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## **Assessment and Student Learning – a fundamental relationship and the role of information and communication technologies**

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### **ABSTRACT**

This paper reviews the role of assessment in student learning and its relationship with the use of information and communication technologies (ICT). There is ample evidence of technology-led innovations failing to achieve the transformations expected by educators. We draw upon existing research to illustrate the links between aspects of student learning, assessment practices and the use of ICT. Assessment influences not only *what* parts of a course get studied, but also *how* those parts are studied. While the adoption of ICT does not, in itself, change student behaviours, appropriately designed assessment that exploits the potential of ICT can change students' approaches to learning. We argue that ICT can enable important learning outcomes to be achieved, but these must be underpinned by an assessment strategy that cues students to adopt a suitable approach to learning.

### **INTRODUCTION**

For many educators, course assessment is something of an afterthought; something to be considered after the content and approach of their teaching has been determined. How often do teachers in higher education start planning their teaching by considering the influence of assessment on what students pay attention to in their studies and on how they go about learning?

Many writers have emphasised the fundamental link between assessment and student learning (for example Boud, 1995; Brown, 1997; Brown & Knight, 1994; Ramsden, 1992). Some refer to assessment as defining the '*de facto* curriculum' (e.g. Rowntree, 1987); others to the 'backwash effect' of assessment on student learning (e.g. Watkins, Dahlin & Ekholm, 2005). The relationship between students' academic success and their attentiveness to assessment requirements, rather than to the curriculum as a whole, was identified more than 30 years ago in studies by Becker, Geer and Hughes (1968), Miller and Parlett (1974) and Snyder (1971).

In this article we draw attention to the particular circumstances of this fundamental relationship for distance learners and examine the role of information and communication technologies (ICT) in the process. We draw upon research conducted into various aspects of the student experience of learning and how it relates to assessment practices. We connect those findings with the outcomes of evaluation studies of distance learning that has involved the use of ICT to clarify the relational nature of technology use in the learning process.

## THE ROLE OF TECHNOLOGY: TOOL, CATALYST OR 'SNAKE-OIL'?

Many claims have been made about the impact of technologies upon student learning, often with little or no supporting evidence and little understanding of the complex relationships involved. The Strategy for E-learning of the Higher Education Funding Council for England aims to

support the HE sector as it moves towards embedding e-learning appropriately, using technology to transform higher education into a more student-focused and flexible system, as part of lifelong learning for all who can benefit (HEFCE, 2005, p.5).

This assigns technology a central role within the process of transforming HE. In the literature, it is not unusual to find statements that are more technologically deterministic, asserting that the use of ICT for teaching and learning will bring about changes in students' learning behaviours in desirable ways.

Over many years the authors have been involved in monitoring the use of media-based course components by Open University students, often through the use of large-scale surveys across many course modules (see, for example, Kirkwood, 2006; Kirkwood & Price, 2005). In relation to course modules studied, some media and electronic resources are *used less* and are rated as being *less helpful* than others. However, there was great variation between course modules in any particular study year: for example, asynchronous conferencing might be much used and highly rated by students on some modules, while being hardly used and considered to be of little value on others. Students' study behaviour is *not* driven by media and technology. Clearly it was not the medium *per se*, but the way in which it had been used to support teaching and learning in each of the course modules that was fundamental to this variability.

## VARIATIONS AMONG LEARNERS

In order to understand the qualitative variability that can readily be found in the ways in which students carry out learning tasks and in their actual study behaviours, it is necessary to appreciate that students have different *conceptions of learning*, different *expectations* of teaching and learning activities and different *approaches* to learning. These will be considered in the following sections.

### Differences in conceptions of learning

There are considerable differences in the ways that people conceive of the process of learning. In a range of interview-based research studies on student learning at various educational stages Säljö (1979) asked the participants to describe what they understood 'learning' to be. From the many responses given he identified different *conceptions of learning*, each of which was qualitatively different from the others:

- Learning as the increase in knowledge
- Learning as memorisation
- Learning as the acquisition of facts, procedures, etc. that can be retained and/or utilised in practice
- Learning as the abstraction of meaning
- Learning as an interpretive process aimed at the understanding of reality

The list of conceptions was hierarchical. While the first three conceptions involve *quantitative* change and assign a largely passive role to the learner, the fourth and fifth conceptions entail *qualitative* change that necessitates learners being actively engaged in processing information and knowledge. In subsequent research with adult, distance learners a similar hierarchy of conceptions was found, but an additional, sixth conception was also identified (Beatty, Dall'Alba and Marton, 1997):

- Learning as personal development

Clearly, students with a conception of learning which is essentially passive will experience any educational transaction in a very different way from those with conceptions of learning

that require their active engagement. In some educational situations passive conceptions of learning might suffice, while in others they are likely to be largely or wholly inappropriate. Säljö's research was not longitudinal, so it did not provide any indication as to whether or not individuals' conceptions of learning developed over time and with experience. There are, however, parallels with the scheme of intellectual development proposed by Perry (1970). He described a process by which students in higher education moved from a holding a view of learning that was characterised by memorising and reproducing knowledge, to one in which they sought personal meaning by transforming information and ideas to extend and elaborate their personal knowledge and understanding. Students at different stages of the intellectual development process would vary in their expectations of what teaching and learning implied.

An individual's conception of learning will determine their *expectations* of what should happen in any educational situation and influence the *approach to learning* they adopt for specific tasks or activities. These are discussed in the following sections.

### Differences in students' expectations

The transition from school to higher education, whether undertaken almost immediately or after an intervening period of several years, can bring about challenges to a student's conceptions of teaching and learning. Most learners have only ever experienced full-time schooling when they embark upon higher education. Relatively few will have experienced self-managed or self-directed learning, so many new entrants discover a dissonance between their expectations and those of the teaching staff. Kember (2001) found that novice students frequently held a set of beliefs about teaching and learning that could be labelled *didactic/reproductive*. Teaching was seen as the largely didactic process of transmitting knowledge, whilst learning involved absorbing the material defined and presented by the teacher - this relates to the *passive* conceptions identified by Säljö (1979). The research by Kember discovered that

... students who commence higher education with didactic/reproductive beliefs can find the process difficult and even traumatic. They are uncomfortable with teaching approaches that do not correspond with their model of teachers presenting information to be passively absorbed by students. (p. 217)

In contrast, other students held a set of beliefs and expectations about teaching and learning that could be labelled as *facilitative/transformative*. Such students had expectations of teaching as being the process of facilitating learning; they accepted that they were responsible for learning independently with guidance. Learning was not considered a passive process; each student's understanding was achieved through actively transforming ideas, information, etc. for the own particular context and purposes.

The reduced opportunities for social interaction in distance education are of particular concern. New students are unlikely to pick up the actual demands and expectations of a course through informal communication with their teachers and fellow students. Certain students may fail to understand the underlying purpose of some of the educational activities designed by staff. For example, some students find non-didactic tutorials incompatible with their beliefs about teaching; they have difficulties with assignments that ask for more than the reproduction of material. Hence an important task for staff is to engender in students an appropriate conception of teaching and learning and to provide an educational rationale for learning activities. This is especially pertinent when teachers expect learners to co-operate or collaborate with others through tasks involving communicative uses of ICT – if the purpose of a discursive activity can be misunderstood in a face-to-face context, why should it be any less problematic when undertaken online?

### Differences in approach to learning

Research originally undertaken in Sweden (but subsequently replicated in many western countries) identified qualitatively different approaches to learning tasks adopted by students (Marton and Säljö, 1976; 2005). When asked what they did when undertaking a reading task in their studies, learners were found to be paying attention to different aspects. Some learners focused on the details of the discourse; they tried to memorise in order to reproduce. Other learners concentrated on what the discourse was about; they tried to grasp the main points, the underlying argument, etc. Marton and Säljö described these as a *Surface Approach* and a *Deep Approach* respectively. The approach adopted encapsulates not only how the students went about the task, but also the underlying purpose. In the first of these approaches there is an *intention to reproduce*, while in the latter there is an *intention to understand*.

It was also found that the outcomes from studying are related to a student's *conception of learning* and their *approach to study*. Students exhibiting more sophisticated (active)

conceptions of learning are more likely to adopt a deep approach to study and to achieve the outcomes that are ostensibly valued in higher education. However, it is important to dispel any notion that learners are intrinsically either *surface* or *deep* in their approach to study. The approach adopted by an individual is not an attribute of the student – it is *relational* – it is their response to the perceived demands of any learning task. In other words, it is how they will be assessed (or *think* that they will be assessed) on the task that determines an individual's approach (Laurillard, 1979).

Students' expectations can be as important as the actual requirements for any test or assignment. Sambell and McDowell (1997) argue that students participate in the construction of the 'hidden curriculum' through their individual interpretations, perceptions and actions, which in turn reflect their orientations, prior experiences and expectations.

#### ASSESSMENT LEADS; IT DOES NOT FOLLOW

Qualitative research on the impact of assessment on learning undertaken by Fransson (who worked with Marton and Säljö at the University of Goteborg) found that students "prepare for what they expect to be the performance requirements" (1977, p. 245). Subsequent quantitative studies by Tang (1992) and Scouller (1998) have demonstrated that students tend to employ different learning approaches or strategies in different situations, according to their perceptions of the assessment requirements. Students are likely to adopt a surface approach to learning if they anticipate a form of assessment that requires little more than knowledge-based factual recall (e.g. a quiz, multiple-choice questions or a short answer examination).

This can be of particular concern if there is dissonance between the form of assessment and the stated aims of any course:

If academic staff genuinely want their students to be analytical and critical thinkers, and able to apply their learning to novel situations and transfer their learning to solve real problems .... then their assessment methods should firstly, encourage the development of such abilities; and secondly, provide students with the opportunity to demonstrate that they have developed these higher order abilities. (Scouller, 1998, p. 469).

It is clear how assessment fits into the experience of learning. It is the means by which most students work out what they actually need to do in order to successfully complete a course and gain a qualification. It influences not only *what* parts of a course get studied, but also *how* those parts are studied. We have found that the pedagogic model employed and the associated assessment strategies are the primary determinants of what distance learners do in their studies and how they go about it (Kirkwood and Price, 2005). In this section we draw upon some findings from studies undertaken in a number of distance education contexts relating to student learning and their use of media technologies.

### Selecting what to study

Most distance learners are busy people; very often they have full- or part-time work obligations as well as domestic commitments and family responsibilities (Kember, 1999; Murphy and Yum, 1998). Few have sufficient time to study all the materials and resources that are provided for the courses they are taking (Kirkwood, 2003). They have to be selective in order to survive and turn to the *assessment* requirements to guide the choices they make. Some students are *assignment focussed* – they study only what is essential for assessment. Many more are *assignment conscious* – assignments have a substantial influence on their study behaviour. Lockwood (1995) reported very similar findings from a qualitative study of UK Open University students. When it comes to making decisions about whether or not to use the full range of course components offered, students are likely to consider the potential *educational benefits* to be gained more significant than the intrinsic features of any particular medium.

When it comes to making use of ICT and media for study purposes it is not simply a matter of whether they are – or are not – assessed. It is seldom self-evident to students how the use of media and ICT can contribute to their learning and to achieving the desired (and rewarded) outcomes. In their literature review of the student experience of e-learning in higher education, Sharpe and Benfield (2005, p. 7) concluded that

In terms of practice, it is *not enough to hope* for a match between students' understanding of how they learn, their conceptions of teaching process, and the teachers' intentions. It is clear that *we need to be more explicit* in our explanations to students of the purpose of online work and our expectations of the activities they will undertake. (Emphasis added)



If it is important for students to learn how to locate, retrieve and evaluate relevant information from remote sources, then courses should not only provide opportunities and guidance on how to do that, but also assess their ability to achieve the desired outcomes. If a distance education course has as one of its stated aims ‘To promote collaborative group learning through discussion’, it should provide ample opportunities for dialogue to take place between students. Online group activities could be used to promote and reward critical thinking through the exploration of multiple perspectives, or for problem solving and inquiry, or for the development of inter-personal skills. Of course, the students would need to understand the underlying purpose of these activities, i.e. *why* they were expected to interact with their peers and *what learning benefits* they could derive from the process.

## VARIATIONS AMONG TEACHERS AND THEIR TEACHING

Understanding the variability between students in terms of how they carry out learning tasks and undertake assignments and examinations also requires consideration of variations in the beliefs and practices of academic teachers. It is necessary to appreciate that teachers in HE have different *conceptions of teaching*, teach within different *social contexts* and exhibit different *orientations to assessment*. Further, the ways in which media and technologies are deployed in teaching are subject to these and other factors. These will be considered in this section.

### Differences in conceptions of teaching

Just as there are significant qualitative differences between students in terms of their conceptions of learning, their expectations of educational processes and their approaches to studying, so too do HE teachers exhibit corresponding differences in their conceptions of teaching and their approaches to teaching. These different conceptions of teaching mirror the hierarchy of students’ conceptions of learning identified by Säljö (1979). Some view effective teaching as being concerned with bringing about *quantitative* change in students (increasing how much they know about their subject), while others focus on effecting *qualitative* transformations in how learners interpret the world (promoting conceptual change in students and building their knowledge and understanding).

Several studies (Kember & Kwan, 2000; Samuelowicz & Bain, 1992 & 2001; Trigwell & Prosser, 1996) have demonstrated that the conceptions of teaching held by HE teachers are

related to how they approach their teaching. So, for example, a teacher who has a conception of the teaching process as being primarily concerned with ‘the transmission of knowledge’, is likely to adopt a teacher-centred approach aimed at imparting what they know to their students. In contrast, if teaching is conceived as being about ‘the facilitation of learning’, then a student-centred approach to teaching is more likely to be adopted, in which the teacher engages learners in activities that promote the development of students’ conceptions and understanding of a topic. Further, there is a relationship between the *approach to teaching* adopted and the *approach to learning* taken up by students (Lindblom-Ylänne, Trigwell, Nevgi & Ashwin, 2006; Trigwell, Prosser & Waterhouse, 1999).

### Differences in the social contexts of teaching

However, the teaching practices *actually* adopted by individuals are not solely determined by their conceptions and beliefs; social and contextual factors are also highly influential. Relatively few teachers in HE have undertaken formal training and good teaching is often seen as being of lower priority and reaps fewer rewards than research. Teaching practices tend to reflect the departmental and/or institutional environment in which they are conducted, even if these differ from the beliefs about teaching held by individual teachers (Norton, Richardson, Hartley, Newstead & Mayes, 2005). The institutional and departmental contexts often fail to support learner-centred teaching and can impose barriers that cause an innovative teacher to revert to teacher-focussed approaches (Hockings, 2005). Professional development activities aimed at enhancing the practices of individual teachers are likely to be insufficient; systemic and systematic change is required at departmental level in order that learner-centred teaching practices are not eroded. Changing the practices of individual teachers may be difficult because their approach is mediated by their working environment (Gibbs & Coffey, 2004; Knight & Trowler, 2000).

Havnes (2004) argues that a social approach to learning is necessary in order to broaden attention from the actions of individuals (students and/or teachers) to the social system and the surrounding institutional practices. Drawing upon Activity Theory (Engeström, 1987) he contends that to suggest that assessment drives learning is a too restricted approach to the problem:

We have to take the educational programme as a whole into account and it is hard to tell which component is prior to the others. It seems that the way that teachers teach,

students learn, exams are constructed, assignments are developed, feedback is given, and textbooks are written are all interrelated (Havnes, 2004, p. 170).

Changes in just one constituent part of any educational programme are unlikely to bring about a substantial alteration to the whole: the interaction of each part with the others needs to be considered if transformation is to be achieved.

### Different orientations to assessment

The assessment practices exhibited by individual teachers reflect their overall approach to teaching and relate to teaching-centred or learning-centred beliefs (Samuelowicz & Bain, 2002). If the approach to teaching is primarily concerned with instruction and transmission, then the associated assessment will focus on ascertaining *how much* has been received by the learners – the quantitative transfer of knowledge. Assignments would most likely test factual recall and would necessarily be able to ‘cover’ only a sample of the whole curriculum. This type of assessment approach often promotes rote memorisation by students, leading to surface learning. In contrast, if the teaching approach is more concerned with enabling learners to develop their understandings, assignments would enable students to demonstrate qualitative changes in their conceptions and ways of thinking, not just the quantitative acquisition of knowledge. For students taking professional or work-related courses, this should include at least some assignments that simulate (or correspond to) authentic tasks that practitioners in the field would need to undertake.

### Different *pedagogic* designs for distance education

At the centre of open and distance education are the pre-prepared materials that incorporate much of the teaching. Academic and production specialists devote much time and attention to the development of materials, with review procedures ensuring that the materials are as flawless as possible before being made available to students. A range of technologies, such as books, video and audio, have been used to enhance motivation and to address a range of learning outcomes. However, the industrial model (Peters, 1983) of packaging materials for learning gives preference to the one-way flow of information and ideas – from experts/teachers to learners. Until the Internet made it easier to facilitate interpersonal communication, there were often only limited opportunities for dialogue to take place between dispersed learners and between learners and their teachers.

Now that computers and the Internet are widely used in HE, for both campus-based and distance learners, the manner in which ICT is actually exploited reflects the beliefs, assumptions and conceptions not only of teachers but also of the department, faculty or institution. Where a *teaching-centred* approach is dominant, ICT will be used for transmissive purposes, with students retrieving information presented in a variety of forms. Where there is a prevailing *learning-centred* approach, ICT will be used to encourage active exploration and manipulation/experimentation, with communications software fostering dialogue, collaboration, reflection and the building of understanding.

## DEMONSTRATING THE PEDAGOGIC LINK FOR ICT USE

Some distance educators continue to expound a technologically deterministic view of teaching and learning. For example Beldarrain asserts that “emerging technologies are changing practices in online distance learning and influencing theoretical frameworks” for teaching and learning (2006, p. 147). However the assertion is based upon the expression of aspirations by some teachers and instructional designers that draw upon the *potential* of new software tools to enhance distance education. Technologies can *enable* different pedagogical models to be utilised by distance educators, but they do not *in themselves* bring about changes in the practices of teachers and learners. More often than not, technologies are used by teachers to supplement their existing ways of working.

In various distance education (DE) institutions we have found ample evidence of the failure of technology-led innovations to achieve the transformations expected by educators. New e-learning opportunities are under-utilised and ineffective when they have been grafted onto courses that are rooted in pedagogic models and practices with which they are not aligned. For example, Erlich, Erlich-Philip & Gal-Ezer, (2005) report that web resources and communications facilities were little used when added to existing distance education courses. Others have found that just making two-way communication available, such as email or computer-mediated conferencing, is unlikely to be sufficient to achieve worthwhile teaching and learning outcomes, especially when it is simply added to an existing course intended for individual study (Fung, 2004; Kear, 2004).

Before the advent of the Internet, many distance educators sought to construct interactive self-instructional learning materials. Holmberg (1989) developed the concept of a ‘guided didactic

conversation' between individual students and their teacher, mediated through materials in various forms. The notion of a 'tutorial in print' (Rowntree, 1994) signified the potential for materials utilising what were essentially 'one-way' transmissive media to promote in students an active internal dialogue. This form of instructional design was at the heart of what Nipper (1989) called 'Second Generation distance education'.

If a course has been designed with a didactic approach to teaching, with all the necessary materials being provided for learners and with assessment that rewards only the outputs from each individual student, there is little room for exploiting the pedagogic potential of communications media. Similarly, if a course 'package' provides everything that students will need for assessment purposes, what benefit will learners derive from consulting 'external' sources of information (Kirkwood, 2006)? If, on the other hand, a course has been conceived and designed based upon a model that assumes that communication with others learners and/or drawing upon online information resources will be not only desirable, but necessary features of the learning experience, it is very likely that learners will engage actively with these activities (Kirkwood, *in press*). Integrated course design of this kind would require the educational rationale to be made explicit, not simply assumed to be self-evident, and the expectations of learners to be managed appropriately.

#### ASSESSMENT, COURSE DESIGN & APPROPRIATE USE OF TECHNOLOGY

If we want students to engage with a course to develop their knowledge and understanding rather than to memorise and reproduce facts, the manner in which the course is assessed (through self assessment tests, assignments and examinations) must reflect that purpose. If collaboration and team working are vital aspects of the learning process, the *process* as well as the *product* of shared endeavours should be taken into account (Macdonald, 2003).

Assessment items should direct learners to those aspects of a course that are of primary importance because they *are* essential for successfully achieving the learning outcomes.

However, this does not fit well with conventional ways of planning and designing courses in higher education. Typically, course design is content-driven rather than being derived from the educational outcomes that learners are expected to achieve or demonstrate. More often it progresses in a manner similar to Teaching Approach A shown in Table 1.

Table 1 About Here
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An alternative model, one in which the learning outcomes determine the content, the pedagogic approach and the assessment that are necessary and appropriate, is outlined as Approach B in Table 1. The outcomes should be conceived in terms of the *knowledge and understanding* of the subject matter that learners are expected to demonstrate, the *cognitive skills* (e.g. analyse, review, evaluate, etc.) necessary for the intellectual processing of information and data, and the *key practical skills* of handling information and communicating with other people. The media selected reflect the desired learning outcomes, by providing the means by which important learning experiences can be accomplished. This view of course design is what Biggs (2003) has called *constructive alignment*, the fundamental principle of which is:

that a good teaching system aligns teaching method and assessment to the learning activities stated in the objectives so that all aspects of the system are in accord in supporting appropriate student learning (p. 11).

This learning-centred approach is not advocating the adoption of a mechanistic style of course design: it is not about specifying behavioural objectives nor about rigidly defined competencies and narrow or limited outcomes. It is much more a matter of enabling learners to demonstrate that have started to think, understand *and act* like an historian, a physicist, an engineer or a health professional. It is about students learning to participate within a ‘community of practice’ related to their profession or discipline area (Lave and Wenger, 1991). Norton (2004) has provided a case study illustrating an attempt at assessing for learning, with the ‘assessment criteria’ for a course being reconceptualised as ‘learning criteria’.

### Achieving constructive alignment using technology

Rust (2002) has indicated ways in which teaching practices in campus-based institutions can be arranged to take account of the research literature in order to achieve constructive alignment and promote appropriate approaches to learning in students. In this final section we look at ways in which different elements in a course can be aligned to enable distance education students to adopt appropriate approaches to learning in order to achieve the desired educational outcomes.

We have identified assignments in UK Open University courses that have enabled students to achieve complex learning outcomes through the appropriate uses of technology. An illustrative example is presented here. The assignment requires students not only to work in small groups to develop a joint report or similar document relating to a real world task, but also to reflect upon the process involved and to consider how well their task-focused collaboration had worked. Table 2 shows how such assignments address several key learning outcomes through the task requirements.

Table 2 About Here
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The assignment rewards both the *product* of the task (the output of collaboration) and the *process* (the conduct of collaboration), with students gaining credit for their individual inputs as well as the overall group report.

We have identified other examples of technology use being aligned with learning outcomes and assessment. These include:

- Assessing students' ability to apply the knowledge and skills developed in a science course to an unfamiliar environment – specific assessed activities requiring the manipulation of information and data that learners can only derive from a Virtual Field Trip on DVD.
- Enabling students to demonstrate critical approaches developed in a literature course through an analysis of primary resource texts available from a specialist online archive.
- Getting students on a management course to write a short analytical report on a particular aspect of communication in their place of work and to compare the approach in their own organisation with those reported by other students in their tutor group – sharing and comparing these student-generated 'case studies' enables learners to suggest recommendations for improvement in their own organisation.

For each of these assessed activities the learning outcomes involve a combination of *knowledge & understanding, cognitive skills* and *key practical skills*. Further, in these sorts of

assignments, the use of *particular* technologies is not always explicit, but for dispersed students there is no alternative than to use technology and online tools. The nature of the assessed task corresponds to the type of activity expected of professionals in the field. It also defines the constituent activities that need to be undertaken to achieve the outcome and to evaluate the processes involved. Further, the task necessitates students' use of whatever online tools are appropriate for them to successfully achieve the outcomes. So the issue is *not* a matter of 'what technologies do we have and how do we use them?' but 'what are we assessing and how can technologies enable the outcomes to be achieved and demonstrated?'

## CONCLUSION

We argue that important outcomes of learning at a distance can be facilitated and achieved through the use of ICT, but that the pedagogic design of courses and the associated assessment must reflect this position. We are *not* suggesting that students are only likely to exploit ICT in their studies if they know that its use will be assessed. Rather, if appropriate learning outcomes can only (or best) be achieved through the use of ICT it seems inconceivable that students could successfully complete a course without making appropriate use of technologies. The assessment requirements would necessarily entail use of ICT as a means to the desired ends (learning outcomes), not as an end in its own right.



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Table 1: Two contrasting sequences of course design for distance education

**Teaching Approach A**

Determine the content (knowledge, skills, etc.) and how it will be taught – including selection of media

Produce teaching materials, exploiting the media available

Construct assessment items to test / sample students' understanding

**Teaching Approach B**

Determine what learners are expected to achieve (knowledge, skills, etc.) from taking course and how that can be demonstrated

Design teaching with appropriate media to enable learners to achieve those outcomes

Assess that teaching and learning have been successful



Table 2: Outcomes of learning, task requirements and focus of assessment for an illustrative assignment

<b>Outcomes of Learning</b>	<b>Task Requirements</b>	<b>Focus of Assessment</b>
Synthesis of different course topics in relation to an authentic issue  [Knowledge & understanding; Cognitive skills]	Identify and relate relevant concepts, principles, theories, etc. and apply to a novel real-world situation	Product & process
Evaluation of information and data from a variety of sources  [Key practical skills; Knowledge & understanding; Cognitive skills]	Search for, retrieve and evaluate relevant information from various sources	Product & process
Developing skills in team working  [Key practical skills]	Communicate with one another about undertaking the task	Process
Developing report-writing skills  [Key practical skills]	Share and discuss the products of their endeavours  Contribute to the writing of a group report	Process  Product
Consider own contribution to the group work and also the manner in which the activity had been undertaken.  [Cognitive skills]	Reflect upon the collaborative activity, procedures employed, successful and unsuccessful strategies adopted	Process