Flexible learning affects the cost of individual courses and may also seriously disrupt the cost structure of an institution, such that resources will need to be deployed in different ways. This is true both for institutions that mix traditional classroom approaches with technology-based applications and for funders of national education systems that mix distance teaching and traditional methods.

The cost structure of an institution (and indeed, of an individual course) reflects the mix of committed (or fixed) and flexible (or variable) costs. The latter change with movements in volumes of activities. Cost structures are also affected by the mix of capital costs (i.e., investment in course design, systems design, equipment, etc. that has a useful life of more than one financial period) and operating costs (the cost of items that are consumed within the financial year and therefore have to be replaced). Since each technology has its own distinctive cost structure, institutions using a mix of technologies may have very complex situations to manage.

The differences in cost structures have invariably posed problems for those funding the activity (Swinerton and Hogan 1981; Snowden and Daniel, 1980; Smith and Bramble 2008), but behind the cost structure lies another management problem—the effect of adopting technology-based approaches on the jobs of staff, and in particular on staff workloads.

Labour costs constitute a high proportion of the total costs of face-to-face teaching, given the direct relationship between the number of students or class hours taught and the number of teachers. In technology-based
approaches, materials replace teachers as the main source of information and content, and this encourages us to see the process as one in which capital (in the form of course materials and support systems) replaces labour. However, this hides the fact that much of the cost of this “capital” is a labour cost. Academic staff engaged in the development of distance and online teaching materials spend many hours designing and developing the materials. Depending on the technology used, they are also likely to require support from a range of technical staff. Thus, the jobs they do and the structures within which they work are likely to be very different from those encountered in a face-to-face environment. Also, the materials produced may be used for several years without significant (or any) modification, so the design and development work on a particular course is not done every year. Indeed, it may be several years (even eight or ten) before a course is redeveloped. This is very different from face-to-face teaching, where labour needs, year by year, hardly vary, provided student numbers are stable. Also, because in technology-based approaches the design and development phase is separated from the delivery phase and because the use of mass-media materials allow more students to follow a course than the designer/developer could possibly look after in the delivery phase, there is often a division of labour between those who design and develop courses and associated materials, and those who teach, assess, and advise students.

Labour Costs of Materials Design and Development
The major issue in designing and developing materials is that it takes more hours of academic staff time to develop the materials needed to occupy a student for one hour than it does to develop a one-hour lecture or seminar. Sparkes (1984, 219) drew on his experience early in the development of the UK Open University to suggest that whereas it took a lecturer two to ten hours to prepare a one-hour lecture, and one to ten hours to prepare for one hour’s worth of small-group teaching, it would take ten to twenty hours to prepare a one-hour radio program or a one-hour audiovisual sequence (in which the lecturer used recorded audio to talk a student through some text-based activity), fifty to one hundred hours to prepare a teaching text that would keep a student occupied for one hour, one hundred-plus hours to prepare one hour of broadcast television material,
two hundred-plus hours to prepare computer-aided learning materials that would engage a student for an hour, and three hundred-plus hours to prepare an interactive video. Moreover, many of these (broadcasting, text, computer-assisted instruction, etc.) would require additional professional and technical staff in a support or directorial/production role.

Studies by Arizona Learning Systems (1998) showed how much the cost of developing a standard American three-credit online course could vary, depending on the nature of the technologies used to design and develop a computer-deliverable course. Costs ranged from US$6,000, for a course involving a simple course outline and a series of assignments, to US$1 million for a course incorporating virtual reality technology. In all cases, the bulk of the cost was driven by the time that academic and expert staff expended on developing materials.

The process of changing technologies, such as moving from face-to-face to online provision, can also be costly. Boettcher (2006) drew on anecdotal evidence plus real experience to suggest “with some level of certainty that it can take an average of about 18 hours—of faculty time—to create an hour of instruction that is on the Web.” Given that the typical three-credit-hours on-campus course in the United States has forty-five hours of class time, Boettcher calculated that it would require “an investment of 810 hours to move a course to the Web,” which, with “time for startup with learning technology and instruction in teaching and learning in this new environment (and also arranging for any copyright and other issues)” could “rapidly approach the 1,000-hour mark for moving a course to the Web—given our current models.” When we compare the 180 to 200 hours “release time” that a typical American faculty member gets per semester to the 810 to 1,000 hours that Boettcher estimates would be required “to move a course to the Web,” it is obvious that the transition from face-to-face to online teaching is likely to be problematic (Boettcher 2006). A more recent survey of faculty attitudes to online learning found that more than 85 percent of academic staff believed that it took “somewhat more” or “a lot more” time to develop an online course, while fewer than 2 percent thought that it took less time (Seaman 2009, 26). More than three in four staff members also thought that developing an online course took even more time than teaching one: since 64 percent of staff thought that teaching an online course takes “somewhat more” or “a lot more”
time than teaching a face-to-face course (Seaman 2009, 27, 26), the impact of online learning on faculty workloads should not be underestimated.

Offering stipends to faculty members to develop materials—a common practice in American universities (McCarthy and Samors 2009, 31)—may act as an incentive for some faculty to get involved in flexible learning, but it will not solve the essential problem: that there are only so many hours that a person can reasonably be expected to work in a year and that one cannot eat into employees’ leisure time forever. Ultimately, a solution has to be found that releases staff from existing duties if they are asked to do new things. Quite rightly, McCarthy and Samors (2009, 32) see the long-term solution being non-financial incentives to participate in course development. Smarter working methods may help, but the key, I suggest, lies in release time.

Certainly, when technology-based “open learning” approaches began to be introduced into traditional further-education colleges in the UK in the late 1970s and 1980s, debates about the resources needed to fund the changes focused not so much on money but on how the staffing needs of a change in practice could be met (Birch and Cuthbert 1981, 1982). The challenge was giving academic staff release time to develop materials when the staff already had a full face-to-face teaching and administrative load. What proportion of a person’s teaching load equated with the task of preparing materials? Should the institutions bring in temporary help to create the materials or to stand in for the staff they want to release? Or should they ask the staff to work even harder now, in the expectation that by using flexible-learning approaches for all students (including those on campus), the academics would have a lighter teaching load in future years, thus allowing them to do other things, such as conduct research or develop new courses?

The challenges they faced also led institutions to look for cheaper approaches to materials development. One way of reducing labour costs is to hire staff on contracts for service to do a particular job—to write a particular course or copy-edit a particular book—rather than employ permanent staff on contracts of service. This is not an either/or choice: the UK Open University has a permanent academic and support staff supplemented by people brought in on contracts for service. However, with its permanent academic community, it is a very different kind of organization
than the UK National Extension College, which operates at secondary-
school and further-education levels and which hires in course writers as
required to develop all its courses. Contract staff cost far less than per-
manent staff with all their non-productive time (holidays, sick leave) and
on-costs (insurance, allowances), although there may be some additional
management costs involved in managing a large force of casual staff.

There are other ways of reducing the labour costs of designing and
developing materials. “Wraparound” courses, in which limited amounts
of materials guide students through existing materials (either commer-
cial or bought in from another provider), significantly reduce the amount
of materials that need to be developed in-house. Project-based courses
achieve the same thing by asking students to research and write up
their own projects. Hülsmann (2000) draws a useful distinction between
student learning hours (courses) and student learning hours (media).
In brief, course designers have an idea of how many hours the aver-
age student will spend studying for a course (course hours), and they
also have an idea of the number of hours students will spend studying
the materials they provide (media hours). The difference between these
two figures represents the student’s “independent” study hours. Table 1
shows the course, media, and independent student learning hours for
three courses and the ratio of course hours to media hours. The higher
the ratio, the more one is essentially relying on students to construct their
own course.

Whether one thinks this is a good thing probably depends upon what
one is trying to do and where one stands on constructivist theories of edu-
cation. Those who subscribe to constructivist theories of learning will put
“the onus on them [students] to construct knowledge. This means giving
greater space for reflection, discussion, questioning, and argument and
for adopting greater equality between teacher and student” (Daniel, West,
and Monaghan 2008).

Using other providers’ materials can have its problems. Some insti-
tutions have agreements on the sharing of materials, but generally
buying in courseware has been bedevilled by the providing institu-
tions’ attempts to recoup their development costs through licensing
and copyright fees. This is why the nascent open-courseware movement
(e.g., MIT’s OpenCourseWare and the UK Open University’s OpenLearn
projects) and the Commonwealth of Learning’s WikiEducator program (Daniel, West, and Monaghan 2008; www.wikieducator.org) are so exciting. However, the Creative Commons licenses (www.creativecommons.org/about/licenses/meet-the-licenses) governing the use of open educational resources (www.oercommons.org) carries a sliding “scale” of restrictions on use.

Not everyone wants to adopt whole courses, or even significant chunks of courses, which is why there is so much interest in reusable learning objects. What has never been satisfactorily explored—at least to my knowledge—is the time cost of sourcing and negotiating the use of appropriate learning objects. Given the cost of sourcing materials, adapting materials, translating them (which is hugely expensive to do well), and acquiring licenses, it can just be quicker (and cheaper) to start all over.

The evidence from the experience of distance-teaching universities and dual-mode institutions suggests that institutions trying to adopt flexible-learning approaches while at the same time maintaining a campus-based program will always find it difficult to release staff to develop learning materials unless they can call upon a significant development fund or unless they change slowly. So the real answer is to find a different way of encouraging learning that relies less on home-produced or bought-in materials and more on students finding their own materials.

### Table 1: Course, media, and independent study hours compared

<table>
<thead>
<tr>
<th>Course</th>
<th>Student Learning Hours (SLH)</th>
<th>Ratio Course SLH to Media SLH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Course SLH (total SLH)</td>
<td>Media-driven SLH</td>
</tr>
<tr>
<td>UK Open University: Second-year undergraduate course in health and social welfare</td>
<td>220</td>
<td>135</td>
</tr>
<tr>
<td>UK Open University: Second-year undergraduate course in mathematical modelling</td>
<td>448</td>
<td>306</td>
</tr>
<tr>
<td>Anglia University, UK: Course on domestic violence and sexual assault for health and social workers</td>
<td>200</td>
<td>47</td>
</tr>
</tbody>
</table>

Source: Adapted from Hülsmann 2000, 42.
Labour Costs of Supporting and Assessing Students

Early commentators understood that the investment in materials development to support distance education would only lower average costs per learner if one significantly reduced the cost of the face-to-face teaching element in distance education. “Pure” distance programs, of course, offered no face-to-face teaching at all. In such systems, teacher-student interaction is reduced to tutor feedback on assignments coupled, if one is lucky, with a limited advisory service responding to students’ written, texted, or telephoned queries.

The lack of opportunities for frequent, “natural,” spontaneous, and rapid dialogue between teachers and students, not to mention among students themselves, was seen by many as diminishing the quality of the distance-educational experience. Telephone teaching and audio-conferencing approaches were developed and used extensively by some institutions in the UK, Canada, and the United States. However, in some jurisdictions, high telephone charges and measured service rates coupled with the drawbacks of the technology (the need for timetabled sessions and limitations on the number of participants) meant these technologies were seen as at best an ancillary aid. Not until the development of online learning did distance educators really feel that they had an opportunity to overcome spatial separation while maintaining channels for rapid, natural, and spontaneous dialogue with students and between students through computer-based conferencing and email systems. Although synchronous conferencing is possible, the majority of systems have relied on asynchronous conferencing, which has the advantage of not requiring contact times to be pre-arranged. The rapid acceptance of texting through mobile devices has increased such opportunities, and increased bandwidth and the conflation of text, audio, and video communications through a common platform (computer, mobile, etc.) can only add to the possibilities available for rapid, natural, and spontaneous dialogue across distance.

Yet these developments raise old questions about the use of resources. Distance-education systems that provide scheduled (and hence time-limited, synchronous) classes, whether face-to-face or by different forms of conferencing (audio, video, computer), can quickly establish the costs involved in terms of time and money, assuming additional payments are
made to staff or adjuncts. Indeed, in time-management terms, there is nothing like a scheduled class to control costs. However, a requirement to support students whenever they need it suggests an open-ended commitment that comes sharply into focus when we consider the costs of supporting students online either as a group (in conferences) or individually (e.g., through email).

For the past ten to fifteen years, there have been attempts to estimate the impact of online teaching on academic staff time. Conflicting messages have emerged from the studies that are available, with the overall impression appearing to be that online teaching is more time consuming than both traditional face-to-face education and “traditional” distance education courses (see Rumble 2001), with the latest extensive survey suggesting that nearly two out of three (64%) academic staff believe that it takes “somewhat more” or “a lot more” time to teach an online course as opposed to a face-to-face one (Seaman 2009, 26), without actually defining what “somewhat more” and “a lot more” means in actual hours worked.

REFLECTING ON METHODS

Research suggests that technology-based teaching impacts on staff time, with Seaman (2009, 33) reporting that the additional time needed to develop and deliver online courses (and I suggest that the same would be true of the development, though not the teaching, of distance courses) is seen by faculty responding to the recent Association of Public and Land-Grant Universities survey as “the most important barrier” to the adoption of online learning. Materials development tends to be time consuming, with the potential to push labour costs significantly up. Certainly, the evidence on teaching seems to show that, in comparison to face-to-face teaching, correspondence-based distance education reduces the time spent teaching and supporting students, while teaching online is more time consuming than correspondence education, even when coupled with limited face-to-face education, and generally more time consuming than face-to-face education.

There are ways of reducing the labour costs (as distinct from hours)—notably by restricting the input of both learning materials and “contact
hours” (however delivered). But the question then arises: does this not diminish the quality of the academic experience for students?

Daniel, Kanwar, and Uvalić-Trumbić (2008, 9) report on a meta-analysis of six hundred papers on distance education by Bernard et al. (2009), in which the latter distinguish three types of interaction in support of learning: student-content, student-student, and student-teacher. Bernard et al. asked which type of interaction, when increased, most enhances student performance. Surprisingly, given that learners constantly reported demand for increased interaction with a teacher, they found that increasing interaction with content was most effective and that increasing interaction between students did more for their performance than increasing interaction with teachers. In other words, fostering student self-help groups and interchanges is likely to be more effective than increased personal tuition, though less effective than increased interaction with content. Daniel, Kanwar, and Uvalić-Trumbić conclude from the evidence now emerging that increasing teacher-student contact (which is often what students want) is actually more costly and less effective than the other two options. The choice then comes down to providing more materials and/or enabling student-student interaction. I have suggested, however, that adding to the volume of materials provided in-house or through purchase-in is costly. It is also unnecessary, given the increasing wealth of materials on the Web. What students need is guidance on which of these materials to use—and here access to electronic books and journals becomes crucial. They also need to be encouraged to work with their peers.

These possibilities of student-student interaction and materials access are being greatly facilitated by the emergence of a group of Web-based technologies that ride upon the emergence of Rich Internet Applications (RIA) browser technologies. These applications, which include the following, collectively allow for enhanced collaboration and interaction.

- Blogs: posting user-generated content and opinions with opportunities for posting comments on the original, and the use of “pingback” to alert contributors to the presence of comments on their contribution
- Wikis: generating user-developed documents that can be easily
edited by anyone, thus bringing people together to harness collective wisdom
• Tagging and social bookmarking of sites to create an archive of sites/documents that can be organized and shared with others
• Podcasting/audio blogging: enabling access to talks, interviews, and lectures
• Multimedia sharing
• Social networking sites, where like-minded people can interact
• Crowdsourcing: in essence an approach that poses requests, issues, or problems, and seeks solutions from anyone; also an approach that seeks content from users, whoever they may be
• Aggregation services that gather information from across the Web
• Data mash-ups that pull data together from a variety of sources
• Collaboration, including in publishing and working

Often referred to as Web 2.0, such approaches have the potential to change the economics of online learning given their basis in mass collaboration, sharing, open source, and non-monetary reward.

Budgeting and costing flexible-learning programs continues to be a challenge. It will not be solved if regulators continue to fail to acknowledge that presential class-based learning, distance learning, and online learning have different cost structures. In the UK, for example, the system-wide Transparent Approach to Costing (TRAC) now distinguishes among teaching, research, other (commercial ventures, conferences, etc.), and support costs (Financial Sustainability Strategy Group 2009), but fails to subanalyze teaching costs by mode or to recognize that, with respect to teaching costs, there is an important distinction to be drawn between the cost of investment in systems and content/materials that will have a useful of life measured in years and the costs of supporting and assessing students’ learning, which—as with all service costs—are consumed at the moment of delivery. Yet TRAC could be extended to cover this issue. Meanwhile, until this key distinction is recognized and financial systems are designed to support the analysis of teaching/learning costs along these lines, institutions that to date have been in the main engaged in face-to-face teaching will continue to face what McCarthy and Samors (2009, 25) note as the greatest challenge in financing online (and I would
add, distance) learning—the problem of securing and distributing money to develop and sustain such programs. Furthermore, it is not just a question of the initial launch into distance and online learning. McCarthy and Samors (2009, 25) report that money is often made available up front to start a program off, but sooner or later the materials get dated and need to be replaced—and money needs to be set aside to ensure that this happens. Ironically, none of this is new to those who have worked in “pure” distance education, but it’s a real challenge for those whose teaching costs have by and large been driven by the logic of service industries, where the cost of service delivery is tied to what service providers often call “the moment of truth” when provider and consumer interact. It is this that underpins the problems facing institutions embarking on flexible learning: how do they shift from an essentially service-based economy to one that requires longer-term capital investment and renewal? My suspicion is that Web 2.0 approaches may mitigate the financial challenges but at the cost of new challenges—not least, quality assurance.

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ABOUT THE AUTHOR

Greville Rumble was educated in Ecuador, using the home-study materials of the Calvert School in Maryland prior to attending school there, in Switzerland, and in England. He is a freelance consultant working on issues around distance-education policy at national and institutional levels and on the planning, management, costs, and funding of distance-education systems and projects. Previously, he worked at the UK Open University as an administrator and, more recently, as professor of Distance Education Management. While gradually deepening his experience, he authored numerous books, chapters, and articles in these fields, drawing on his experience in Latin America, Asia, Europe (including the UK), the Near East, and Africa to focus, at the expense of techno-fixes, on realistic and affordable solutions for developing-country environments.