a number of ways. Firstly there is the familiar idea of sharing best practice. Secondly there is the possibility of innovation through the cross-pollination of ideas. Thirdly benefits can be gained from sharing expertise and improved decision making. However collaboration is not something which occurs automatically (see Hansen and Nohria, 2004 for a discussion). Universities are complex organisations and often contain very strong sub-groupings. These two features can lead to barriers to collaboration. Complexity makes it more difficult to connect knowledge and strong groupings can exhibit “not invented here” resistance to knowledge generated elsewhere and be potentially unwilling to engage with others. It follows that universities need to develop strategies for promoting collaboration and realizing knowledge economies of scope. These could include adjusting recruitment and promotion criteria for staff and the generation of cross-cutting rather than hierarchical or departmentally-based communication mechanisms.

Economies of reach, or network externalities as they are also known, derive from the number of people and places that can be reached by a network. Thus the growth of the network is of itself an important feature. New users not only gain benefits by joining but also confer benefits on others (external benefits) by being reachable by existing members. The growth of mobile telephone networks is an obvious example. Once a network is established the interplay of economies of scale, scope and reach provides a strong

mechanism for growth. Put another way, the combination of bigger size and spreading of fixed costs (scale effects) coupled with increasing variety of use (scope) and the breadth of users (reach) provides the ability to simultaneously reduce prices and increase service variety. However technological advances are also important; the attractiveness of e-learning as a proposition is increased not only by the number of people who can be reached (the size of the network) but also the quality of the communication (richness) enabled by the availability of greater bandwidth and the development of new social software systems. For some the change in the economics of information is shifting universities from being wholly physical centres of activity to becoming access nodes on the knowledge network. However some people will always wish to access the higher education network predominantly via physical presence (Quinn, 2001). In particular virtual networks may not be able to generate the “thickness” of social relations which, for many people, enhances their performance (Duke, 2002).

Thus there are two complementary and inter-twined trends at play. Firstly as higher education institutions become more globalised (or just simply larger) they develop more complex organizational forms but also generate new opportunities to exploit the more diverse resource base at their disposal. The potential benefits of such exploitation may be called economies of knowledge sharing. Secondly economies of reach are being progressively expended as information technology develops. Both sources of economies are predominantly ones of scope, although economies of reach also confer positive scale effects. However the potential benefits will not be realized by accident, higher education

leaders and policy makers need to recognize and understand their existence and take appropriate positive action. This will include both reducing the barriers to collaboration and promoting knowledge sharing and investment in ways of exploiting the possibilities for e-learning offered by enhanced reach

Conclusions

There is little compelling evidence that exploiting economies of scale in e-learning production is a major benefit deriving from its development. However exploiting economies of scale has not been an obvious feature of policy making or planning in the introduction of e-learning although, as shown above, occasional references to the concept have been made, although not always accurately. Economies of scope are rarely, if ever, considered explicitly (and are certainly not planned for) in the e-learning world despite some evidence that they do offer significant possibilities both within institutions (internal economies of scope) and across the higher education sector (external economies of scope). Within institutions their exploitation offers the possibility that face-to-face, blended and online course programmes can feed off each other through sharing knowledge, pedagogic innovation and re-using course materials. Within and across institutions the development of federated repositories of learning and teaching objects promotes the possibility of re-purposing materials for use in different contexts (scope effects) rather than simply replicating their use in their original form (scale effects).

Within the UK it may be possible to detect a shift in policy emphasis from promoting scale effects to promoting activities likely to yield external economies of scope. For example the HEFCE e-learning strategy (HEFCE, 2005b) aims to “implement our strategy through a partnership approach” and “build upon our investments in learning and teaching” but rejects the idea of setting up new organisations. This would be achieved, in part, through encouraging “co-ordinated strategic management approaches to development of e-learning”, evaluating and disseminating “national and international good practice in e-learning” and increasing “opportunities for interoperability of materials through common standards in order to promote sharing” (HEFCE, 2005b). The new Joint Information Systems Committee (JISC, the UK government agency charged with promoting the effective use of information technology in higher education) states that it has a primary aim to “deliver value for money through economies of scale”. Economies of scale are mentioned on four other occasions notably in the context of national procurement and delivery of on-line content. Dig below the surface however and the main mechanisms for delivering the strategy are producing guidance, developing standards based systems for federated access management and repositories, enhancing interoperability of systems within and between institutions and so on (JISC, 2007). All these are (unrecognized as such) examples of promoting economies of scope.

Technological change is shaping a new interplay between scale and scope effects which is driven by specific technological developments such as digitization of content, managed learning systems and dynamic networks including Net 2.0. In the past economies of scale

and scope have been seen in a static setting within a fairly stable technological environment, in future the focus will need to be on a dynamic perspective. Economies of scale and scope interplay in a cycle. New technologies, such as the internet, create new sources of economies of scale. New economies of scope emerge as the new technologies reduce in cost and become more flexible (Net 2.0), enable the management of increased business complexity and allow common capabilities to be exploited to serve smaller (“niche”) markets as well as existing ones.

None of this is to suggest that university leaders and higher education policy makers should suddenly begin base their actions and decisions on purely economic grounds or that discussions of scale and scope should come high on the policy agenda. On the other hand economies of scale are one of the most enduring features of production activity in many industries and it would be unwise to consign them to the graveyard just yet. Economies of scope are becoming more prevalent and have the potential to show how e-learning can be effectively exploited to achieve the supposedly impossible dream of simultaneously reducing higher education costs and improving quality. But the dream will not happen of its own accord.

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