THE TWO-PRONGED ATTACK ON LEARNER SUPPORT: COSTS AND THE CENTRIFUGAL FORCES OF CONVERGENCE

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1 Introduction

This paper looks at the cost aspects of supporting learners at a distance. Hence the focus will lie on efficiencies rather than quality. However, we do not want to imply that strategies, which maximize efficiency or arrive at minimal average costs by exploiting scale economies, represent distance education at its best. The model serves to identify efficiencies and deviations from the efficiency path. While deviations may well be legitimate, planners should be aware of them.

In distance education students and teachers are geographically separated for most of the time. For this reason the educational process has to be conducted by means of media. Media (and their *capabilities*) have changed substantially in the history of distance education. In earlier generations of distance education, such as in correspondence teaching, communication between teacher and students had been cumbersome, which made it imperative to develop quality materials pre-empting most of the questions students may have. Hence media impinge on the process of teaching and learning in such a way, that, more than in face-to-face settings, content and communication had to be separated. Because of these difficulties to sustain responsive communication at a distance (especially in earlier generations of distance education), there is a marked shift in emphasis away from communication towards a specific instructional design, which involves the student in a 'simulated dialogue' with the text (Holmberg, 1995).

These two fundamental aspects of distance education are reflected in different terminologies. Holmberg (1995) distinguishes between one-way traffic (i.e. 'simulated dialogue'), and two-way traffic (e.g. forms of 'guided didactic conversation', which allows for the necessary feed back loops between teacher and student). Hülsmann (2000) tries to capture the same difference as a one between *internal interactivity* (i.e. the internal dialogue triggered by the specific instructional design of distance education course material) and *external interactivity*, which refers to the communication between real persons most importantly the interactivity between student and teacher). Hence, external interactivity would comprise what Moore & Kearsly (1996) call *student-teacher* and *student-student interactivity* while their *student-content interactivity* corresponds to internal interactivity. Hülsmann also suggests classifying media along similar lines: media which can mainly be used to provide content and facilitate internal interactivity are *resource media*; media which sustain communication, are classified as *communication media* (2000). The distinction between these types of media has obvious economic consequences since they differ in terms of cost structure.

Hence, learners are supported in both ways: (i) by providing them with learner friendly material (i.e. material in which some student-content interactivity is designed) and (ii) by sustaining a line of communication between teacher and learner.

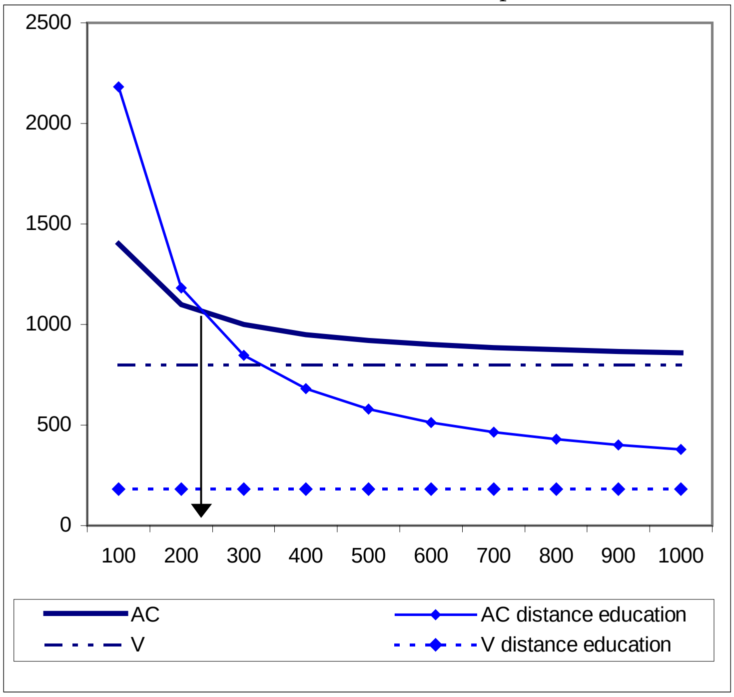
Interestingly, a more canonical definition of learner support explicitly ousts the development of course material from the realm of learner support: "For the purpose of the argument here, the widest definition of learner support will be used. This is the totality of the provision by an institution to support the learner, other than generic teaching materials produced by instructional designers/course producers. To be absolutely clear, where learning materials are produced for numbers of student ..., this is regarded as the academic teaching and is considered to be outside the framework of learner support." (Mills, 2003, p. 104)

Being a nominalist I can live with any definition as long as it is consistently applied, but given the actual purpose of this discussion, i.e. to look at student support in ICT-based distance education, it may be questioned if such an exclusion of improved instructional design from the realm of learner support camouflages the intricate relationships between the two system components.

2 Costing of student support in traditional Distance Education

In the following *traditional distance education* is understood as the generations of distance education up to (and including) the multimedia model of distance education.

Given the centrality of the mathematical model for any type of cost consideration, we shortly parade the standard argument claiming the cost-efficiency of distance education. Recall the *total cost formula*, which reads TC = F+V x N, where F stand for *fixed costs* and VxN *variable costs*, N representing the number of students and V the variable costs per student. Total costs allow to derive average cost per student by dividing TC by the number of students. This leads to the *average cost formula*, which reads: AC = TC/N or AC = (F/N) + V. The characteristic graph of such an average cost function is a curve which falls asymptotically towards a straight line parallel to the x-axis. *Asymptotically* means, that it approaches the straight line with increasing number of students but never falls below it. *Scale economies* simply means that, with increasing numbers, average costs per students fall. The potential for scale economies is the differential between fixed costs (F) and variable costs per student (V). The flattening of the curve shows the degree, by which scale economies are becoming exhausted.



The figure above depicts two graphs[1], one representing conventional education, one distance education. The traditional argument asserting the efficiency of distance education then is as follows: Even if in distance education fixed costs of development may be higher than in conventional education, as long as the (aggregate) variable costs per student in distance education are lower (and this, it is argued, is generally the case), average costs of distance education eventually will fall below the average costs in conventional education. The arrow in the figure points to the *break even point*, i.e. the number of students, beyond which the average costs of distance education undercuts the costs of conventional education.

To the extent with which we can associate learner support with variable costs per student, it becomes clear, why student support is sometimes regarded as the 'Achilles Heel' of distance education: (i) it defines the limit, below which average costs never can fall, and (ii) it retains the linkage between costs and volume of activities (students to be taught), which distance education prides itself to loosen.

One would have, however, to add some *caveats*. First, all such model considerations may lead planners to think that they could at will adjust all parameters independently, in order to achieve the intended results. In fact, they can make decisions about media sophistication and set levels of teacher-student interactivity. But they cannot simply and independently set the enrolment level. Lowering

[1] We take as one graph the curve and the straight line towards which it falls.

media sophistication may prevent students from enrolling, which in turn may mean that the intended measure of scale economies cannot be realized and average costs are higher than expected. What applies to media sophistication may also apply to learner support since a supportive learning environment could influence enrolment levels and therefore costs.

Secondly, we need to distinguish between *efficiency* and *cost-effectiveness*. Efficiency measures usually use as performance indicator 'average cost per student', while cost-effectiveness measures control for academic outcomes and would look at 'costs per graduate'. We know that student support positively influences retention rates and even academic performance (e.g. Gibbs, 2003; Hohlfeld, 2003). If additionally the funding regime shifts from 'per student' to 'per successful student' (Johnson & Barrett, 2003), there is an additional economic rationale for protecting a good student support system even it sets limits for lowering average costs per students.

One further comment: The efficiency path would lead to lower average costs per students. Given the enormous demand for education (and the 'perverse way' of raising unit costs, the capacity of distance education to bring down average costs per student is closely related to its remit to broaden access to education. Especially, in developing countries coping with large numbers is one of the main reasons to turn to distance education (Perraton, 2000). However, planners should be aware that lowering average costs per student in this model is achieved by expanding the system, which, in turn, raises total costs. (This *caveat* to any cost-analysis, exclusively singing the praises of distance education for lowering unit costs, is forcefully developed by Butcher & Roberts, 2004.)

3 A fundamental distinction

The term ICT draws together the two main aspects of the new technologies: (i) *information* processing, retrieval and exchange, and (ii) sustaining *communication* between people at a distance. We classify the respective usages as being of type-i and type-c respectively. Borrowing from Rumble (2003) we define:

- *Type-i applications* offer Computer Based Training (CBT) involving textual, audio, and video course materials in digital format. Content can be downloaded from the Internet or distributed by CD-ROM. No student support is involved.
- *Type-c applications* offer Computer Mediated Communications (CMC) supporting tutor-student and student-student interaction. This support may be offered in the synchronous mode *(type-c1)* or asynchronous mode *(type- c2).*
- *Type-i/c applications* combine both CBT and CMC

The distinction between type-i and type-c applications recalls the one made earlier between resource and communication media, which relates to different types of interactivity (internal or student-content interactivity corresponding to resource media, external or student-tutor interactivity corresponding to communication media). However, in the context of ICT-based distance education the difference between resource and communication media becomes increasingly obsolete due to *technological convergence*. While in earlier generations of distance education media could be classified according to their technologies, media capabilities in ICT-base distance education do not split along technology lines[2]. In fact, both applications (type-i and type-c) can be realized on the same learning platforms (or *learning management systems* (LMS) such as *Blackboard* or *Learning Space*). Instead of trying to select appropriate technologies for the best media mix to support learners, we need to define the optimal *educational scenario* (Baumgartner & Bergner, 2004). Educational scenarios are related to educational *interaction patterns*, which then are realized by using tools available within the learning management system. The interaction patterns, in turn, lead to the specific cost-structure characterizing the scenario. Recall what has been said about communication media. The main cost drivers are not the hardware or line costs, but the teachers' time, which means that costs of communication between teacher and learner are largely independent of the specific technology used to sustain it.

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[2] We distinguish with Kozma between media and technologies. Media "can be defined by its technology, symbol systems, and processing capabilities" (Kozma, 1994)

3.1 Supporting students through type-i applications

Type-i applications include CBTs to be downloaded via the Internet or distributed as a CD-ROM. CBTs can include simulations, computer marked assignments, video clips, graphics, and audio files. It is obvious that this means that producing such material increases fixed costs in a way that makes it difficult to define a ceiling for the fixed costs of development[3].

While the good news is that the cost-structure of such type-i applications are compatible with the traditional cost structure of distance education, it is difficult to imagine that the increased fixed costs of development can be compensated by increased enrolments. Devolving the increased development costs to the learners might not be possible since it could counteract potential increases in enrolment, which may come with the bells and whistles of higher level of media sophistication.

The capabilities to support learners at a distance through type-i applications have lifted internal interactivity to new heights. Exploiting such capabilities, however, comes at a cost. Neither is it likely that such costs can be compensated through increased enrolments, nor is it possible to devolve them fully to the student. Assuming that the new capabilities can substitute routine tutorial work, learner support, as communication between teacher and students (external interactivity), comes under pressure. This illustrates that the two main subsystems of distance education, far from being neatly separated, form a system of 'communicating tubes', where developments in one subsystem may increase pressure in the other.

3.2 Supporting students through type-c applications

Type-c applications, synchronous (e.g. videoconferencing) or asynchronous (e.g. online conferencing), sustain communication between teacher and student. In both cases the main cost driver is teacher time.

A model for analysing the cost of videoconferencing has been proposed by Hülsmann (2000, pp. 132-138). Again, the costs depend not so much on infrastructure and hardware, but on the teaching and learning scenario one may want to implement. This is because the *educational scenario* determines the *interaction patterns* and the interaction patterns, in turn, impinge on costs and cost structure: The more interactive, the higher the costs. If videoconference systems are used to lecture at a distance, per student costs can be brought down. But this may be taken as a case of *chained media*[4], i.e. not making use of the full capability the medium offers. The cost advantages of videoconferencing mainly reside in reduced opportunity costs (less forgone income due to lower loss in productive time due to savings in travelling time[5]). The cost-structure is similar to the one of conventional education[6].

Asynchronous communication may be conducted as *online conferencing* on learning platforms like Learning Space and Blackboard. To the geographic flexibility of synchronous communication time flexibility is added. Again the cost-structure depends on the educational scenario to be implemented. If discussion drives the course, claims on teacher times are higher than when the learning platform is essentially subsidiary to a print based course. This leads some analysts to complain:

"If there is one thing which researchers and practitioners of on-line teaching agree about, it is that interacting with students in this medium is more time-consuming than traditional campus lecture courses or print-based distance education tutoring. Anyone with experience of tutoring on-line will be

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[3] Cf. Hülsmann (2000, p. 17-19) und Perraton & Moses (2004, p.149)

[4] Seel & Winn (1997, p. 319)

[5] There is a pile of literature, which claims effects of *time compression* attributable to the use of media (Witte, 1995; Whalen & Wright, 1999; Hasebrook, 1999).

[6] Some distance educators would not accept the synchronous model as a member of the distance family proper. (Cf. Peters exhortation of the extended classroom in Bernath & Rubin, 1999, p. 162).

considerably more familiar with the over-demanding, emotionally needy, or endlessly chatty student, than with any picture I have conjured up of confident, efficient, focussed learners." (Mason, 2003, p. 96)

Rumble tends to agree, although reports conflicting evidence. Bates considers a class size beyond forty to be reasonable and Boettcher would allow class sizes between 25 and 65 (Rumble, 2001, p. 75). The contradicting experiences reported may be explained by the fact that they correspond to different teaching/learning scenarios, misleadingly insinuating that technology determines the scenario. Below the surface of the same technology, quite different instructional strategies are emerging. You may staff courses with teachers and teaching assistants to limit costly expert time. This represents a labor-for-labor substitution. You may fend off communication volume by encouraging peer discussion and allowing for only a limited amount of questions to be put to the expert (groups preparing expert interviews)[7]. However, eventually it will be difficult to administratively (and for economic reasons) limit the demand for student-teacher dialogue made possible by new technologies and enjoying un-abated prestige among educators.

Because of the increased ease of communicating at a distance, what applies for student-teacher communication in traditional distance education applies *a fortiori* in ICT-based distance education. The respective cost drivers contribute to rising variable costs per student and re-introduce a cost-structure linking costs to activities. Though it is possible to scale down the fixed costs of developing materials few economies of scale can be harvested (Hülsmann, 2003).

Hence, type-c applications also do not fit into the classic picture of the tutor strictly belonging to a world strictly separated from academic teaching either. In this division of roles tutors are the mere interprets of expertly developed courses and should not fiddle with the content. There is little to stop the online teacher from tipping the balance from static content which is pre-prepared towards the dynamically generated content of captured dialogue.

3.3 Recovering lost efficiencies

We have observed centrifugal tendencies. ICT-based distance education opens up two distinctively different avenues of development. One emphasizes type-i applications with a tendency to considerably increase fixed costs of development, one emphasizes type-c applications with a tendency to substantially increase variable costs per students. Mixed scenarios are possible as well and more likely to increase than to decrease overall costs. If distance education still wants to cling to its original remit of increasing access and, therefore does not accept that the higher costs price itself out of the market (Rumble, 1999) we need to look for ways to recover lost efficiencies.

Re-purposing, learning objects: The digital format allows the re-use of material once developed and research is underway to itemize standardized *learning objects*. If for example you develop a unit on trigonometry with some interactive applications on sine and cosine, it is possible to store it as a learning object, which, in principle, could be archived, re-used, re-purposed and shared by being integrated into alternative contexts. Until now we have depreciated the fixed costs of course development over fixed shelf lives. We may re-conceptualise and associate fixed costs of developments with learning objects, which could be depreciated not only *longitudinally* along the shelf life of a course but also in a *cross-sectional* manner by re-purposing them in different applications. Some legwork in this direction is already being done by SCORM (Shareable Courseware Object Reference Model). While the potential of this line of development is still unclear, the malleability of course content in digital formats is reflected by the increased tendency of course developers to not set a definite shelf life for a course, but to plan updating the course in a rolling manner.

Strategic alliances: Collaboration at a distance has become technically easier. This facilitates forging alliances between institutions. Such alliances may allow offering courses which, if offered regionally, would, as niche courses, not be economically feasible. Recall, moreover, that distance education has been described as a complex system, comprising a variety of subsystems. The new possibilities to cooperate at a distance suggest that the different system components need not necessarily be hosted at

[7] Considerations are even underway for billing the amount of learner support an individual student may claim.

the same institution. Rumble & Latchem (2004) give the most comprehensive account of what could be achieved through collaboration.

"Technology and e-business approaches make it possible for integrated processes of open and distance education to be disintegrated into their constituent parts: curriculum development; content development; learner acquisition and support; learning delivery; assessment and advising; articulation; and credentialing. These processes can then be managed by different organizations." (Rumble & Latchem, 2004, p.134; also Moore, 2003; cf. also Bernath & Hülsmann, 2004).

4 Conclusion

We began by challenging Mills' definition of learner support, which, consistent with the organizational setting at the OUUK, defines learner support as being separate from course development. We have identified a very old tendency in distance education to shift the burden of teaching and learning away from the realm of learner support to the instructional design of course development. We have argued that it may make little sense to draw such a sharp line between these two major subsystems if we want to gauge the incumbent changes in learner support due to ICT-based distance education, because it is precisely the *technological convergence*, which pierces the membrane between the two subsystems.

We therefore find learner support in ICT-based distance education being subjected to a two-thronged attack. The increased capabilities of type-i applications increase fixed costs of development in a way not easily recovered through scale economies. The costs are not for nothing. They reflect the enhanced capabilities of type-i applications. It is not unlikely that distance educators do what they have done in the early days: shifting the burden of the teaching and learning process towards highly interactive courseware. The high costs of investment create the need to do so and the high capabilities of the type-i applications lend a certain credibility to this strategy. In any case, it puts learner support as we know it (or as Mills defines it) under pressure.

The second prong of the attack puts traditional learner support under pressure by blurring the lines between course development and teaching and learning. The online tutor does not stay the mere interpret of the holy writ issued by the course developing experts; he or she may add to and/or shape the content of the course. This is especially the case when online courses are no longer based on specifically developed course materials but draw from available resources (journals, library books, and in most cases, if possible, provided online). - Given this two-pronged attack it is unlikely that learner support will remain unscathed.

References

1. BERNATH, U., HÜLSMANN, T. (2004, 4-6 March). *Low cost high outcome approaches.* Paper presented at The Third EDEN Research Workshop and International Conference: Supporting the Learner in Distance Education and E-Learning, Oldenburg.
2. BERNATH, U., RUBIN, G. (2001). "Professional development in distance education"– a successful experiment and future directions. In F. Lockwood, Gooley, A. (Ed.*), Innovations in open & distance learning, successful development of online and Web-based learning*, (pp. 213 - 223). London: Kogan Page.
3. BERNATH, U., RUBIN, G. (Ed.). (1999). Final report and documentation of the Virtual Seminar for Professional Development in Distance Education. OLdenburg: BIS.
4. BUTCHER, N., ROBERTS, N. (2004). Costs, effectiveness, efficiency. In H. Perraton, Lentell, H. (Ed.), *Policy for open and distance learning*. London: RoutledgeFalmer.
5. GIBBS, G. (2003, September). *The future of student retention in Open and Distance Learning.* Paper presented at the The 10th Cambridge International Conference on Open and Distance Learning: The Future of Open and Distance Learning, Madingley Hall, Cambridge.
6. HASEBROOK, J. (1999). Web-based training, performance, and controlling. *Journal of Network and Computer Applications*, *22*, 51-64.

7. HOHLFELD, G. (2003). *Service-Qualität des Fernstudienzentrums: Befragungsergebnisse 1988 - 2002*. ZEF. Retrieved January, 06, 2004, from the World Wide Web: http://www.uni-oldenburg.de/zef/literat/ 25jservicequ.pdf

8. HOLMBERG, B. (1995). *Theory and Practice of Distance Education*. London/New York: Routledge.

9. HÜLSMANN, T. (2000). *The costs of open learning: a handbook* (Vol. 2). Oldenburg: Bibliotheks- und Informationssystem der Universität Oldenburg.

10. HÜLSMANN, T. (2002). Costs without camouflage: A cost-analysis of Oldenburg University's two Graduate Certificate Programs offered as part of the Online Master of Distance Education (MDE) - A case study. In U. Bernath, Rubin, E. (Ed.), *Reflections on teaching and learning in an online master program - a case study* (Vol. 6). Oldenburg: Bibliotheks- und Informationssystem der Universität Oldenburg.

11. HÜLSMANN, T. (2003). Book Review of Trends, Policy and Strategy Considerations, UNESCO Report (2002). *Open Learning, 18*(3).

12. JOHNSON, M., BARRETT, C. (2003). Addressing the learning skills needs of students at a distance. In A. Tait, Mills, R. (Ed.), *Rethinking learner support in distance education: Change and continuity in an international context*. London, New York: RoutledgeFalmer

13. KEEGAN, D. (Ed.). (1994). *Otto Peters on Distance Education*. London: Routledge.

14. KOZMA, R. B. (1994). Learning with media. *Review of Educational Research, 61*(2), 179-211.

15. MASON, R. (2003). On-line learning and supporting students. In A. Tait, Mills, R. (Ed.), *Rethinking learner support in distance education:* Change *and continuity in an international context*. London, New York: RoutledgeFalmer.

16. MILLS, R. (2003). The centrality of learner support in open and distance learning: A paradigm shift in thinking. In A. Tait, Mills, R. (Ed.), *Rethinking learner support in distance education: Change and continuity in an international context*. London, New York: RoutledgeFalmer.

17. MOORE, M. G. (2003). Network systems: The emerging organizational paradigm. Editorial. *The American Journal of Distance Education, 17*(1), 1-5.

18. MOORE, M., AND KEARSLEY, G. (1996). *Distance Education: A Systems View*. Belmont: Wadsworth Publishing Company.

19. PERRATON, H. (2000). *Open and distance learning in the developing world*. London: Routledge.

20. PERRATON, H., MOSES, K. (2004). Technology. In H. Perraton, Lentell, H. (Ed.), *Policy for open and distance learning*. London: RoutledgeFalmer.

21. RUMBLE, G. (2003). The costs of providing student support services (2001). In G. Rumble (Ed.), *Papers and debates on the costs and economics of distance education and online learning* (Vol. 7). Oldenburg: Bibliotheks- und Informationssystem der Universität Oldenburg.

22. RUMBLE, G., LATCHEM, C. (2004). Organisational models for distance and open learning. In H. Perraton, Lentell, H. (Ed.), *Policy for open and distance learning*. London: RoutledgeFalmer.

23. SEEL, N. M., WINN, W. D. (1997). Research on media and learning: distributed cognition and semiotics. In D. Tennyson, Schott, F., Seel, N., Dijkstra, S. (Ed.), *Instructional design: international perspective* (Vol. 1). Mahwah, New Jersey: Lawrence Erlbaum Associates.

24. TAIT, A., MILLS, R. (ED.). (2003). *Rethinking learner support in distance education: Change and continuity in an international context*. London, New York: RoutledgeFalmer.

25. WHALEN, T., & WRIGHT, D. (1999). Methodology for Cost-Benefit Analysis of Web-Based Tele-Learning: Case Study of the Bell. *Online Institute American Journal of Distance Education, 13*(1).

26. WITTE, K.-H. (1995). *Nutzeffekte des Einsatzes und Kosten der Entwicklung von Teachware: Empirische Untersuchung und Übertragung der Ergebnisse auf den praktischen Entwicklungsprozeß*. Bovenden: unitext Verlag.

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