E-Primer Series

No. 3: Designing for E-learning

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3.0 Designing for E-learning

Faculty are often too busy to seriously consider learning design. Rather than embracing its open-endedness and seeing the almost limitless potential for customising it to their own educational purposes, we often hear comments such as 'Just show me how it looks and I'll get on with it', or 'Do you have a sample that I could look at and use as a template? (There is a clear parallel with 'Just give me what's in the exam'!) It is *all too easy* to provide examples and templates, and so give the impression that instructional design for e-learning is simply about filling in blanks and copying exemplars. But instructional design and e-learning have too much potential and variety to even consider a Model-T Ford approach to development. Faculty also tend to think of writing courses rather than creating learning experiences. This e-primer aims to help you, as faculty, to think creatively about how to match what you would like students to learn with an enlightening learning experience.

This E-Primer provides a framework for deciding how you might apply instructional design and e-learning to any given educational context. The framework is relevant to all educational contexts, but the discussion assumes a tertiary education context in humanities, and a distance education or hybrid delivery model. I do not consider Web 2.0 technologies and techniques in depth here (for that discussion, see E-Primer 5, *E-xtending Possibilities*).

Recommended resource

The Commonwealth of Learning handbook, *Creating Learning Materials for Open and Distance Learning* is a valuable resource. Freely available online from http://www.col.org/colweb/site/pid/3145, it is an excellent introduction to instructional design.

Terminology

In this E-Primer, the term *instructional design* encompasses the process of developing a course of study for delivery, and planning for delivery. The term *course* (or *paper*) is a single, credit-bearing unit of education; *courses* are passed by students to obtain a qualification. Each course might consist of a series of *topics* or defined areas of study that are sub-units of the course. Topics might be discrete or complementary to other topics.

3.1 Instructional design and e-learning

In E-primer 1: *E-Learning in context,* I suggested that e-learning is pedagogy empowered by technology. Instructional design is actually far broader than this. Instructional designers make use of e-learning – not the other way around. Instructional design gives purpose and shape to all forms of structured learning (Brown & Green 2006), and so encompasses formal e-learning. E-learning and instructional design are inescapably intertwined.

The goal of instructional design is to help the teaching and learning process by ensuring that education experiences are optimised for particular learning goals. All faculty are actually instructional designers in that all plan their education interventions. Anything from a lecture to an assignment is an intervention, and they all benefit from instructional design. A course or paper could be considered a major education intervention, drawing on a pre-determined selection of resources and events that are supplemented

throughout the instruction. But although all faculty engage in instructional design activity, not all are effective instructional designers or able to maximise the lessons of instructional design as a discipline. We use instructional design throughout course preparation, from setting the curriculum to preparing assessment tasks, from setting dates to choosing resources. Instructional design also determines, and is determined by, the role of the faculty member throughout the period of learning.

Instructional design activity is especially significant when we use a mix of different media for instruction. Most distance education courses supplement paper-based resources (study guides, readings, books and so on) with electronic media such as digital video and audio, online communications, and self-marking tests, and there is a rich literature on how to apply such mixes. This e-primer draws on some of the major themes and models in instructional design theory, and tailors some of them for e-learning purposes.

Shearer (2003:275) explains that the traditional role of instructional design is 'to bridge the distance between the student, the instructor, and the learning organization'. This distance might be *physical* or *transactional*. Transactional distance is the 'communications distance' between the faculty member and the learner (see Moore & Kearlsey 1996), or 'the degree to which a distance student perceives the availability of, and connectedness with, other parties involved' in their course (Shin 2002). Reducing the transactional distance between faculty member and student improves student achievement (Shin 2002). Even if a course is delivered on-campus and in person by the faculty member, the transactional distance between them and the student may be such that real communications and cognitive engagement are not possible beyond the structured lecture. Large class numbers and highly structured learning environments increase transactional distance. You could say that one of the major goals of instructional design is to minimise the transactional distance between student, faculty and institution as much as possible.

3.1.1 Instructional design – broad principles

We can only prepare topics for study once we have made the important decisions about what ought to be learned and how it is to be assessed. I'm not suggesting that all learning must be pre-determined; we do need to set boundaries so that learning can be intentional and focused.

The following five guiding principles put instructional design in context.

1. Instructional design is the *foundation* of formal education
Some instructional design occurs in all forms of education. The lecturer preparing overheads, the tutor preparing a discussion outline, and the teacher planning a thinking-hats exercise are all engaged in instructional design. But because e-learning educators are not always present when their students engage in learning, they can't be as flexible in the teaching and learning transaction as they might be in a classroom or seminar. Instructional design for e-learning, then, tends to be more thorough and deliberate than might be the case for a lecture or classroom discussion, and it tends to have a more prominent role in e-learning than it does in classroom teaching.

2. Instructional design is *probabilistic*; it seeks to increase the likelihood of educational success, rather than determine it.
Instructional design does not guarantee that learning objectives will be met, but applying instructional design theory does increase the likelihood that they will be

(Reigeluth, 1999). We can set up learning topics in many ways; there are, as the saying goes, many ways to get to Wellington. Different course designers will use different instructional techniques; resource constraints and other contextual matters will vary, even when the actual learning objectives themselves are the same. These different techniques may be equally effective.

3. Instructional design is *contextual*; it seeks to match educational methods to educational situations.
Formal education is not designed in a vacuum. Contextual factors (such as which technologies can be used, the availability of an instructor, the time-frame of design, awareness of pedagogical alternatives, institutional systems and policies, the level of the course, the nature of expected students, and many other important considerations) shape what might be appropriate for a given course or topic. Instructional design takes a systems perspective on course design and delivery to ensure that the course is optimised for its overall context.

4. Instructional design is *iterative* and *dynamic* throughout the course development process.
All topics in a course needn't look the same. Think of each topic as a fresh opportunity to apply particular pedagogies. As you design a course you may make decisions or adopt particular pedagogical approaches that will have implications for other topics. Instructional design may appear straightforward and linear, but in practice it is somewhat cyclical.

5. Instructional design is comprehensive in that it envelops all aspects of course development.
Instructional design is more than just selecting from a list of activities and readings to create a series of topics that, in turn, form a course. It is concerned with *all* of a course, from setting the curriculum or major learning objectives, to setting assessment tasks, selecting topics, choosing resources, and deciding between media and technologies. It aims to make these components into a holistic learning experience for students.

3.1.2 Instructional design models – ADDIE and OTARA

There are a number of different instructional design models. One prominent one internationally is ADDIE; another homegrown model is OTARA. Models are used to simplify the decision-making process of course design.

Instructional design is usually associated with the ADDIE model, which describes the process for entire courses – right down to individual media:

- **Analyse** the context, including the learning objectives and the characteristics of prospective students.
- **Design** the learning objectives, assessment, content requirements, and media.
- **Develop,** or gather the required resources, and link them for instructional purposes. This step includes the production of active activities.
- **Implement** or deliver the course to students (instruction takes place).
- **Evaluate** the course for effectiveness, based on feedback from students. The feedback is then used to improve the course.

ADDIE is often criticised as being too systematic; however, it is a useful starting point because instructional design looks at the 'big picture'. It also provides a rough representation of good practice. Other approaches (such as rapid prototyping, which

fast-tracks development to get valuable initial feedback [evaluation] on course structure) modify the ADDIE process. One particularly significant alternative is that of Dick and Carey (1990, in Gagne et al 1992), in Figure 1 (see also Dick et al 2005). This particular model starts with instructional goals and progresses through to evaluation. It also includes a clear feedback and revision loop.

- *Instructional goals* can be extremely broad, but they must be specific enough to direct the design steps that follow. A goal might simply be 'to get students thinking critically about classroom management, or 'to provide a comprehensive introduction to aerodynamics'. A course will usually have a number of such goals.

- In *instructional analysis* we identify the skills that students need to meet the instructional goal. This stage sets the broad and abstract academic aims for the entire course, such as 'Understanding the four Ps of marketing' or 'Exploring the definition of classroom management'. There should be several such aims – these form the basis for performance objectives (below).

- *Entry behaviours* considers the pre-requisites that students are likely to have or require, and includes consideration of the sorts of learning requirements they might have. Some courses might attract a variety of practitioners and non-practitioners, with or without relevant prior experience or qualifications. It is useful to have a general understanding of the target audience.

- *Performance objectives,* otherwise known as learning objectives, are more specific outcome statements that reflect the instructional goals. Performance objectives state the aims in concrete terms, indicating the tasks the student might be expected to perform. These might range from 'replace the toner cartridge in a laser printer' to 'critique Aristotelian dualism'.

- *Criterion-referenced test items* are developed for formative and summative assessments. The items should link to the performance objectives. Think of these as general assessment items rather than test-items, as the latter implies an exam-type assessment. A criterion-referenced assessment might be, for example, 'replacing the toner cartridge of a standard laser printer according to instructions and disposing of the waste appropriately', or 'write a 1,000 word essay criticising Aristotelian dualism, citing examples where dualism is not appropriate and suggesting an alternative philosophy'.

- The *instructional strategy* is the 'plan for assisting the learners with their study efforts for each performance objective' (Gagne et al 1992:27). It is similar to a series of lesson plans or a study guide in which resources are introduced and activities are prepared. The instructional strategy is a draft that shows how different instructional resources might be assembled. An instructional strategy for e-learning courses is suggested toward the end of this document.

- *Instructional materials* are the resources used in the course. They might be printed readings, digital video on CD-Rom, or any other item used for instruction. Some materials may be available from the internet.

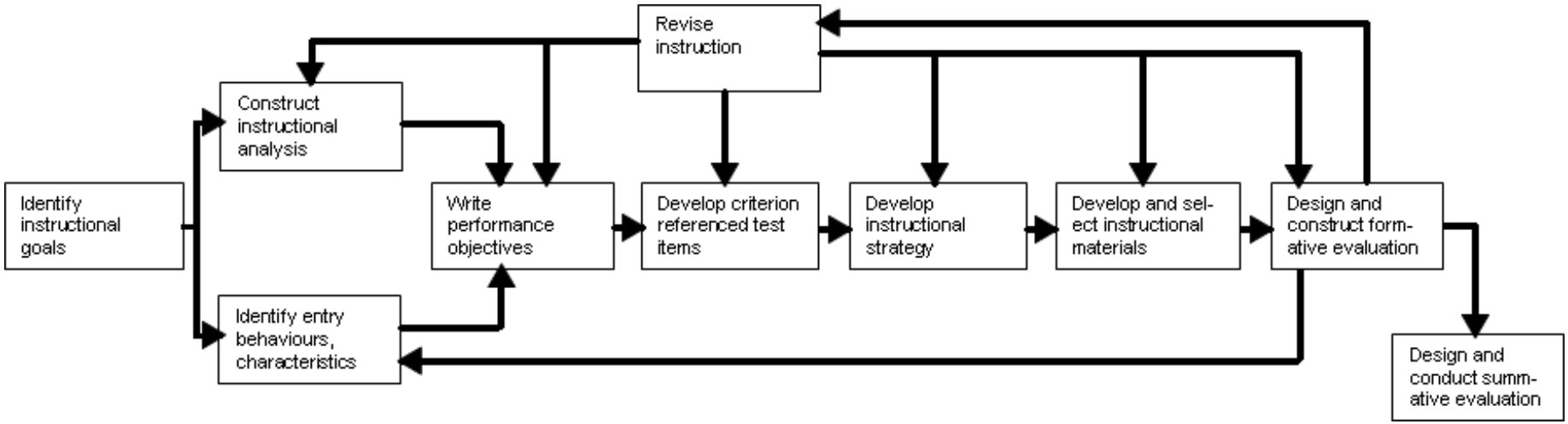


Figure 1 – The Dick and Carey model

- Ideally, *formative evaluation* takes place next in the process. This might involve discussing a prototype with a student representative, or conducting a small group tryout or a pilot. This evaluation provides feedback on the design before the course is officially offered.

- The *summative evaluation* considers the effectiveness of the entire process, and takes place after the course has been offered to enrolled students.

ADDIE and its variants may seem behaviorist at first glance; however, they don't actually prescribe a particular educational methodology. Instructional design based on behaviourism, constructivism, and social-constructivism are all possible using the ADDIE model. The model ensures that such methods are applied thoughtfully.

The OTARA framework (Hunt nd) is a useful one to apply when deciding on the design and develop stages of ADDIE. OTARA focuses on activities, and is immediately concerned with activity, topic, and assessment design and development. It also acts as a template and record of development. The basic outline is shown in Table 1.

Objectives (or Outcomes)	What students are intended to learn from the overall course; what students need to know or do.
Topics (or Themes)	The subjects or information headings.
Activities	The practical tasks students complete to meet the objectives.
Resources	The specific sources of information that students will use.
Assessment	The means by which students' learning will be checked against the objectives.

Table 1 – The OTARA framework

OTARA places considerable emphasis on what students will *do* to meet the learning objectives. Like ADDIE, it ensures that assessment is lined up with objectives, topics, learning activities and resources.

Several distance education providers have specialist instructional designers who work with faculty and technologists. This practice pools expertise and opens up a larger range of potential media and pedagogies. In other institutions, particularly those that provide both on-campus and distance education, instructional design is left to faculty.

3.1.3 E-learning – specific tools and pedagogies

I have said that e-learning is sometimes seen as a sub-set of instructional design – that e-learning is a partnership between pedagogy and digital technology. Debate (pedagogy) using an online discussion forum (technology) is one example of this partnership. Another would be verbal instruction (pedagogy) using a podcast or digital audio file (technology). If you think of e-learning in these terms, you'll have a scaffold to

implement it effectively, and you'll be sure to consider the technology alongside the educational opportunity.

It is possible to consider the various elements of course design using the categories below, most of which are possible through the tools you'll find in learning management systems:

1. Presented resources

Presented resources are any reference media (text, audio, video) that you might use for instruction, and that are stored in digital formats. They might include administrative tools (such as a calendar, course outline, or assessment cover sheets) and instructional materials (such as online library articles stored in a subscription-only database, specific and relevant webpages, or specially designed digital files such as video-clip interviews, animated illustrations, audio podcasts, and PowerPoint slideshows – with or without voiceover). You can use both online (internet, email) and offline (CD-Rom and DVD) media to distribute such files.

The development of internet browsers means that students can access all of these electronic files through one interface, provided they have the necessary viewing software. As a general rule, you can put files on the Web if they are not too big. Think twice about posting up anything larger than a 2MB file, and anything larger than 5MB should be distributed via an offline medium. If you have large or multiple digital files, or you are going to produce a CD-Rom or DVD anyway, put as many resources as possible on the offline media. However, if the information is time-sensitive, use online media because they are more easily updated. Try to confirm your digital information and resources before your course begins.

2. Interactive resources

The category of *interactive resources* comprises online quizzes and tests, interactive case studies, problem-based learning scenarios, and computer simulations. These might use standard tools within learning management systems (such as Blackboard or Moodle), or they might require specialised applications. This category is very open-ended. Exercises might use particular communication tools such as online bulletin boards or discussion forums, wikis, glossaries, or even email (in which case they overlap with *asynchronous communications* below). They might also include multiple choice tests, wordfinds, fill-in-the blank exercises, crosswords, or a variety of other quiz options. You can design webquests, case studies, and problem-based learning exercises in webpages to add an exploratory element; it is even possible to give students a limited resource (such as time or money) to explore a case or problem, or to limit further exploration based on previous choices. Develop simulations that give students virtual opportunities to experiment with science concepts, the operation of technical equipment, or to experience different environments. A number of Web 2.0 applications also fit into this general category.

3. Asynchronous communication

We use the term *asynchronous communication* in the broadest possible sense. The term 'asynchronous' means 'without time' or 'not time-bound' – the communicating parties don't have to gather at the same moment. Further, in contrast to digital information and resources, which are generally finalized before the course is offered, asynchronous communications are generated and made available *as the course is run*. Specific examples include:

- new digital information and resources prepared or updated during the course itself
- written feedback on student work
- course or material updates provided during the study period
- email correspondence
- online discussion using asynchronous tools such as bulletin boards or discussion forums
- RSS feeds (resources that are gathered automatically by syndication).

In traditional forms of distance education, asynchronous communication has been costly in terms of administration and distribution, but e-learning makes it more immediate and convenient. Asynchronous communication is a key element of e-learning.

4. Synchronous communication

Synchronous communication includes all communication that requires participants to gather at the same time. This has traditionally included classroom sessions, meetings, teleconferences and videoconferences in specialised suites. E-learning tools now enable computer-based text chat (using standard learning management system tools, or services such as MSN), online telephony, and one-to-one and one-to-many videoconferencing over the internet. Standard desktop videoconferencing applications also allow you to record and archive presentations, which can then be available as asynchronous events. Online telephony and desktop videoconferencing work best with broadband (or better) internet access, so their use – though growing – is still fairly low in mainstream education. Education providers are also very interested in synchronous communication in virtual worlds such as *Second Life*; presented and interactive resources can also be stored and used in such environments.

These four categories encompass a great deal of potential for education. Of course, adopting e-learning approaches does not preclude using more traditional elements of education such as textbooks, lecturers (or lecturing!), or paper. Indeed, paper is still a mainstay of distance education instructional design and should remain so, particularly for learning guides and compulsory readings (see Everland & Dunwoody, 2001).

3.2 Instructional design – art and science

You can see, then, that instructional design is both art and science. Instructional design models enable course designers to work innovatively and openly within a broad framework. The ADDIE and OTARA models ensure that the artistic elements are meaningfully constructed and placed in a context suitable for student learning. The models do not quash creativity; they place the art of instruction in a well designed gallery, so that effective learning can take place.

Instructional design models do provide a template, but it is really a template of *process*. Course designers must still make key decisions to ensure that structured learning takes place, and they must emphasise particular learning outcomes. The course designer decides which resources will be prepared, which topics are for significant discussion, which exercises will be useful, and which presentations might help learning. Creativity and innovation are not precluded from the process. The art of instruction is exercised within a scientific framework.

3.2.1 E-learning: artistic challenges and opportunities

Your challenge as an instructional designer is to develop an increasing awareness of e-learning possibilities. Just as drawing with charcoal is different from painting with oils, so course design for e-learning differs from course design for the classroom. Your basic activity is much the same, but you will have different considerations, opportunities and limitations. Your workflow may need to change. You will explore and experiment with new techniques and ideas. Because e-learning is flexible, you'll probably find that you can transfer exercises that work in the classroom situations into the distance environment. And, because e-learning is flexible, you will discover entirely new educational possibilities.

Here are a few examples of e-learning's possibilities:

- multiple presentations of important ideas through articles, video clips, audio files and PowerPoint presentations
- group discussion at a distance, including academic discourse, debates, preparing glossary or encyclopaedia entries as a class resource, and sharing experiences and perspectives
- realistic and complex case studies that enable students to access video clips of key characters
- learning key concepts or skills by manipulating virtual machines and other devices
- international experts presenting guest lectures to students' homes or classrooms – live from overseas
- electronic marking of student work, using typed comments inserted at relevant points
- internet links to different points of view on topical events.

E-learning has staggering potential, and there are many examples of highly creative (and effective) educational applications. Your educational context will determine which possibilities are most useful for you.

3.2.2 The educational context

All instructional designers operate within a context of institutional requirements and processes, student characteristics, the nature of the subject matter, and available time and budget. Other factors that influence instructional design include decisions about the level of interaction between students and their instructor(s) and how this will affect autonomy and learner control; the type of learning required; and access to technology (for both instructor and learner). The level of instructional design and media development skill available to a course design team adds to the complexity – so no two instructional design situations are ever the same.

Educational context differs from institution to institution, and from course to course. This context shapes and limits the potential for course design. A post-graduate course in humanities – with a 1-year lead time, an open-ended budget, and designed by a team of specialists – will look very different from a certificate course in beginning computing, developed by a single lecturer, with a 4-week deadline. Likewise, you would design a post-graduate humanities course for a small group of five differently from that intended for a large class of 500.

The diverse nature of educational context means that I can give only very general advice.

Firstly, class size is an important – but not necessarily limiting – consideration. Although the dynamics of the interaction might change, you might be able to use the same exercise or discussion for both small and large classes. In a small class, for example, a single online educator might be involved with students on a one-to-one basis. In a larger class, the educator might interact with students as a group; the online educator responding to a group summary rather than individual contributions. Group tutors, or peer feedback, could meet the need for expert input. Either way, the actual exercise or discussion could remain the same.

Secondly, the challenge to instructional designers is to move beyond a broadcast and teacher-centred mindset toward one that is interactive and interpersonal (Tapscott 1998; Naidu 2003), though this assumes that social constructivism is the best educational methodology. In some course contexts this may not be the case. A research methods course or introductory course to a field of study, for example, might justifiably take a behaviourist or individualistic approach. Still, in general, the goal for e-learning enhanced instructional design should be to engage students with one another and with the materials of the course itself as much as is appropriate.

Thirdly, the academic level of the course affects design decisions. The comprehensive approach used for an introductory course will probably be inappropriate for a third- or fourth-year course designed to explore particular issues within the subject. A novice may lack the vocabulary and conceptual landmarks required for exploration in introductory courses.

Finally, you must consider your students' level of online access. Again, speaking generally, it is best to assume dial-up internet access. Extended periods of time online and substantial online traffic will therefore be barriers for students. Unfortunately, in most cases this makes online telephony and desktop videoconferencing unrealistic.

3.3 Key concepts for practical instructional design

If we are to be practical about instructional design, we need to introduce some more terminology. The pairs of *presentation and process*, *design and delivery*, and *online and offline* will help you to actually design your course.

3.3.1 Presentation and process

It is helpful to think of instructional design in terms of *presentation* and *process*, both of which can be managed and intentionally intertwined into an effective learning experience for students.

Presentation relates to the information already available from experts – it recognises that every subject domain has experts who are worth reading about and listening to. It also recognises that knowledge can be stored and transmitted – lectures, libraries, and the internet are classic examples of this principle in practice! For the purposes of instructional design, we can think about presentation in terms of *prime* and *supplemental* resources. Prime resources are compulsory; supplemental resources are more optional.

Process recognises that learners are also important in education, because they construct meaning for themselves. In instructional design, process describes those elements of a course's design that have students communicating with one another and actively using the knowledge they gain from the presentation opportunities provided.

Process might therefore consist of *interpersonal communication* and *activity*.

Presentation (information)	Prime resources Supplemental resources
Process (construction)	Interpersonal communication Activity

Table 2 – Presentation and process

The main difference between presentation and process is largely one of engagement. Presentation makes information and knowledge available for students to draw from and think about. Process gets students to explore meaning and apply knowledge. Process needn't be confined to the information given in a paper. It can be any activity or discussion that students use for learning. Presentation and process, with their subgroups of prime and supplemental resources, and interpersonal communication and activity, provide a useful basis for topic design (see p22).

3.3.2 Design and delivery

I use the terms *design* and *delivery* in this context to describe the elements that are produced before a course begins (design), and those that are produced while the course is actually taking place (delivery). Both have different instructional design considerations.

A course's *design* might consist of texts, articles, discussion opportunities, exercises, PowerPoint slideshows, video clips, and assessment tasks prepared *before you deliver* the course.

Course *delivery* is that online discussion, synchronous sessions, assessment marking, additional instructional resources *generated and released during* the course.

There is usually a relationship between these two elements, in that a course with a high design element tends to have a lower delivery element, and vice-versa. Highly *designed* courses are largely pre-determined, whereas highly *delivered* courses are very open and more flexible. They have very different dynamics.

The mix between design and delivery should be optimised according to the educational context. A beginner-oriented course introducing a discipline might have a higher design component, whereas a post-graduate course might emphasise delivery. Even if one element is emphasised, good design will seldom make up for poor delivery, and nor will good delivery gloss over sloppy design. Design and delivery must be combined into a coherent and interdependent whole.

3.3.3 Online and offline

We know that many students rely on dial-up internet access. But even if all of your students have high-speed internet, you must still decide on the best mix of online and offline media.

Online media are accessible only through an internet or network connection. This includes email, any activity provided through a learning management system, online conferencing systems with shared whiteboards, text chat and voice.

Offline media don't need an internet connection though students may still need a computer. Video or digital audio on CD-Rom or DVD, printed materials, and science kits are all examples of offline media.

It is widely held that online materials are very accessible. Unfortunately, until mobile internet access is a reality for more people, we must assume that, for many learners, internet access means using the family telephone line on a home computer, or using computers at the learners' institution. Even offline media such as digital video and digital documents can be very inconvenient for many students because they require computers. For these reasons, I suggest that you minimise students' online time and reserve computer-based activity (such as access to digital multimedia) for supplemental resources. However, more extensive use of online and on-computer media will be increasingly appropriate as connectivity to the internet becomes cheaper and faster.

The following mix will suit most student users:

- print (offline) for prime resources and study guides whenever possible
- CD-Rom (offline) for digital video, digital audio, and supplemental readings and resources
- email (online) for one-to-one asynchronous communication
- internet (online) for online one-to-many presentations and discussions, course updates, chats (at pre-determined times), and supplemental resources less than 2MB in size (up to 5MB if justified).

This mix doesn't rule out synchronous communication provided you create archives for students who can't participate in the session. Synchronous online learning is becoming increasingly viable (see, for example, Chen et al 2005).

3.4 Instructional design for e-learning

Having explored the nature of instructional design and of e-learning, and examined some associated terminology and concepts, we can now take a practical look at an instructional design process for e-learning. This process will consider everything from determining the context and curriculum, to preparing assessment tasks, topic design, and media preparation.

3.4.1 Constraint analysis

The following constraining factors will determine your design and delivery.

- *The nature of the intended course:* If your course is skills-oriented, for example, you might not use paper-based readings or online discussion. Instead, a mix of classroom-based learning, extensive simulation, and demonstration might be more appropriate.

- *Course level, scope and pre-requisites:* These indicate the sort of student who is likely to participate (and this information gives you further insight into appropriate presentation and process, design and delivery, and online and offline mixes).

- *The design and delivery mix of other courses:* It's usually best to be as consistent with other courses as possible. Using novel approaches or technologies means students have to learn new ways of doing things.

- *Institutional policies:* Your institution may have policies on online learning or tutoring, course design and delivery, assignment submission, student privacy, student support, internet use, and distance education. Your faculty job description might provide additional constraints.

- *Support tutors:* Are they available?

- *Technologies and support:* Course designers, deliverers, and students must have access to specific technologies, and support for those technologies.

- *Time, budget, and design support from instructional design and technology specialists*.

- *Your own limitations and experiences as an educator:* Consider these limitations specifically as a course designer and deliverer.

- *Media availability:* You will probably have an institutional learning management system (such as Moodle or Blackboard), and you might be able to develop a CD-Rom or DVD as well as traditional paper resources. Developing a CD-Rom or DVD is recommended if you are planning to make extensive use of video clips and extended slideshow presentations with voiceover.

Each of these constraints excludes some opportunities and encourages particular approaches. Some constraints are worth challenging, but most will simply shape what you can and cannot do.

3.4.2 Make or reuse?

Henry (1994) suggests three approaches to instructional design: *buy-in*, *wrap around*, and *originate* (see also Rowntree 1994). These are on a continuum of increasing cost and time to produce, but they are not mutually exclusive. To optimise your design time and funding, find a worthwhile text book or two to 'wrap-around' (that is, to base learning materials on), and supplement it with additional media that you can buy or make. In general, it is far better to spend time 'wrapping around' than writing content that is already available in accessible text books. Invest your development time in drawing lessons out from texts and developing additional materials such as multimedia presentations, online discussions, small group tutorial exercises, case studies, and other activities.

You might even be able to use other course materials – particularly if, say, you are redeveloping a lecture-based course into a distance education or hybrid delivery course. While this strategy usually requires you to develop some extra resources and exercises, it is usually far more cost-effective to adapt than to create from scratch (see, for example, Dalsgaard & Godsk 2007). Littlejohn (2003) has documented the difficulties of using learning objects, or reusable e-learning material available from online repositories. Even if you can find a promising learning object, you often need to provide significant context before it will fit into your course.

Another option is to 'buy-in' an entire course (Willhelm & Wilde 2005).

3.4.3 Instructional goals, over-arching statements and assessment

Once you have an idea of the limitations and opportunities afforded by your course's context, you can focus on the course's instructional goals and assessment tasks.

In the earlier discussion about the Dick and Carey model for instructional design, I noted that instructional goals tend to be rather broad. For most courses it would be sufficient to list four to six of these goals. Abstract and high-level language (even teacher-centred language) is perfectly appropriate. Consider these, which might be instructional goals for a course on e-learning:

- For learners to understand what e-learning is, and the issues surrounding its potential benefits.
- For learners to appreciate the likely changes that e-learning assisted education might require of faculty.
- For learners to be able to design effective courses that make sound use of instructional design principles and e-learning.
- To enable learners to cultivate an effective online presence for online discourse.
- For learners to become confident users of a learning management system.
- To provide learners with a scaffolded experience in adopting new e-learning techniques.

Clearly, setting instructional goals requires an excellent understanding of the field. Seasoned faculty will have little difficulty in formulating the instructional goals for their courses, though they may need to prioritise them. Each goal is general enough to permit more specific objectives, while also being specific enough to give the course its shape.

Ideally, instructional goals determine the topics within a course. An over-arching statement is also useful:

> To enable learners to become confident designers and deliverers of e-learning assisted courses by immersing them in an effective course that models good practice.

An over-arching statement can either be used as the basis for instructional goals, or to summarise them once they have been prepared.

The over-arching statement and instructional goals also shape assessment. Assessment tasks must address the learning outcomes set for the course. You can do this by explicitly mapping the outcomes of a course to assessment tasks to ensure that all are adequately covered.

Assessment tends to represent the curriculum from the perspective of the student, so assessment means and ends are actually educational tools and not merely devices to measure student ability. Indeed, assessment is one of an instructional designer's most potent tools for encouraging particular types of learning. Ramsden's (2003:204–205) 14 rules for better assessment in higher education continue to provide a very pragmatic and strategic perspective of assessment.

1. Link assessment to learning: focus first on learning, second on encouraging effort, and third on grading; assess during the experience of learning as well as at the end of it; set tasks that mimic realistic problems whenever possible; reward integration and application.

2. Never assess without giving comments to students as to how they might improve.

3. Learn from your students' mistakes. Use assessment to discover their misunderstandings, then modify teaching to address them.

4. Deploy a variety of assessment methods.

5. Try to get students participating in the assessment process, through:

    - Discussion of appropriate methods and how the methods relate to course goals
    - Joint staff-student design of assessment questions and negotiation of criteria for success and failure
    - Self and peer assessment activities
    - Offering students responsible choice among different methods.

6. Give lucid and frequent messages, both in the assessment questions you set and in your course goals that memorisation, reproduction, and imitation will be penalised and that success in your courses will only be achieved through decisive demonstrations of understanding.

7. Think about the relation between reporting and feedback; justify on educational grounds either the separation or the combination of the diagnostic [formative] and summative functions of a particular test, rather than blindly applying an algorithm such as 'No assessment for feedback should count for a mark' or 'Every assessment should count or students won't bother with it.'

8. Use multiple-choice and other 'objective' tests very cautiously, preferably in combination with other methods. When numbers of students and time permit alternative techniques, use these.

9. In subjects involving quantitative manipulations, always include questions requiring explanations in prose (such as 'what does it mean in this case to say that the standard deviation is 1.8?') as well as numerical examples.

10. Focus on validity (is what you are measuring important?) before reliability (is your test consistent?). Try to avoid the temptation to test trifling aspects because they are easier to measure than important ones.

11. Do everything in your power to lessen the anxiety raised by assessments.

12. 'Examinations are formidable even to the best prepared, for the greatest fool may ask more than the wisest man can answer' (Colton). Never set an assignment or examination question you are not ready to answer yourself. Practice the habit of writing model answers to your questions and using them to help students appreciate what you want.

13. Reduce the between-student competitive aspects of assessment while simultaneously providing inducements to succeed against a standard (through using assessment of group products and deriving standards from several cohorts of students, for example).

14. Be suspicious of objectivity and accuracy of all measures of student ability and conscious that human judgement is the most important element in every indicator of achievement.

Use these 14 rules when you consider your assessment mix. Ramsden's stance is that assessment should be directed at understanding rather than recall. The potential for creative and innovative assessment tasks is implicit in Ramsden's work. Validity (number 10), in particular, requires instructional designers to consider how relevant an assessment task is to the 'real world'.

Assessment workload is another critical consideration at this stage of course design. In formal education, hours are usually assigned to courses in point values. At Massey University, for example, each point relates to 1 hour's study in each week of the semester. A 12.5-point paper or course should therefore comprise about 160 hours of activity, which calculates to about 12 hours per week across a 13-week semester (or about 6 hours per week across a 26-week full-year offering. More than half of this time could be allocated to assessment activity, the rest to directed study. In other institutions a single credit might equate to 10 hours' work by the student, a 15-credit course therefore implying a workload of 150 hours spread over about 13 weeks. Again, assessment time must be factored into this overall load (workload determined topic by topic is addressed later (see pp21-22)).

Unfortunately it's not possible to give a more detailed treatment of assessment development in this e-primer, but I offer the following ideas for further thought.

- Make your expectations and marking criteria clear in your assignment guidelines. A marking matrix helps you and your students to understand expectations. You might even invite students to provide some reflective comments to accompany their assignment submission. This gives them an opportunity to express their thoughts on their performance, and the strengths and weaknesses of their work as they perceive them.

- Consider how students might engage with the assessment tasks you have set. This gives you some insight into the types of learning that your assignment task(s) will reward. By varying assessment tasks, you encourage different types of activity and, therefore, different types of learning.

- Consider an assessment process that requires students to submit their written work electronically in a standard word processor format, either through a learning management system or by email. You can then provide detailed feedback with electronic mark-up (that is, inserting comments directly in the students' own electronic submissions), commenting on the structure, logic and formatting of their work. There is a great deal of potential for this approach.

- E-learning offers many new forms of assessment (both formative and summative) and some twists on existing methods. You can grade online discussion according to its value (see E-Primer 4, *Online Discourse*); students might use wikis and glossaries for collaborative assignments. Online quizzes are effective, particularly if they are well designed. Such quizzes are sometimes used for summative assessment in supervised computer labs. Simulations can immerse students in conditions that represent real-life. Traditional case studies, portfolios, problem-based learning, and assessment techniques can also be enhanced through multimedia and hyperlinked resources.

- There are many creative means for assessment outside of e-learning. Projects, video evidence, journalistic writing, portfolios, expert interviews, annotated bibliographies, and learning contracts can complement the traditional mix of essay and exam. The 'patchwork text' (a series of small written assignments that students share with their peers then revise and assemble at the end of a course), is another example of creative assessment that highlights learning as an ongoing activity (see Parker 2003; Winter 2003).

Considering the learning outcomes from a practical perspective should yield a number of effective assessment ideas. Combine these with some innovative thought to design workable and valid assessments.

3.4.4 Setting learning objectives and topics

In the earlier commentary on the Dick and Carey instructional design model, I pointed out that learning objectives are specific outcome statements that build on course aims. Some examples of this relationship are given in Table 3.

Instructional goals	Learning objectives
Characteristics Abstract All-encompassing Theory-based Cognitive Based on curriculum Determine objectives 'Teacher objectives'	**Characteristics** More concrete Expresses aim in terms of broad activities that the learner should be able to perform Break-down of aim into broadly defined practical tasks 'Learner objectives'
Examples For you to understand the importance of learning objectives and be able to use them effectively in your learning materials. For learners to be able to design effective courses that make sound use of instructional design principles and e-learning.	**Examples** At the end of this topic, you should be able to: • Discuss the importance and role of learning objectives • Use learning objectives to structure a section of your course material • List the components of an effective objective • Write learning objectives in a practical, student-centred style. At the end of this section, you should be able to: • Define instructional design and its relationship to e-learning • Define the constraints that shape course design and delivery • Design an effective course that reflects good practice.

Table 3 – Comparison of instructional goals and learning objectives

If instructional goals provide the overall topic framework for a course, learning objectives shape individual topics. Learning objectives are clear and direct statements of what the learner should be able to do once they have completed the topic. The verb you choose for a learning objective is more important than it is for an instructional goal. Table 4, from Forsyth et al (1999), will help you to ensure that the verbs you choose indicate the level of cognitive development you want your learners to achieve.

Knowledge		**Comprehension**	
Arrange Define Duplicate Label List Memorise Name	Order Recognise Recall Relate Repeat Reproduce	Classify Describe Discuss Explain Express Identify Indicate	Locate Recognise Report Restate Review Select Translate
Application		**Analysis**	
Apply Choose Demonstrate Dramatise Employ Illustrate Interpret	Operate Practice Schedule Sketch Solve Use	Analyse Appraise Calculate Categorise Compare Contrast Criticise	Differentiate Discriminate Distinguish Examine Experiment Question Test
Synthesis		**Evaluation**	
Arrange Assemble Collect Compose Construct Create Design Formulate	Manage Organise Plan Prepare Propose Set up Write	Appraise Argue Assess Attach Choose Compare Defend Estimate	Evaluate Judge Predict Rate Score Select Support Value

Table 4 – Learning objective verbs based on cognitive domains

Topics should generally be guided by about four learning objectives, which might even serve as topic subheadings.

In general, a topic learning guide will have the following structure:

- *Introduction:* The introduction lists the learning objectives and might also include some warm-up reflective questions and introductory commentary.
- *Sub-headings:* The content under each sub-heading consists of a mix of presentation and process elements.
- *Conclusion or summary*.

A topic is not a scholarly article. The idea of ‘writing a course’ won’t help you to prepare a topic. Rather, topic learning guides tie resources together in a meaningful and coherent way. Topics are best written in the form of a ‘guided didactic conversation’, a term created by Holmberg (1977) to describe a flowing monologue. This conversational

writing style resembles a faculty member actually talking to a student in a one-to-one setting.

You might also base topics on a literature review or a monograph like this document. But note that this document is *not* a learning guide. Rather it is a learning *resource* that might be part of a topic's presentation mix. A learning guide, for example, might direct a learner to read the parts of this document that relate to particular learning objectives.

3.4.5 Determining student workload

Before we address the specifics of preparing a topic, consider the time that students will spend on different learning activities. In distance education, workload has traditionally been determined by the number of pages students have to read. In contrast, on-campus courses measure the number of hours a student spends in class. When you design for e-learning, you also need to consider interpersonal interaction and activities.

Rowntree (1997) suggests that students can study 80 to 200 pages of text every 10 hours, depending on the complexity of the text. Without careful planning, course designers can overload students with unrealistic workloads of reading and interaction.

Though workload estimates are invariably subjective (Chambers 1994), the following rules of thumb should prove reliable.

- *Readings:* Eight to twenty pages per hour, depending on the text (this is *study pace* rather than *reading pace)*
- *Asynchronous discussion:* One to three hours per exercise, depending on scope
- *Presentations (multimedia) or lectures*: Double the time it has taken taken to present the material.
- *Activities:* Very dependent on scope – consider the level of familiarisation students must have before starting, and any necessary collaboration as well as time for the task itself.

Collaboration usually requires significant student effort, so make a generous time allowance for collaborative tasks. If a typical 15-credit course comprises 150 hours over 13 weeks, you might budget about 12 hours per week for course-related activity. Allocate about half of this to assessment, leaving about 6 hours per week. If the topic consists of readings and online discussion, the time might be broken down as in Example 1.

	Assessment allowance (including compulsory online discussion)	*6.0 hours*
8 pages	Learning guide, easy read	0.5 hours
25 pages	Text book chapter, moderate complexity	2.0 hours
10 pages	One journal article, complex	1.0 hours
15 minutes	Pre-recorded presentation, on CD	0.5 hours
200 words	Online discussion – optional initial post	1.5 hours
50 words	Online discussion – optional follow-up post	0.5 hours

	TOTAL	**12.0 hours**

Example 1 – Emphasis on reading

In Example 1, we allowed time for taking notes from the pre-recorded presentation, and considered each reading's complexity. You can see that more is expected of the initial online discussion post than of the follow-up post.

You could also build a whole topic's work around an activity. In Example 2, the activity is a computer simulation exercise:

	Assessment allowance	*6.0 hours*
4 pages	Learning guide, easy read	0.5 hours
12 pages	Simulation brief, complex	2.0 hours
	Simulation exercise	2.5 hours
100 words	Online discussion – optional 'lessons learned' post	1.0 hours
	TOTAL	**12.0 hours**

Example 2 – Emphasis on activity

Giving students time breakdowns for each topic means they have a clear idea of what is expected and the time it will take – but be clear that such breakdowns are inevitably estimates.

3.4.6 Topic design

I mentioned earlier that instructional design is both an art and a science. So far, you might have the impression that instructional design is little more than following a template. But here, at the level of topic design, course designers can express their artistic flair. The following advice is not restrictive. My aim is to provide a useful framework to help artists choose a medium.

In our earlier discussion on presentation and process, I introduced four different elements (see Table 2). These elements provide a useful framework for designing topics.

Presentation (information)

- Prime resources – essential for learners.
- Supplemental – optional for learners.

Process (construction)

- Interpersonal communication – interaction with others.
- Activity – working with knowledge in an applied context.

Each element presents several options for actual design, as outlined below.

Prime and supplemental resources	
Text book (or chapters) Monograph Hypertext document Guided didactic conversation Lecture (various media) Webpages or websites Journal articles and reports Video clips (interview or documentary) Podcast (audio file of lecture, commentary or interview) PowerPoint slides (with or without commentary) Handout summary Animations	
Interpersonal communication	**Activity**
Sharing perspectives or experience Debates Question and answer Role play Investigative reporting Guest experts Open-to-class journalling Anonymous critique Live chat session (text)	Simulation Case study Reflective questions (personal) Application Exercises and quizzes (tutor or self-marking) Problem-based task Personal journal Investigative reporting

Table 5 – Elements of topic design

The difference between *prime* and *supplemental* resources is their role as compulsory or optional elements of the topic. Prime resources contain everything the student needs to know from the topic; supplemental resources present perspectives of interest or further things to consider.

The key question for effective topic design is this: Which of the four elements will *drive* the topic, and how will the other three contribute?

If you want to emphasise established principles and concepts, you are likely to choose prime resources as the driver. If you want to expose learners to the diversity of ideas in a topic by addressing a specific element in depth, you might use supplemental readings as the driver. If you want learners to share experiences or discuss and debate key ideas, interpersonal communication becomes the driver. Finally, if your focus is application, activity will drive to your topic design.

To help you decide on the driver, you may want to consider which particular learning objectives, if any, you want to highlight.

Driver	Characteristics
Prime resources	'What you need to know' Familiarisation with central concepts and ideas Getting to know terminology 'Big picture' of the topic Getting to know what is known
Supplemental resources	'What you need to consider' Guided teaching Exploring specific sub-topics in-depth Focus on the perspectives of experts Exploring the complexities of what is known
Interpersonal communication	Social constructivism Collaboration and perspectives of peers Self-disclosure Sharing experience Debating and exploring meaning with others
Activity	Discovery learning Application and implementation Problem-based learning and simulation Reflecting on experience

Table 6 – Presentation and process drivers, and key characteristics

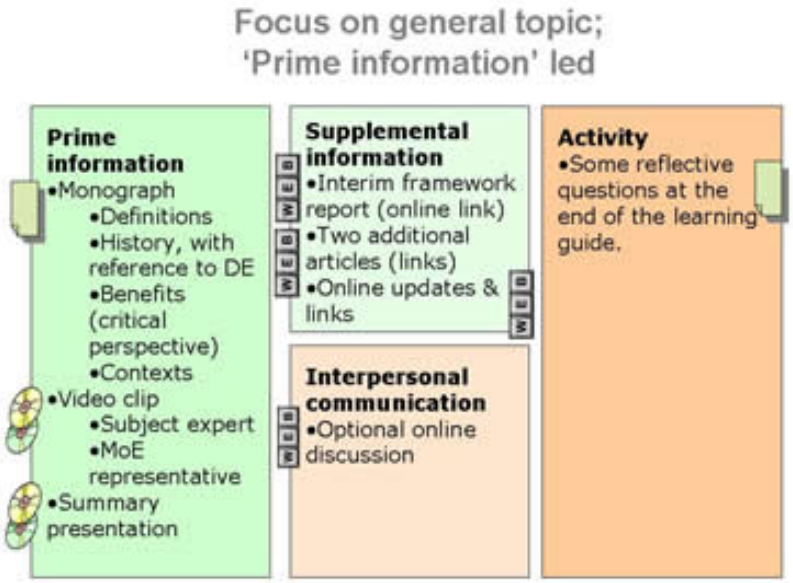
Remember that these categories are only a guide. It is recommended that only one driver be selected, even if elements of the other three are used as passengers! Having a driver does not discount the use of the other three categories. It is just useful to decide on an emphasis (the driver), so that each topic has a clear and central form of engagement for students.

The examples in Table 7 are based on a topic called 'e-learning in context'. As you can see, each driver lends itself to particular objectives. Or you could say that the objectives lend themselves to particular drivers!

Driver	Objectives
Prime resources	Define e-learning Describe the benefits of e-learning Choose the benefits of e-learning that are most appropriate to your own context
Supplemental resources	Define the role of the government strategy Analyse the government strategy for e-learning Describe various perspectives of the strategy
Interpersonal communication	Explore and contrast the perspectives of various stakeholders in e-learning Describe the context of e-learning in your own organisation Defend an e-learning strategy based on your organisational context
Activity	Analyse an organisation's e-learning context Discover potential barriers to e-learning Propose an e-learning strategy for your own organisation

Table 7 – Presentation and process drivers, and key characteristics

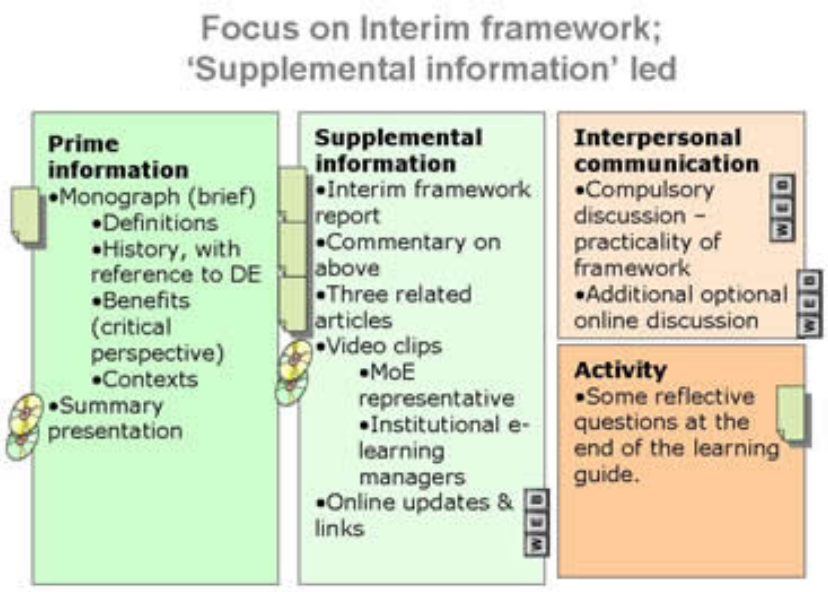
The following models show how the topic in Table 7 might be designed, depending on the driver. (Paper, a CD-Rom and the internet are assumed as offline and online elements, and the educator is involved in the delivery of the course.)



Model 1 – Prime information

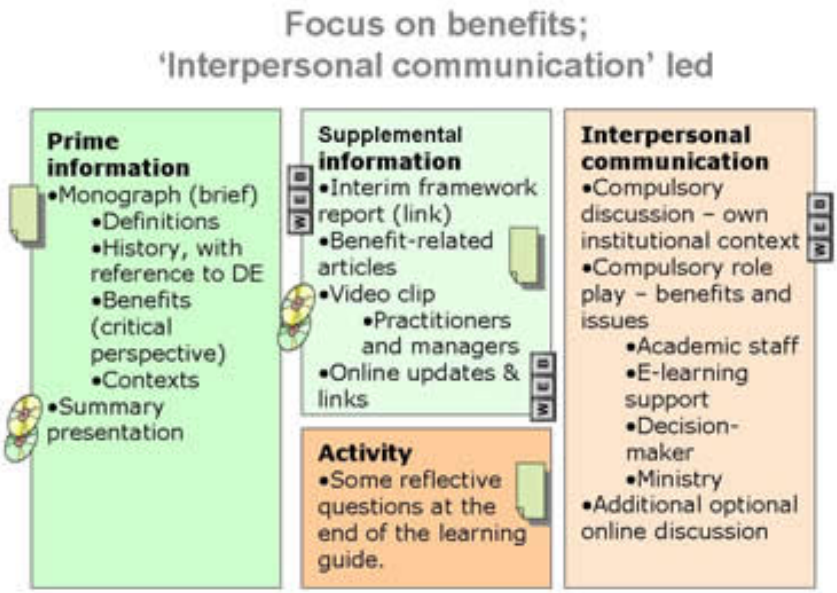
In Model 1, the *prime information* led design, a monograph provides a comprehensive overview to the topic. It is supplemented by video clips of the subject expert (faculty member) and a Ministry of Education representative, and a presentation of the

summary. The supplemental information is linked to on the internet rather than provided in the course materials. An optional online discussion and some reflective questions round off the topic.



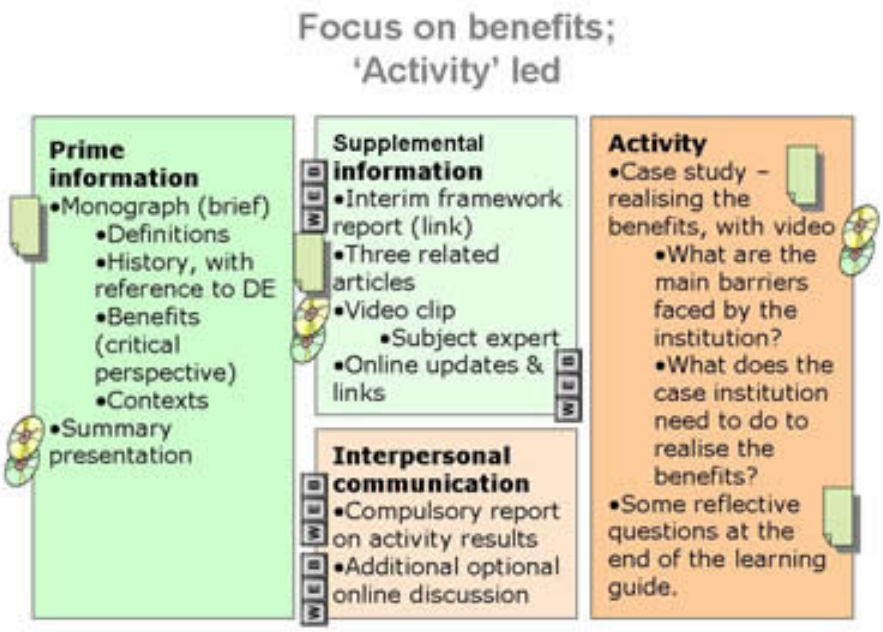
Model 2 – supplemental information

Model 2 is led by *supplemental information*. It focuses on the Ministry of Education's e-learning strategy. As in Model 1, a monograph is provided as prime information; however, this one is shorter. The focus is instead on a specific report, an associated commentary, and three supplemental articles (all provided on paper). This model uses a compulsory online discussion in which students are asked to discuss the practicality of the report.



Model 3 – interpersonal communication

Interpersonal communication is the driver in Model 3, and the focus is on students' own institutional context and an online role play. A short monograph is still provided as prime information (as in Model 2) and the supplemental information is linked (as in Model 1).



Model 4 – Activity

Finally, Model 4 shows how an *activity*-led topic might be based on the case study of an organisation that has successfully implemented e-learning. The case study has some questions that form the basis of a compulsory online discussion.

These models show how the same topic might consist of very different learning experiences and encourage different types of student engagement. Your choice depends on your objectives and the constraints we considered earlier.

Each topic might be presented in the following format:

- Topic title
- Suggested workload
- Learning objectives
- Relation to assessment
- Introduction
- Sub-topic
  - Introduction
  - Prime information
  - Supplemental information
  - Interpersonal communication
  - Activity
- Next sub-topic…
- Reflection questions
- Summary.

There are many ways to prepare topics and, of course, there are exceptions to any template. Melton (1997) suggests a format based on units (topics), each made up of different sessions (sub-topics). Melton's diagrams are adapted here to suit our terminology and 'topic driver' emphasis.

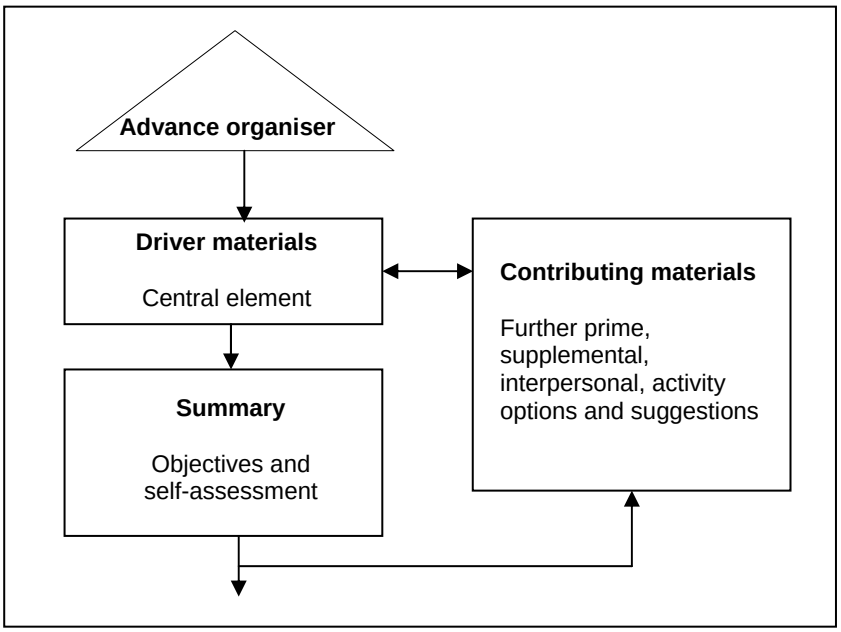


Figure 3 – Sub-topic organisation, based on Melton (1997:67)

A sub-topic consists of an *advance organiser* or introduction. The *driver materials* make up the central element of instruction; the *contributing materials* are from the other three elements, and are either optional or subsidiary. The *summary* is a brief overview of the main ideas of the sub-topic and gives students an opportunity to reflect or answer some self-assessment questions. How these sub-topics might fit within an overall topic is also suggested by Melton (1997), below. Here, there is an advance organiser for the bigger picture (the overall topic) which then proceeds to each discrete sub-section (the sub-topics).

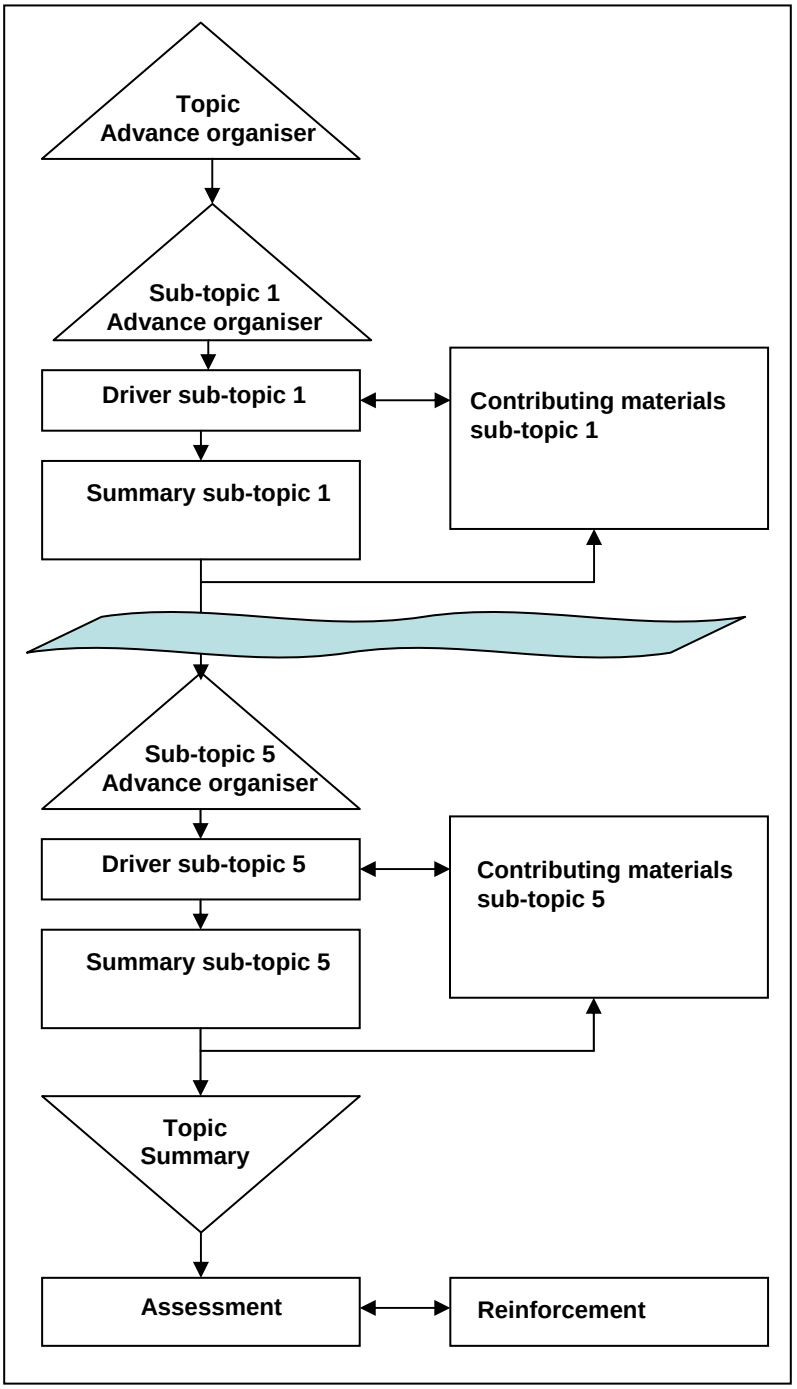


Figure 4 – Topic organisation, based on Melton (1997:70)

There are summaries at the end of each sub-topic, and an overall summary at the end of the topic. This overall summary leads into an assessment task and further reinforcement, which might consist of additional or recommended reading, further practice, further problems, further examples, or alternative perspectives and approaches. Melton's (1997) format clearly illustrates how topics can be matched to assessment tasks.

You can see now that the relationship between topics and sub-topics is an important one in instructional design. So far, I have suggested that drivers apply to topics; they could just as easily be applied to sub-topics, depending on the scale of those sub-topics. I have experienced well-designed full-year distance education courses that consisted of four *blocks* (topics), each consisting of multiple sub-topics, as in Melton's (1997) format in Figure 4. I have also designed courses with twelve topics, each with smaller sub-topics; with an assessment after several topics have been covered. Practice (and terminology!) varies from institution to institution.

It is best to select driver elements for discrete blocks of study, perhaps on the basis of a 6-hour time slot (approximately 1 week's work in a 15-credit course). Whether this 6-hour block represents a sub-topic of a larger topic or a series of sub-topics within the same topic depends on the context the instructional designer works within.

3.4.7 Media and website preparation

In E-Primer 2, *E-Education and Faculty*, I argued that faculty *not* be expected to undertake instructional design on their own (see also Oblinger 2006). Rather, I suggested a team of faculty member, instructional designer, and media specialist. This approach will usually improve the quality of the overall course design and any media that are developed. While faculty *can* develop their own media and formulate their own mix of topics and drivers, don't underestimate the benefits of pooling a team of specialists.

Here is one suggestion of how a team might work:

- *Course outline development*: faculty member, with peer input
- *Overall development plan*: negotiated between the faculty member (who 'owns' the process), instructional designer and media specialist
- *Learning guide development*: faculty member negotiates drafts with instructional designer; instructional designer prepares final copy, acting on feedback from the faculty member.
- *Multimedia resource development*: instructional designer acts as a project manager; faculty member provides content and is recorded presenting the materials; media specialist edits the footage, digitally renders the finished clip into the required format and provides final copy
- *Website design (in LMS)*: instructional designer sets up the initial site according to a plan agreed with the faculty member

- *Ongoing maintenance*: faculty member maintains the course and website, after professional development.

This proposal acknowledges the expertise of all team members, ensuring a solid initial design that can be maintained by the faculty member. Major redesign would involve the instructional designer and media specialist.

3.5 Summary – Designing for e-learning

Instructional design has a rich history. E-learning is best applied within a carefully considered instructional design framework. The concepts of presentation and process, design and delivery and online and offline are crucial for instructional design practice.

Instructional design is both an art and a science. Within the general principles and models for instructional design there is ample scope for innovation and creativity, particularly if an instructional design team consists of faculty, an instructional designer and a media specialist.

There are four potential drivers for instructional design: prime information, supplemental information, interpersonal communication, and activity. One way of effectively using the opportunities afforded by e-learning is to consider which one of the drivers will be emphasised for any particular topic. It is important that all topics form a coherent whole that meets the stated goals of the course.

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