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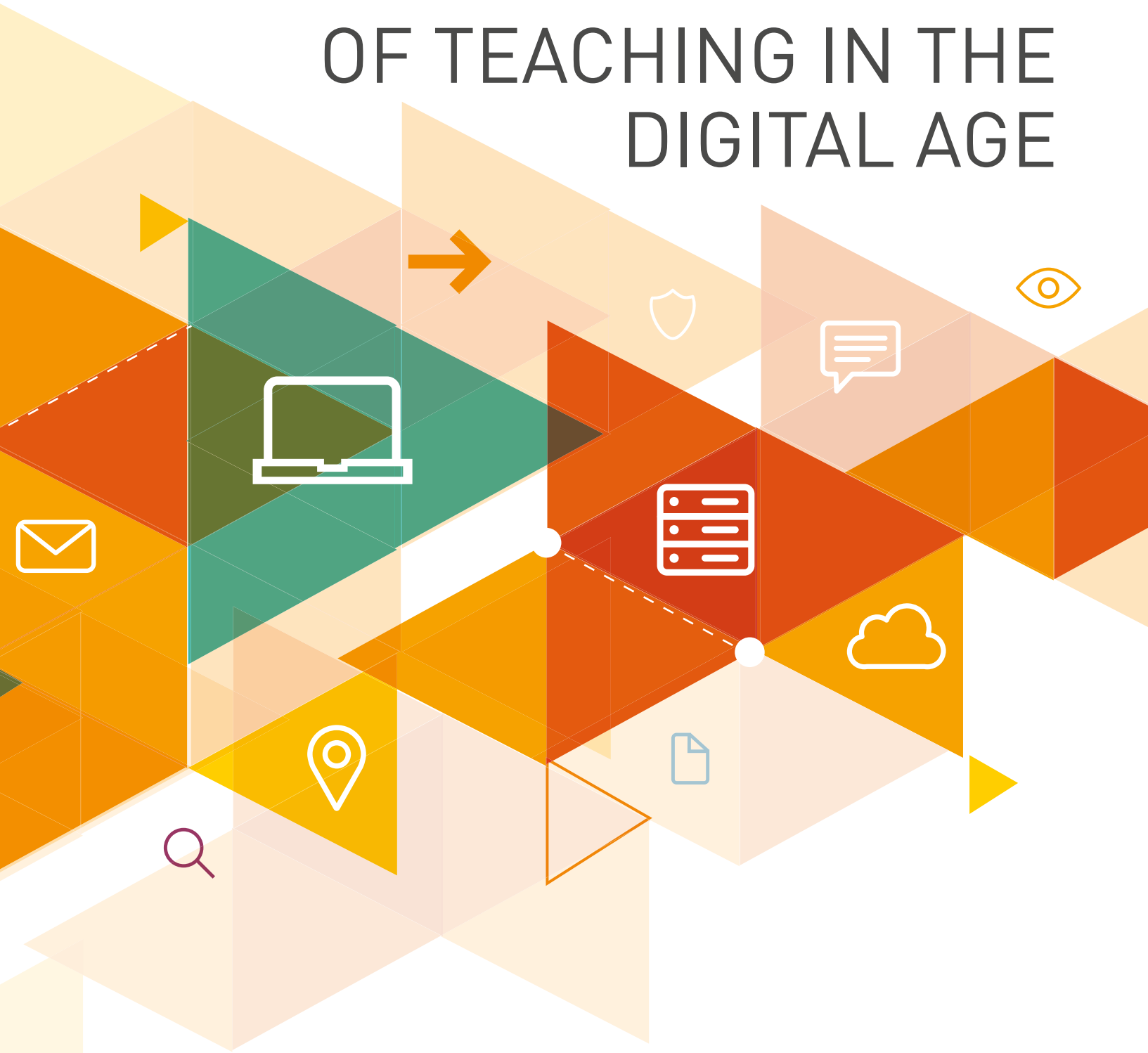
EXPLORE NEW WAYS OF TEACHING IN THE DIGITAL AGE



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INTRODUCTION

Dear Instructor,

Welcome to *Explore New Ways of Teaching in the Digital Age*. This FreeBook discusses the ways technology and the internet have been used in university teaching, and how you can use these initiatives with your students.

First chapter is from Louise Starkey's, *Teaching and Learning in the Digital Age*. This book is for all those interested in the impact of emerging digital technologies on teaching and learning. It explores the concept of the digital age and perspectives of knowledge, pedagogy and practice within a digital context. This chapter considers the teaching side.

Secondly, we have included a chapter from *Teaching Online: A Practical Guide*, by Susan Ko & Steve Rossen. It is an accessible, introductory, and comprehensive guide for anyone who teaches online. This chapter discusses classes that combine online and face-to-face activities.

The third chapter is taken from *Learning Theory and Online Technologies*, by Linda Harasim. It offers a powerful overview of the current state of online learning, the foundations of its historical roots and growth, and a framework for distinguishing between the major approaches to online learning. This chapter offers a means of understanding online learning, some of its different forms and how differing approaches and processes can be used to support effective learning and educational change.

Next is a chapter from *Best Practices in Engaging Online Learners Through Active and Experiential Learning Strategies*, by Stephanie Smith Budhai & Ke'Anna Skipwith. The book is a practical guide for all instructors working in online or blended learning environments who want to provide a supportive, engaging, and interactive learner experience. This chapter focuses on gamification and social media.

The final chapter is taken from *Sustainable Mobile Learning: Theory, research and practice*, by Wan Ng & Therese M. Cumming. This book discusses the complexity of the key issues surrounding sustainability in mobile learning. This chapter uses two case studies to consider how to move forward in seeking sustainable mobile learning in the university sector.

INTRODUCTION

As you read through this FreeBook, you will notice that some excerpts reference previous chapters, please note that these are references to the original text and not the FreeBook.

Finally, don't forget that Routledge offers a range of textbooks and instructor resources to help you with your teaching. Explore the latest resources here.

Happy Reading!

Best wishes,

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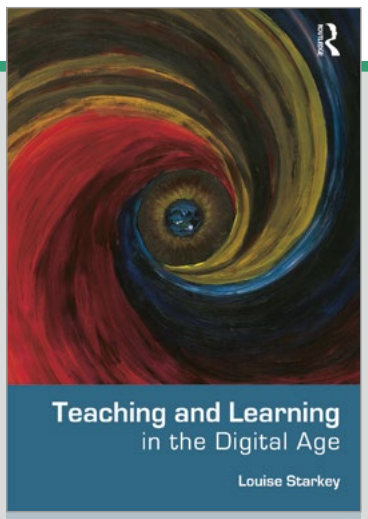
CHAPTER

1

TEACHING IN THE DIGITAL AGE



This chapter is excerpted from *Teaching and Learning in the Digital Age* by Louise Starkey.

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TEACHING IN THE DIGITAL AGE

Louise Starkey

Excerpted from *Teaching and Learning in the Digital Age*

Effective teaching in the digital age requires a high level of professional knowledge and skill. The teacher needs to be able to recognise what students know and don't know, draw on discipline knowledge, pedagogical content knowledge, educational psychology and knowledge of the context to teach the students concepts and skills that they will need to participate in society. They also need to facilitate opportunities for students to collaboratively create and critique knowledge within and beyond the formal learning environment. Teaching will be a highly skilled and demanding profession (Figure 1.1).

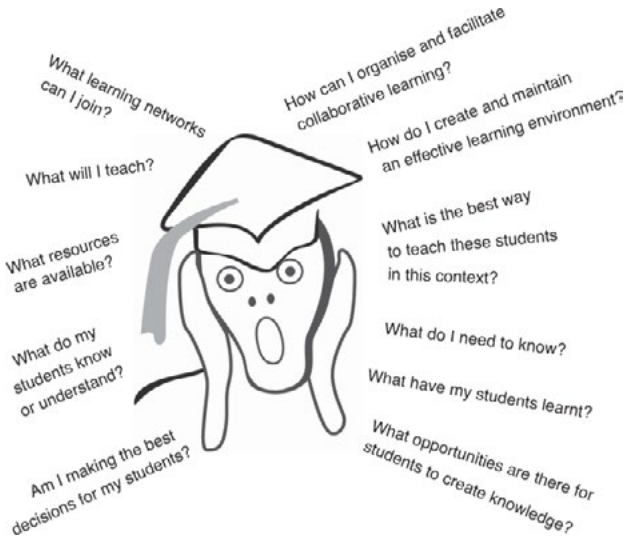

Figure 1.1 • The teacher scream.

PRIORITISING TEACHING OR LEARNING

In the digital age teachers will prioritise student learning over teaching. There is a subtle but important difference between teacher decisions which prioritise teaching above learning and those which prioritise learning over teaching. They are two perspectives; both value teaching and learning, but they approach the teaching process from different priorities. The former is to keep the students engaged through the use of resources and carefully designed lessons, the latter is to monitor student learning through use of formative assessment and base teaching decisions on the learning progress of the students.

A teacher who prioritises teaching carefully selects resources and teaching tasks that will disseminate content information for the students to learn. Their classes may be engaged in learning tasks and focused on getting the work done. It is likely

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that students are directed to ensure they have the correct notes and achievement is measured through task completion. A student who follows the instructions and completes their work (the set tasks) is considered a good student. The teacher may plan in a sequence so that students are being scaffolded through learning tasks as per constructivist learning theory. The teacher may assess to ensure that students have achieved the 'learning intention' that the teacher has shared with the students. Knowledge creation may be shared through movies showing students' art works, poetry written by students, stories or the results of scientific inquiries. The purpose is to showcase what the students have been doing, rather than to extend the learning. It is underpinned by the focus on task goals and task completion rather than the learning. When it does show the learning it is within the framework of 'we are learning about', which tends to be what the teacher is teaching.

A teacher educator or mentor who prioritises teaching over learning will expect to observe clear structured planning, behaviour management that ensures students can focus on the tasks set by the teacher and students who clearly understand what they have to do and when. An outcomes based curriculum that specifies what students need to be able to achieve at certain stages can encourage or underpin prioritising teaching over learning.

A teacher who prioritises learning requires similar skills to the teacher who prioritises teaching, but frames their thinking about the process from the perspective of the student rather than the teacher. Their starting point when considering how to teach is the students and their learning needs. The focus is less on getting work done and more on learning. At the end of a formal lesson the students may have nothing physical to show the teacher, but they should be able to explain what they have learnt. A student who demonstrates conceptual understanding, uses critical thought, collaboration, metacognition, and creativity within the subject context is considered a successful learner. The teacher may plan a sequence of learning experiences to scaffold students, assessing their progress along the way and adapting instruction and feedback for individuals or groups of students. They will also encourage students to use the concepts they have learnt creatively, collaboratively and critically.

A teacher educator or mentor who prioritises student learning over behavioural aspects of teaching will expect to observe a learning environment in which the articulation of thought processes, discussions about what is being learnt and a teacher who is focused on understanding the learning that is occurring by individuals and groups.

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PEDAGOGICAL REASONING

Pedagogical reasoning is the process a teacher undertakes when making teaching decisions prior to, during, and after their students' learning episodes. Lee Shulman's (1987) model of pedagogical reasoning and action was designed to identify the professional practice of teaching that was specific to teachers. The model comprises actions that a teacher undergoes during the teaching process including: comprehension of subject knowledge, transformation of subject knowledge into teachable representations, instruction, evaluation of students' learning and teacher's performance, reflection, and new comprehensions (by the teacher). The underlying purpose of teaching in this model was to impart knowledge to students and then assess them to ensure that they had learnt the intended information, skills or concepts. This model was a useful representation at the time it was published, helping to establish recognition for teaching as professional practice.

Model of teacher pedagogical reasoning and action for the digital age

(adapted from Shulman, 1987)

Comprehension of subject (content knowledge) including:

- substantive knowledge (concepts and principles); and
- syntactic knowledge (subject methodologies).

Enabling connections – preparation for teaching (pedagogical content knowledge) including:

- reviewing and analysis of student learning records;
- selecting appropriate resources and methods to enable students to make connections between prior knowledge and developing subject knowledge and skills;
- transforming existing knowledge into teachable content;
- enabling opportunities for students to create, critique and share knowledge;
- enabling connections between groups and individuals to develop knowledge of the subject.

Teaching and learning – (knowledge of context) including:

- ongoing evaluation of student learning with feedback to, and discussion with, the students and modification of the teaching process and learning experience where appropriate;
- adaptation and tailoring learning experiences for the students being taught;
- being culturally responsive.

Reflection – (teacher professional learning) including:

- reviewing and critically analysing teaching decisions based on evidence;
- formal and informal professional discussions about student learning, evidence and teaching decisions.

New comprehensions – about the subject, student learning and teaching.

Figure 1.2 • Pedagogical reasoning and action in the digital age.

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Figure 1.2 is a simplified model of pedagogical reasoning in the digital age which prioritises student learning. An earlier version of this was published in 2010 (Starkey, 2010a, p. 243). In the digital age student learning is the focus of teaching decisions.

Teachers draw on knowledge and experience when making teaching decisions. At the planning stage the teacher will draw on their academic knowledge of the subject being taught, pedagogical content knowledge, curriculum, knowledge of the context and learners being taught.

CONTENT KNOWLEDGE

For a teacher to teach students about a subject they need to be able to draw on their own personal substantive knowledge of the subject gained through academic study. The substantive knowledge of subject includes the concepts, principles and the nature of the subject. Each subject has a body of knowledge that has been debated and developed over time, evolving as new connections and ideas become embedded. Students in the digital age will continue to learn what each subject contributes to broader understanding of society, the world and beyond, and the methodologies unique to the subject. The more complex the concepts, principles and methodologies being learnt, the greater the level of academic knowledge the teacher requires.

Students learning the social sciences will learn how research, critique, debate and referencing occurs along with key concepts and perspectives. All this knowledge is embedded within the subject and the teacher needs to be able to draw on the substantive knowledge of the subject when making decisions about which aspects to teach, how and why.

PEDAGOGICAL CONTENT KNOWLEDGE

Academic knowledge is the basis for the development of a teacher's pedagogical content knowledge, which is essential for effective teaching practice. Pedagogical content knowledge was identified by Lee Shulman (1986) as the understanding and skill needed to teach students the substantive knowledge of a particular subject. It is how to teach a particular concept, methodology or principle based on how students learn, the context, and the resources at hand. For example, a geography teacher needs the substantive knowledge of how natural and cultural processes occur and interact to form the environment in which the students they teach live. They also have the pedagogical content knowledge to inform how they teach the students about their

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environment, when to use field assignments and the appropriate methodologies for learning beyond the classroom, what models or simulations will help students learn about the processes, how many examples should be used, when to use collaborative learning, when to introduce independent learning tasks and how to familiarise the students with geographic vocabulary and concepts.

Pedagogical content knowledge is important for effective teaching. To teach 6-year-olds how to add the teacher needs to know more than the substantive knowledge (how to add). He or she needs to know the process of *learning* to add and the teaching methods that enable the learner to learn. Likewise the geography teacher may know how the environment has formed through natural and cultural processes, but this alone does not make them an effective teacher. An effective teacher will be able to select appropriate resources and teaching strategies to enable the students to master the concepts, skills and methodologies specific to the subject and design opportunities for students to critique, create and share knowledge.

Professional learning in teaching has been studied and considered over time with different ways of measuring effectiveness suggested. It can be evaluated by how much the teacher enjoyed a professional learning programme, the results of which may depend on the intrapersonal skills of the programme leader, the quality of the lunch or the ease of parking. It may be measured by a behaviourist approach to learning by examining the change in teacher behaviour as a result of the programme. Another way suggested by Kirkpatrick (1994) is to examine the effect on student learning as a result of the programme. A programme that focuses on pedagogical content knowledge is more likely to directly influence student learning than programmes that focus on other aspects of the teaching process.

What is to be taught is guided by a national, regional, district or school-based curriculum. In the digital age teachers will be likely to continue to need knowledge of the curriculum they are to follow, though the nature of the curriculum may be different. This is explored further in the next chapter.

KNOWLEDGE OF EDUCATIONAL PSYCHOLOGY

A teacher in the digital age will draw on their knowledge of educational psychology when making teaching decisions. They will understand motivational and behavioural theories and be able to apply appropriate strategies to engage students in learning. For example, an awareness of value-expectancy theory can be applied to teaching when introducing a learning unit by making the learning relevant to the lives of the

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students. If the students can recognise the value of what they are learning they will be more motivated to apply metacognitive strategies to monitor their own progress and ensure their success. A digital age teacher will make the learning the focus rather than the task. In the poetry learning unit described in the previous chapter the teacher would be emphasising how the use of literary techniques once learnt can be applied to poetry, song lyrics and other literary endeavours. This is a different focus to emphasising the task, the writing of a poem. A teacher who has a strong learning relationship with their students will establish where their interests and motivations lie and use this to help the learner to make connections between their learning and their life. Value-expectancy theory recognises that learners balance the value placed on learning with their expectation of success. If learning something such as how to use literary techniques to write original song lyrics is considered high value in teen culture then the high level of motivation will allow the students who may doubt they are able to develop their literary skills to persevere and the teacher can continue to set challenging learning tasks. If students see little value in learning literary techniques and the task appears daunting, a simpler achievable learning goal would be necessary to motivate the students. Therefore the skilled teacher needs to recognise the level of difficulty and scaffolding that will challenge the learner without demotivating them, which balances the value they place on the learning with their expectation of success (Figure 1.3).

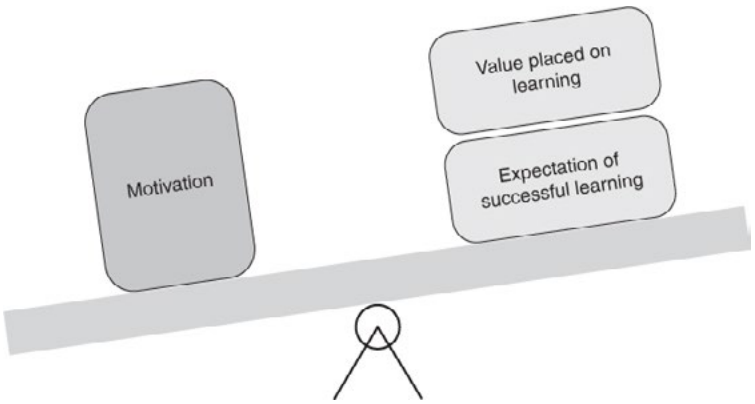

Figure 1.3 • Value-expectancy theory.

In an ideal world the students would place a high value on every learning focus. In reality not all concepts or skills that students need to learn to participate effectively in society are highly valued by all learners. A challenge for the digital age teacher is to maximise the students' perceived value of learning through making explicit connections between the learning and the students' participation in society. The

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teacher who can maximise the perceived value of the learning will be able to place greater learning challenges before the students.

An understanding of how memory works can inform teaching decisions. A teacher can incorporate learning activities which require students to become emotionally involved in the learning. This can be useful when learning aspects which require memorisation. This type of learning activity in which students can apply creativity and individual preferences will be remembered long after they have moved on from this class, especially if the students had become emotionally involved in developing their business. Emotional memory tags are thought to help students, particularly young adults, to remember situations and can be useful in education (Richter-Levin and Akirav, 2003).

Teachers are familiar with behavioural theories including the use of extrinsic and intrinsic rewards, behaviour management strategies, and group learning theories. To effectively apply motivational and behavioural theories the teacher establishes and maintains a learning relationship with their students.

KNOWLEDGE OF LEARNERS

The teacher is the adult and mentor in the learning relationship and therefore has the leadership role, responsibility and accountability for their students' learning. By drawing on educational psychology, behaviour management strategies and a focus on developing an effective learning environment, the digital age teacher will develop the learning relationship with each student.

Developing a learning relationship involves not only accessing the learning history of the students being taught it also involves building trust and an understanding of the interests and motivations of the learners. Such a relationship develops through the learning process as the students see the teacher taking an interest in their individual learning needs and giving feedback on how they can progress their understanding of concepts and skills.

There are many aspects to recognising and teaching diverse learners. Students each have one or multiple identity, culture and language which reflects their experiences and the context in which they live. From their families they will have had particular perspectives, values, behaviours, and principles instilled. In diverse societies there can be considerable variation within each cohort of students. It is a challenging task for a teacher to have all their students developing understanding of the concepts

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being taught when they have diverse funds of knowledge (Hogg, 2010). The learning relationship with students and their families can provide the knowledge the teacher needs to be able to teach and respond to diversity amongst learners.

A student's culture, identity and language are important to how they approach and value school learning. Students are able to make connections between learning and their participation in society when they can see that their identity and culture is respected and understood (Ministry of Education, 2008). While students may have multiple identities that they draw on, particularly during adolescence, the skilled teacher is able to acknowledge and reflect consideration of these through the teaching and learning process.

CONTEXTUAL KNOWLEDGE

Pedagogical decisions will be informed by knowledge of the context in which the learner is situated and where the teaching occurs. In the digital age the context may be broader than the local physical environment; it could include a virtual or global environment. Learners may not be situated in the same physical location as the teacher, in which case the context for the teaching and learning may be an online environment. A context is made up of resources, policies, procedures, goals, culture, identity and language(s).

Each context has access to resources which can be used for teaching and learning. This includes people and places in the local community, books, libraries, educational resources such as posters, blocks and models. Through the Internet, people and programmes can be accessed and used as teaching or learning resources. Computerised adaptive learning programmes that guide learning according to student responses to tasks can be useful learning resources especially when data on student learning progress is linked to learning records.

The types of educational digital resources that will become available to teachers and their students are difficult to predict, but it is likely that there will be exponential growth in the range as technologies advance. There is scope for simulation and virtual learning environments to be available to help students learn concepts and skills, and to enable collaboration and evaluation. Such an exponential growth in accessibility and affordability of digital resources may be perceived as making the job of teaching easier. But the digital age teacher will be evaluating each resource to consider whether it will be the best tool to use for the learners and the teaching aims. Selecting and using appropriate learning tools from a wider range may

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make the job of teaching more complex rather than easier, although it is likely that teachers will share knowledge and experiences through their professional teacher networks.

The context of teaching and learning will be guided by policies and procedures. There will be procedures or ways of doing things for that particular context whether a physical or a virtual context. A teacher or student who changes from one school to another will find that there are differences between the schools and it can take a while to learn the unique way that things are done in a particular context.

Policies are set at a school through to national level. A school will have policies that the teacher is expected to follow in the teaching process. National policies such as accreditation requirements for teaching, the gathering of evidence of student learning or achievement, examinations and attendance, will all be taken into consideration by the teacher when making decisions about their teaching and their students' learning.

Along with policies and procedures there may be internal or external goals that have been set that informs decisions that teachers make. If a school has set a goal to have all the students creating knowledge in at least one subject per term, or a national goal is for learning to be bilingual, then the teacher will be considering how to incorporate these goals within their teaching plans.

The way that things are done in a particular learning environment reflects the culture of the context. The way that people are greeted, how they participate, behavioural expectations, hierarchical systems, how feedback is given, and the language(s) used are all aspects of the culture of the learning environment. The teacher has an important role in setting the cultural context of the learning environment and establishing the contextual identity. In the digital age students bring their own culture, identity and language to the learning environment and the teacher will take this into account as they make teaching decisions.

EVIDENCE OF LEARNING PROGRESS

In the digital age the teacher uses evidence to understand the learning needs of the students being taught (**Figure 1.4**). The development of technologies or software to record, analyse and report on student learning progress is likely to provide valuable information for teachers. Student information can be the basis of teaching plans that will progress student learning across years at school. Each student's learning history contained within the data system will be cumulative over the learner's schooling with

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each teacher contributing to the record and linking learning to evidence. As a teacher is allocated learners, they are able to explore their students' learning achievements through the data system, compare their progress over the years with others in the cohort, pinpoint their learning strengths and aspects they have progressed slowly with, and identify the context or focus of studies. Accessing a groups' rich learning data to explore patterns across a cohort can inform teaching plans that focus on the learning needs of the specific students being taught.

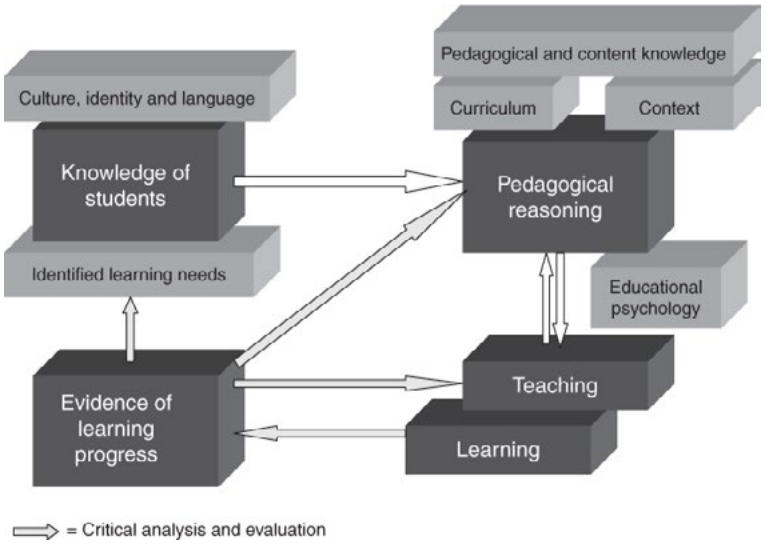

Figure 1.4 • Evidence based teaching practice.

TEACHING FOR MASTERY LEARNING

The teaching process in the digital age will prioritise learning over tasks. A range of teaching strategies will be used in the digital age, some of which may not yet be developed or named, but each will focus on student learning. **Figure 1.5** outlines types of learning focus and the associated strategies.

It is important to master the skills and concepts so that they are thoroughly understood and embedded in the mental schema to be drawn upon and used as knowledge artefacts at appropriate times. Mastery level for concepts can be considered within the context of the SOLO taxonomy (Biggs and Collis, 1982). A student may start learning the individual parts of a concept (prestructural stage of SOLO taxonomy). For example, if students are learning the concept of sustainability they may start by learning about mining and oil extraction through an interactive

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educational programme with embedded video footage. From there the teacher can teach about the limitations of the use of these resources through an interactive timescale programme, thus the students will be reaching the unistructural stage of the SOLO taxonomy where simple and obvious connections are made, but their significance may not be grasped. The students may then consider their household consumption over a week, what is brought into the household and what leaves. This could be recorded by scanning each product entering the house and mashing with the online energy consumption figures for the household. Analysis can be provided through a sustainability website. This takes the students to a multistructural understanding where a number of connections may be made, but the meta-connections between them are missed, as is their significance for the whole. The origins of each student's household inputs are considered as to whether these are mined, grown or manufactured and how sustainable these are. The students are now able to appreciate the significance of the parts in relation to the whole and are working at the relational level. The students then consider the inputs and outputs of the school, tracking the origin and destination of inputs and outputs. The students are now reaching an extended abstract position where they are making connections not only within the given subject area, but also beyond it, able to generalise and transfer the principles and ideas underlying the specific instance.

	Examples of learning experiences
Conceptual understanding	Simulation, direct instruction, using models or graphical organisers, interactive programmes, experiments, field research, modelling
Concept mastery	Inquiry or research, collaborative learning, questioning, game or quiz development, peer teaching
Skills introduction	Modelling, simulation, virtual reality
Skills mastery	Coaching, competition, peer teaching
Critical thinking	Problem solving, simulations, debating, questioning
Creation of knowledge	Problem solving, collaboration, mashing

Figure 1.5 • Learning experiences.

There are a range of instructional models based on learning mastery. The key aspects across these approaches are: clearly identified learning goals, regular feedback for students on their progress towards those goals, understanding of

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metacognitive processes, corrections and advice for students to help them progress, and a learning environment that is conducive to the students being able to meet their goals. Students who believe they can achieve their learning goals (expectancy-value theory), attribute their success to their effort rather than luck (attribution theory), and can see the value of what they are learning (expectancy-value theory) and are supported as and when needed, are most likely to be motivated to focus on learning. Teaching that is focused on students mastering concepts and skills is most likely to be successful, as this is the measure of achievement in the current system.

Mastery of the concept or skill is when the learner has a thorough understanding, they can discuss, explain and demonstrate mastery within the learning context and consider applications beyond the context. To be successful the student must be making connections between the learning tasks and the concepts or skills that they are to master. The students may be fully engaged in a learning task and meet all the set requirements and therefore it could be observed to be very effective teaching from a behaviourist perspective, but without connections between tasks and the concepts or skills students will focus on task goals, and learning, if it occurs, is incidental, dependent on task design and student disposition.

The way the teacher frames their rhetoric can orient students to learning or to task completion. A teacher who talks about completing 'work' is focusing students on the behavioural aspects of learning at school. Alternatively, a teacher who talks about learning progress, weaving the concepts, methods, or skills being mastered into classroom rhetoric, is focusing students on thinking about their learning and making connections. Teacher orientation can be reflected in the expectations of the behaviour within the learning environment, whether it is a place for compliance ('behave in a way that lets the teacher teach') or for learning ('behave in a way that allows yourself and your peers to focus on learning'). Digital age teachers prioritise student learning progress in their rhetoric and as they make pedagogical decisions.

DIVERSITY IN LEARNING

There will be diversity in the speed and depth at which learners learn skills and master concepts, which creates complexity in the process of teaching. Teachers are expected to meet the learning needs of all students and all students are expected to achieve curriculum outcomes. This causes tension due to schooling structures and diversity in the student population (Slavin, 1987). The curriculum sets the expectations of student learning.

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A curriculum designed with expected outcomes aligned with ages of children may be underpinned with a norm referenced expectation of student achievement. The expectations in such a curriculum may be that students do some learning around each of the stated aims with some reaching mastery level (**Figure 1.6**).

The creation of knowledge requires mastery of concepts and skills and a further exploration of these, including the mashing together of different concepts. A digital age curriculum may set the minimum level of learning for all students at mastery. A teacher using such a curriculum would plan learning experiences so that those learners who reach a mastery level first will be applying the concepts and skills they have mastered to develop knowledge further. Learning experiences include sufficient assessment opportunities to enable appropriate monitoring of student progress and subsequent teaching to ensure all students reach mastery level. It may be that not all students begin to develop knowledge which provides flexibility within the students' learning experiences (**Figure 1.7**).

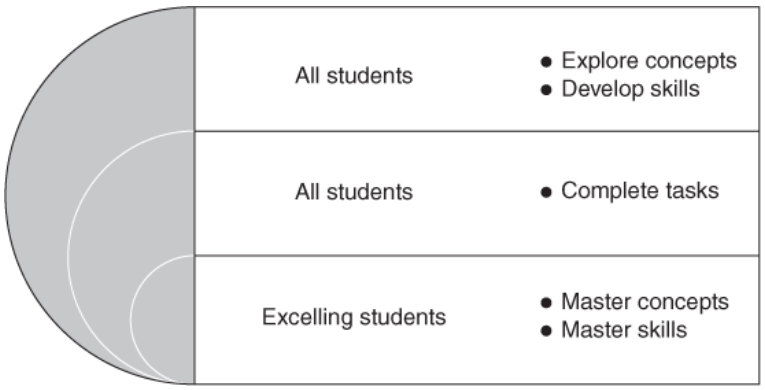

Figure 1.6 • Differentiated learning outcomes in teacher centred model of schooling.

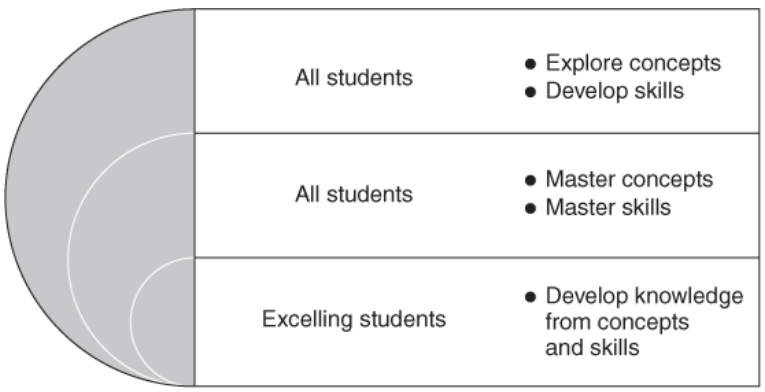

Figure 1.7 • Differentiated learning outcomes in learner centred model of schooling.

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The effective teacher in the digital age teaches in a way that encourages mastery learning and knowledge creation, builds learning relationships, makes teaching decisions based on evidence and guides student learning through targeted formative feedback. Being aware of student learning progress informs the teaching practice.

EVIDENCE BASED TEACHING

A teacher in the digital age gathers, analyses, and uses evidence of student learning throughout the teaching process. Student learning is an ongoing process and the teacher who is focused on learning monitors progress to report on learning, responds appropriately, and refines professional practice.

There is a range of evidence of learning that can be used to inform teaching in the digital age. Informal evidence from student 'think alouds', written or verbal responses to questions, and quiz or activity processes and results. Thinking aloud is a process used in educational research to explore the thinking processes explained by Ericsson (2006). A student verbalising what they are thinking as they are learning or carrying out a task can give the teacher valuable insight into their understanding and what to teach at that particular time. This can be a digital attachment to the learning task. The more formal evidence can be downloaded through interactive educational programmes which guide student learning, quizzes, tests and examinations which the students undertake during the learning process along with student directed evidence of learning.

The evidence of learning will align with the concepts, skills, and knowledge creation that form student and teacher negotiated interpretations of the national, regional or local curriculum. The data that is incorporated into the student learning record will need to be robust if it is to be useful. The teacher will be experienced in gathering evidence of learning against curriculum benchmarked concepts, skills and knowledge creation. The student record will reflect ongoing learning progress.

If the students are learning about the concept of entrepreneurship their record of learning will include whether they have learnt the components of the concept such as advertising, original design and profit. It will link to an example of when the student demonstrated understanding of these and whether the student was able to draw these together to explain entrepreneurship in one or more contexts, or ultimately to demonstrate entrepreneurship and explain how the concept is linked to decisions the student made. At the appropriate place in the record of learning notes about how the student understood the concept would be made which may include a link to a sample

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of student work that demonstrates their learning or progress towards understanding the concept. This may be recorded directly if the record of learning is mashed with educational software.

A digital record of learning will be similar to a medical record. It will belong to the student and be accessible to the student, their family and the school or learning organisation to which they are enrolled. A student's record will include progress against benchmarked curriculum levels, national cohort comparisons, and learning goals which are negotiated between the teacher, the student and the family based on evidence of learning progress.

Attached to each student's record will be links to knowledge created and debated beyond the learning environment. In the digital age exemplars of a student's learning can be collated by the learner who can download a sequence for a specific purpose from his or her record of learning. This idea builds on the notion of a portfolio which emerged in the paper based pre-digital environment.

ANALYSIS

Evidence of learning progress will be analysed and reported to the student, their family, the teacher and the management team at the school. Analysis is done on an individual student basis.

Evidence of student learning will be analysed. It will be evaluated against expected progress which can be plotted based on national data averaged over the years or the individual student's negotiated progress. Individual learning progress results will be discussed with the teacher and the student. The evidence can be used to set future learning goals and inform the individual students' learning programme or feedback being given.

The teacher will analyse the cohort data prior to teaching students to inform the decisions about content, context, and levels of learning activities and expectations of students. The cohort data will be tracked over time to see if the learning progresses at the expected level. They can also check to see how the cohorts progress in one year compared to other years and compared to different teachers. The teacher will analyse data and explain or explore why any results differ from expectations and adjust teaching to maximise learning when appropriate. On some occasions the learning may be occurring in areas that are not being measured, so the evidence

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base needs to be flexible enough to recognise learning that occurs beyond the specific aspects within a curriculum document.

The school management team will use the evidence to analyse data to set policies and goals for cohort or school wide goals. The student learning records can be collated to compare learning progress within cohorts, comparing groups such as those taught by different teachers, different subjects, cultural or ethnic groups. Student achievement can be compared from one year to another tracking the same cohort to compare how they achieve over time within individual subjects or learning areas.

The teacher can also examine cohort learning data to identify any aspects in which they need to improve, or aspects in which they excel.

USING EVIDENCE WITH STUDENTS

As the teacher examines student learning they make judgements on what has been learnt and what the student should learn or master next. Research that explores effective feedback on learning has identified a number of features that can help learners.

Clarke (2001) examined how students responded to teachers' written feedback and found that too many criteria made it very difficult for specific feedback to be given and students were overwhelmed when too much information was included. In the digital age student feedback on learning, whether written, verbal, or automated through a programme should be specific to the learning or criteria, be co-constructed and highlight learning achievements, and guide the student to the next aspect to learn and how to learn this.

The content of learner feedback is important. Pat Tunstall and Caroline Gipps (1996) developed a typology of teacher feedback by recording and classifying the feedback given by teachers to students. They classified feedback as either evaluative (involving a value judgment) or descriptive (describing what the student said or did).

Evaluative feedback involves a judgement by the teacher based on implicit or explicit norms. For example: 'That's a good essay' or 'You've done well'. This type of feedback can have a short-term motivational effect on learners, but it is unlikely to help the learner to develop their understanding of concepts, skills or construct knowledge.

Descriptive feedback makes specific reference to the student's learning progress. An example of descriptive feedback would be: 'That's a good advert because you

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have made connections between the product and the target market and explained your thinking behind your choice of images. Now ¼ which aspects could you animate to maximise the appeal for your target market and how will you know if your advertisement is likely to be successful?' This feedback requires the student to respond to the next learning steps and consider how they will achieve their learning aim.

The teacher who is giving formative feedback on the collaboration and creation of knowledge in the digital age analyses student progress in the virtual or physical learning environment. Effective feedback to the student is focused on the student's learning progress and uses the criteria and language introduced and developed between the teacher and the students. If new language is introduced it is discussed and explained and a common understanding of terminology established.

Quality feedback:

- is focused on learning;
- occurs as the students are learning (timely);
- is descriptive, with specific information;
- is framed within the context of student learning progress;
- is a discussion with co-construction rather than 'telling';
- is strategic to help the student to learn.

The judgements that a teacher makes about student learning and the relevant feedback to be given are a professional response based on their knowledge and training. Samples of these decisions are moderated and discussed through formal and informal teacher networks and difficult decisions can be made collaboratively within the teaching profession. Teacher professional knowledge is created and developed through discussion, research and debate around core decisions about the use of learning evidence.

When a teacher has comprehensive pedagogical content knowledge they are able to help students to learn and construct knowledge more effectively than when their decisions are based on generic pedagogical knowledge. A study of beginning teachers found that strong substantive subject and pedagogical content knowledge enhanced their confidence and ability to be innovative in teaching approaches and responsive to their students' learning (Starkey, 2010). A teacher without substantive knowledge of the subject they are teaching will be limited in the feedback they are

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able to give their students and may not be aware of their limitations. Without the substantive knowledge of the subject student learning may be limited to either discovery or inquiry type learning which focuses on task completion or students working methodically through a textbook or computer adaptive program. These teaching strategies can give students a basic understanding of a concept or skill, but the teacher will struggle to be responsive to ad hoc student learning needs or extend learning beyond the tasks. The teacher is likely to lack confidence to be innovative or flexible in their teaching approach and unable to give direct teaching or targeted formative feedback to students on their learning about the nuances of the concepts and skills within the subject being taught.

Teachers who are responsive to students through an autonomy-supportive learning environment encourage intrinsic motivation by enhancing student control over their learning progress. Conversely, research by Benware and Deci (1984) found that students who are overly controlled not only lose initiative but also learn less well, especially when learning is complex or requires conceptual, creative processing.

Evaluating teaching occurs at many levels in the digital age. The teacher reflects during the teaching process on how well students are learning and what they can do to help students to learn. At regular times during the year the teacher will evaluate individual and cohort learning against expected progress. Learning will also be evaluated against cohort and school goals or targets.

TEACHING IN THE VIRTUAL LEARNING ENVIRONMENT

Student cohorts can be more fluid in the digital age. Students from different locations can be grouped together with a teacher or teachers to learn through online learning environments. A teacher may have a special interest learning group, students isolated or at a distance from education or connected for other reasons. The potential for individuals to collaborate through global connections available through digital technology and the Internet enables geographically diverse people to form like-minded groups. Anderson (2006) examined the impact of the Internet on sales and marketing of products which would not be viable in a small geographically bound community. He found that in a global community the market for special interest products such as a particular type of music or book can become profitable and accessible, hence the success of Amazon. He called this phenomenon 'the long tail'. When the long tail is applied to learning rather than the market situation, it means that through the World Wide Web, learners and knowledge creators are able to

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connect with others in the world with similar interests, to critique and give feedback. The long tail can be applied to school age education, where young people can connect with other learners with similar passions, talents or learning needs.

Teachers with students in a virtual learning environment apply the same teaching principles as those who are teaching their students within the same physical environment. They establish a learning relationship with their students and base their teaching decisions on evidence about the learning needs of the students, the curriculum and the context. They establish goals for each student's learning and monitor their progress, co-constructing, giving feedback and coaching or advising as needed.

SUMMARY

Effective teachers in the digital age context will be part of a highly skilled profession focused on student learning. The teachers will have strong content knowledge appropriate for the level and subjects being taught, pedagogical content knowledge, the ability to cement learning relationships, and understand how to gather, analyse and apply learning data within their teaching practice. Digital innovations provide communication tools, electronic evidence management and analyses systems and will continue to be developed to enable and enhance the process of teaching and learning.

The process of teaching will have digital technologies integrated at different levels and stages. The availability of evidence and analysis of student prior learning, current, and anticipated progress is likely to be a revolutionising aspect of the development of the teaching profession. The ability to instantly access annotated evidence and analysis of what and how students have learnt about a concept, principle, method, or skill will help teachers to plan, co-construct and guide student learning experiences. The teaching process will be flexible to be responsive to evidence of student learning progress as they strive to master skills and concepts and create knowledge.

The range of and flexibility of digital learning resources that will be available will enhance the teacher's ability to select appropriate learning experiences that meet the curriculum objectives and identified learning needs of the students that they teach. Understanding how to build effective learning relationships and be culturally responsive will continue to be important features of effective teaching.

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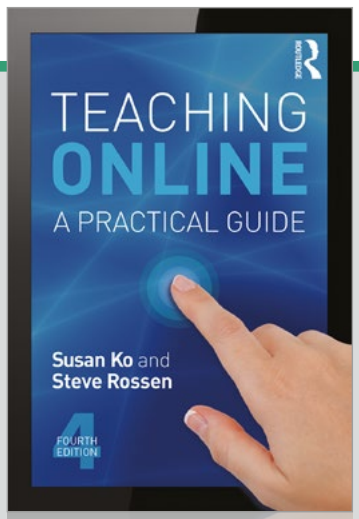
The teaching profession will develop through being connected. Professional discussions, which can be facilitated through digital technologies, help share and develop teachers' collective knowledge. Such discussions will focus on priorities for digital age teachers, which include: student learning, conceptual understanding, skill development, knowledge creation and evidence based teaching.

CHAPTER

2

TEACHING WEB-ENHANCED AND BLENDED CLASSES



This chapter is excerpted from

Teaching Online: A Practical Guide, 4th Edition

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Although we've discussed issues as they pertain to "blended" classes throughout the book—classes that combine online and face-to-face activities—this chapter focuses specifically on them as well as those in which online elements play a merely supplemental role to the face-to-face class. You may find that material that was discussed in the context of the chapters in which it occurred is here summarized or treated in greater depth.

Today, the use of the internet by instructors is broad and varied. Some universities maintain their own "channels" on YouTube and their faculty use it to host video course introductions or to stream video versions of some of their on-campus lectures to the internet, while other instructors schedule just a few online discussions throughout the semester and post their lecture notes, while still others teach classes that regularly meet online one week and on campus the next. How can you best integrate the online and face-to-face elements of a class? What factors should you think about? Are there any pitfalls to avoid? To answer such questions, we'll try to offer helpful tips for blended classes as well as for integrating online tools for a primarily face-to-face class.

Let's look for a moment at those instructors who make minimal use of online. Perhaps they teach a traditional on-campus course but maintain some sort of online presence for the course. Typically, such websites, blogs, or site in their institution's LMS contain a course syllabus, a schedule of required readings and assignments, a listing of the course office hours, and some hyperlinks to relevant websites in the instructor's particular subject area. They may also include a link to a discussion board which may be entirely an optional area, with students deciding whether to use or not use the site. In these cases in which students seldom look at the website, the situation suggests that the instructor isn't using online resources and tools to maximum advantage. If asked to provide a reason why their online sites are so lightly utilized, instructors might cite their students' lack of reliable access to the internet from off campus (a typical complaint for developing countries), or even a lack of interest on the part of students who are having their instructional and social needs met on campus. Instructors may also say that because of their own workloads, they don't want to spend more time creating material to post online or moderating instructional activities or communications there. They may even express the fear that if they use online resources more extensively, their students will no longer have a reason to come to class. In other words, instructors are asking why they should work more for the same pay, doing something that perhaps threatens their livelihood. The ultimate answers to this question are beyond the purview of this book. Academic

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senates and other faculty organizations, institutional administrators, and union representatives must work them out. But we don't believe that using the internet and online tools effectively requires you to labor twice as long for the same pay. We do think that it can improve the way you teach your traditional course. To that end, this chapter will also provide some practical suggestions for this skeptical audience.

As previously noted in this book, the Online Learning Consortium (formerly Sloan Consortium) definitions of Web Facilitated (what we call "enhanced" here), Blended/Hybrid, and Online are based on the amount of content delivered online. They term "Web Facilitated" as those courses with 1–29 percent of content delivered online; "Blended" courses as those in which 30–79 percent of the content is delivered online but still require some face-to-face meetings; and true "Online" as containing 80 percent or more online content with few or no face-to-face meetings. But another way to approach this is to look at the types of instructional activities carried out online and whether or not they are required or the degree to which they replace face-to-face time. (Still persistently termed "seat time" by many.) For the purposes of this chapter, we will use the following definitions:

- *Web-enhanced*. A broad category of courses with associated websites, mobile apps or online tools, or learning management system class sites that contain materials relevant to the course (perhaps a syllabus, a list of web-based resources, a course calendar, a reading list, lecture notes or video lectures, discussion board, and/or real-time online meeting functions and chat). Actual online activities may be required or optional.
- *Blended*. Courses in which both online and face-to-face instructional elements are required and complementary. A sizeable percentage of content is delivered online, there are required online student activities, and a significant portion of the student's grade is based on online activity.

TIPS FOR TEACHING WEB-ENHANCED COURSES

While we want to focus first on those teaching web-enhanced courses, readers who are mainly interested in true blended courses may find that many of the following tips are also relevant to their needs.

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POSTING LECTURES ONLINE

The matter of online lectures is probably the biggest bugaboo teachers face when considering whether to use the internet. Why should students bother to come to class if they can simply read (or view video versions of) the lectures online?

Most lectures consist of a body of core material, factual or introductory in nature, followed by a discussion of more complex issues, proofs, or processes. The core material constitutes the main dish of the lecture. It's usually this material that students are expected to know. The other material serves as side dishes, which help differentiate the A students from the B and C students. If the core material were posted online, enriched by graphics and charts (perhaps with a few links to other relevant material available online), students would be relieved of the chore of reproducing this material word for word in their notes. That would allow them to concentrate on the finer points of the lecture. In other words, posting the lectures online frees the students to concentrate on what is being said.

Yet that argument still raises the question: Why should most students bother to come to class?

The answer may have something to do with preferred learning styles. Some students learn better or are more readily engaged by listening and taking notes. Others do better by reading rather than by listening to lectures, and a third group seems to benefit by doing specific assignments based on the material covered. In that sense, posting lecture notes online helps some, but not all, students.

But the answer goes deeper still. It involves the basic approach to lecturing. Perhaps you need to rethink how you use your face-to-face time with students.

A REVISED APPROACH TO LECTURING

Admittedly, an instructor who posts lecture notes and reads them aloud in class may be in danger of putting students to sleep. But if the lecturer alters what he or she does in class, relying on the fact that the material is freely available online, then the experience of attending class may have a different meaning. This approach is often referred to as "**flipping**" the class and it is a model that may be implemented as part of a web-enhanced or a blended course. This means to free up class time by moving more of the instructor's lecturing and presentation online, and to replace that face-to-face class time with student activities, peer-to-peer interaction, and individualized attention from the instructor.

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Say that the assignment for the week is to read the core notes posted online, along with whatever textual material supports it. In that case, instead of spending the first twenty minutes or so reviewing the core or introductory material, the instructor can concentrate on a particularly knotty issue or complex concept, examining it, elucidating it, debating it in class. Those students who have read the material beforehand will gain a deeper insight into the concept. (Of course, those who have not read the material will have considerable difficulty following what's going on. One hopes they will get the message and come to the next session better prepared.)

Online lectures offer other advantages as well. For the instructor, posting lectures can be an aid in reevaluating older and possibly out-of-date course materials, improving organization, coherence, and comprehension. For the students, having the core portion of the lecture online provides an opportunity to review the material in its original form (rather than using their scribbled notes) or to catch up on material they may have missed because of illness or absence. Putting the lectures and lessons online also means that students can more easily work through the material at their own pace, then come to class prepared to delve into the issues at greater depth or to translate their newly gained information into hands-on activities.

> **Important! The point here is that posting your lectures online is neither a panacea nor a threat. It depends entirely on how effectively the online material is integrated into the class and what you do with the freed up face-to-face time.**

HOW TO POST YOUR CONTENT ONLINE

Posting your lecture notes or other content online does add to your initial workload, particularly if you've never prepared your course this way before. But once you've done it, you'll find it comparatively easy to update your notes the next time you teach the course. There are more and more choices available to accomplish this, which were discussed in Chapters 6 and 9 in some detail. You may post your lectures by uploading PowerPoint, by creating a PDF version of your word-processed documents, by writing directly into your learning management system content area, or use one of the free sites mentioned in earlier chapters to create course web pages or a weekly blog posting. You may also use one of the many Web 2.0 programs already mentioned in this book to create narrated slides or an audio or video lecture. You may want to experiment with these diverse ways of offering lectures before deciding on one that is easiest for you to create and for your students to access. If your institution provides for lecture capture, you may opt to post the video of your lectures originally delivered

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in the classroom. However, the latter is probably the least motivating in terms of persuading students to come to the live lecture although it may serve to help students review the material.

Give your students a reason to come to the face-to-face class— either use the face-to-face time to do more than lecture or use the face-to-face lecture time to provide more depth or focus to your lecture, and leave the background information or broad overview, additional examples, resources, etc. to be accessed via the online class site. Then tell your students what the plan is—what to do online before coming to class, and what to do afterwards.

USING A DISCUSSION BOARD

Most classes, particularly smaller, seminar-style classes, involve discussions of some sort. Ordinarily, students prepare for the discussions through readings. In some graduate classes, students prepare "position" papers, which are then circulated to other students for their consideration before coming to class. Using the internet in conjunction with the work done in class can enhance any of these techniques. Take the case of the seminar. In order to present the topic properly, the instructor will generally introduce it with either a short lecture or an impromptu talk. The students will then offer initial reactions to the discussion topic, setting the stage for the eventual discussion. A half-hour or so may have elapsed before the discussion is really joined.

An alternative approach is to have the students post their initial reactions to a discussion topic online and read the postings on each topic before coming to class. Although this would require more work from the students, it would not increase the instructor's workload except insofar as he or she had to read the work posted to the website. What it would require of the students is perhaps a more carefully considered appreciation of the discussion topic and a greater awareness of where they stand in relation to other students in the seminar. Presumably this would make for a livelier and more informed discussion, and it would elicit remarks from all the members of the class rather than merely the most vocal.

A discussion board can be of use in large, lecture-style classes as well. For most students, "attending" such a class means finding a seat somewhere in an auditorium, staring at the back of someone's head, and listening to the instructor intone the lecture from a stage. Discussion in such a setting is usually fairly haphazard. The instructor pauses to solicit input from the assembled students. The more intrepid dare to raise their hands, while the rest sit quietly.

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The internet can humanize such a class and permit students far more interaction with their colleagues and instructors than might otherwise be possible. An instructor can divide up the class into groups of twenty or so, depending on the number of TAs or assistants available. The instructor with a large class and no assistance might even devise a system of rotating student moderators who take turns facilitating their groups. Students using the discussion board will thus have a work group composed of class members whom they might not ordinarily get to know, a considerable advantage in schools where a majority of students don't live on campus, or in large universities where most students know only their dorm-mates.

Instructors and students can use these virtual study groups for a number of purposes. Students can post and discuss questions related to the material covered in class. Or, having delivered a lecture in class, an instructor might post a follow-up question, requiring the students to formulate an appropriate response as part of their grade. These responses might then become the basis of a future class discussion or lecture. They might also serve as an archived resource for students reviewing the material.

An instructor can monitor the comments posted in the discussion groups and use them as the basis of a frequently asked questions (FAQ) page containing general answers to the students' more noteworthy queries and concerns. This will save the instructor the extra time of having to respond to the same question over and over again, either by email or in one-to-one advising sessions. Finally, if the instructor creates some relevant and focused initial discussion prompts, the discussion group postings can provide the instructor with valuable insight into how effectively the material in lectures has been conveyed.

ENLISTING TECHNOLOGY IN YOUR FAVOR

Much has been made of the ubiquity of laptops, tablets, and smartphones (some of which are as large as tablets) and the distraction these pose to students in the on-campus classroom, taking attention away from the lecture or other activity that the instructor has so carefully prepared. Rather than fight it, try to enlist technology in your favor. This goes beyond the "clicker" personal response systems many universities have introduced on campuses whereby instructors can poll students or ask them to contribute questions. Why not make something on the internet the object of your attention (for example, a photograph representing a current event, or a video) and ask students to log in and take five minutes to post their quick responses in a chat. Then display the chat and its results and discuss the issues. (For those students

who may not bring an electronic device to class, you might provide the option of logging on after class to an asynchronous forum you have established to add their responses to those of their classmates.)

Similarly, there are ways to take advantage of the popularity of social networking sites like Facebook. However, be careful to allow students to preserve the boundaries between social interaction and "official" class participation. You can create a special Facebook group to communicate with students, or ask students to create a limited class profile with appropriate privacy settings for participating in your class.

However, start by deliberating what you would like to accomplish and then try out those activities of interest to you within Facebook to judge for yourself whether it would be easier to use a learning management system or one of the other sites mentioned in previous chapters rather than Facebook for your purposes. It may be that you decide to use Facebook primarily for community-building activities for the class or as a way to update students on the class activities.

If your subject matter involves current events, you might want to highlight topical exchanges on Twitter to discuss in class or assign students to search for relevant subjects. Because students do not need to register on Twitter to read what is being tweeted, this can be a great way to widen the classroom conversation. Beyond that, you have many options, depending on whether you or your students register on Twitter and how comfortable you are using Twitter for instructional purposes. For example, you can create a hashtag (#) for your class, and encourage students who want to tweet their comments (during or after lectures, for example) to do so using that hashtag. If you prefer more privacy, you can make your own tweets protected so that only those you accept as followers (your students) can see them (this does mean that students must sign up on Twitter). You can display Twitter on a screen in your classroom and ask students to use their mobile devices to take part in a short real-time exchange "chat" on a topic. All these are possible ways to leverage technology to enrich your classroom time.

USING ONLINE QUIZMAKING TOOLS

If your course is enhanced or blended, you presumably can conduct your high-stakes testing in a proctored on-campus environment. But online quizmaking tools can provide valuable assistance by permitting you to construct self-grading quizzes online. Most learning management systems contain this feature. They permit you to construct a quiz consisting of true/false statements, multiple-choice questions,

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one-word answers, multiple answers, matching answers, ordered answers, or short or long essay questions. Even if your institution offers no access to learning management systems, you can make use of the numerous free quizmaker tools available online.

Students taking these tests can receive immediate feedback. This feedback can consist of a simple "correct" or "incorrect" message, or a statement explaining in detail why the student got the answer right or wrong. Questions can include embedded graphics. Depending on the software, they can even include sound or video files you've made, or links to such files that you found elsewhere on the internet. Another use of such online quizzes is to provide sample practice exams for students to use to prepare for midterm or final exams. Using one of the quiz generators, the instructor can provide answers as well as focused feedback, so that those taking the practice exams can learn from their mistakes. As with the preparation of lecture notes, creating quizzes can be time-consuming at first and then save you a great deal of trouble the second time around. One caveat, however: be sure to save the questions and answers in a word-processing file of your own. Sometimes institutions change their learning management systems, and it isn't always possible to import a set of questions in one software system into another.

PROVIDING ADVICE AND SUPPORT

Providing counseling, advice, mentoring, and support is part of the job of teaching. Instructors list their office hours in their syllabi and, once or twice a week, sit dutifully behind their desks waiting for someone to knock on their door. All too often, nobody comes, leaving the instructor to wonder about the utility of sitting in an office for two hours a week. For some, the meager trickle of students is an opportunity to catch up on paperwork. Some may see it as a testament to their pedagogical skills—a sign that students aren't having any difficulties. To others, however, the lack of office visitors is a warning signal that something may be wrong—either the allotted time isn't convenient or the students don't feel they are getting what they want from the course. Using two of the online tools readily available to most instructors—email and instant messaging—can improve the flow of communication markedly. Instant messaging applications have become so sophisticated that it is possible for you to have something closely akin to an office hour conversation. Depending on what tools you and your students have, and your own preferences, you can use Skype, FaceTime (with Apple iOS users), Facebook Messenger, What's App, or other popular free messaging tools to talk with individual students via text, voice, or video. To preserve

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your own privacy, use a service that allows you to set up a separate account that you can use just for teaching, or ask your institution if it is possible to create an institutional account.

CONFERRING WITH STUDENTS ONLINE

With email and instant messaging, instructors can respond to student inquiries at a time and place of their choosing, leaving them freer to structure their activities during the day. Students can submit their inquiries as the need arises—for example, in their dorm room late at night when they're studying.

But shifting the counseling load to online has its obvious downside as well: it can significantly increase the instructor's workload if it isn't kept in check. To control your workload, we suggest the following guidelines, some of which we've recommended in earlier chapters as part of establishing a protocol for communications.

- Set strict parameters for responding to emails and other online messages and make these clear to your students in both your syllabus and your class. For instance, make sure your students understand that although you will accept emails from them, you will not necessarily respond to each one immediately and that you may provide responses to a question in the classroom if you see it is one that has been repeatedly posed. (A good reason to create a Q&A discussion forum online.)
- Specify which kinds of problems you will respond to: for example, personal problems, requests, or issues; or difficulties comprehending the subject matter. Steer clear altogether of administrative issues, such as dates for upcoming tests or questions about homework. Such information is either available in the syllabus or more properly discussed in an online or on-the-ground discussion session. State that you will respond most quickly to emails whose chief issue is clearly identified in the subject line of the communication. This will save you the trouble of having to read through the entire email to discover the problem at hand. It will also allow you to forward a student email to a TA or assistant when appropriate.
- Respond to a problem you perceive as being potentially a question for all by sending one email to your entire class, or by posting an announcement in the online classroom or by compiling a FAQ page with your answers and post it on your website. Finally, depending on the complexity or private nature of the issues to be discussed, know when to move the conversation to a face-to-face meeting or an online real-time communication. If you are teaching a blended or web-enhanced course, there is likely to be a time that you can arrange to meet with the student. Then follow up the face-to-face or online real-time meeting with an email

in which you summarize the conclusions of the conversation. Doing this will provide a record of your advice or decisions made during that conversation.

ESTABLISHING VIRTUAL OFFICE HOURS

Whether you establish contact with individual students via one of the messaging apps already mentioned or use an online chat program that is designed for use with a group or individuals, by conducting virtual office hours you can, for instance, lighten your advisory load, or at least make it less onerous, if you use it in a focused way. Say, for example, that you tell your students that you will be available for consultations for an hour or two on certain days. If you're in your office, or even your home, you can open a chat session, leaving the chat window visible on your screen. As you wait for students to check in, you can do other work, glancing at the screen now and then to see if anyone has arrived.

Once a student has arrived, your conversation (depending on the tool you're using) can usually be logged; that is, a record of your conversation is automatically saved to a text file. This permits you to edit the text file at some later date, extracting material for your FAQ page. Check the capabilities of your chosen tool for saving a record of the interaction.

Some chat software tools include a whiteboard function. The whiteboard, as you may recall, is a communal area where an instructor can draw or type. The students in the chat session can then discuss the instructor's display or present material of their own as part of the online give and take. Such software tools permit you to display in the whiteboard area any document on your hard disk (such as a PowerPoint presentation or an Excel spreadsheet) or any web page you have bookmarked; you can do this simultaneously while chatting with your students. More impressive still, the students can do the same thing. Thus you and your students can see the same documents, web pages, or applications at the same time that you are discussing them.

Today's instructor now has a broad array of communication tools with which to conduct advisory or small-seminar sessions with a class whether or not their institution provides such tools. See some of the tools described in Chapters 6 and 9 if you need to select one for your class. It's best to try out these tools well in advance and make sure you are comfortable with their operation. If you have a real-time communication tool that is bundled in with your LMS and students are accustomed to using it, this might be the best solution. However, the very best solution is the one that is easiest and most likely to be put into use!

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ASSIGNING GROUP PROJECTS

One feature commonly available in most learning management software is the ability to divide large classes into small student groups, affording them a private area online in which to collaborate on the production and publication of group projects.

In these private areas the students have access to the full panoply of online tools—message boards, chat rooms, and whiteboards. They can create information, format it, and share these newly created items with each other, unseen by the rest of the class. This gives them a virtual workspace, permitting them to work together on a schedule convenient to them—a particular advantage to students with busy schedules or difficult commutes. It also permits you as the instructor to assign group collaborative projects with the assurance that they won't overwhelm the students' time or capabilities. Many institutions and learning management systems also provide wiki software for such group collaboration purposes.

In a small private college, using a discussion board or other tools to promote online group work may seem superfluous. But in a large urban school, where students commute long distances, have jobs, or are raising families, the opportunity to work online overcomes a number of logistical obstacles while at the same time affording a level of intercommunication that wouldn't otherwise be possible. It also helps students learn how to collaborate with one another, a communication skill highly valued in the workplace.

Access to online group collaboration tools may permit you to assign more complex research projects than you might have before. By dividing the workload, students can tackle problems of much greater complexity than might have been possible if the assignment were for one student alone. With adequate preparation and planning, students from different institutions, cities, and even countries can connect online and may be able to work together collaboratively using the same set of group tools. Finally, the group projects can be released for viewing to the whole class and form the basis of a vigorous face-to-face or online discussion. To explore this subject further, see Chapters 6 and 7 for discussion of some of the specific options available for group activities.

ONLINE AS A STUDENT PRESENTATION MEDIUM

The online environment is a powerful presentation medium, and it can be used in both web-enhanced and blended classes to display work created by students as course projects, either individually or in groups. Some instructors understandably

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prefer the more traditional means of expression, such as the research paper or the PowerPoint slide show delivered in front of the class. Frequently, however, an inordinate amount of classroom time is required to present such projects to the class. How much more efficient it can be to have students present their work online instead.

Using the online medium to present such reports permits students to use a wider range of media to make their points. Students can create videos, narrated slides, blogs, and web pages replete with graphics, sounds, animations, and links. Students can be asked to create an ePortfolio of their best work from the semester. Even without such multimedia embellishments, student work artifacts posted online can be viewed and evaluated by all the students before or after they come to class, leaving more face-to-face class time for discussion, analyses, and critiques.

Assembling such projects should no longer be considered a hardship for students. In most cases, it is a skill they can master easily, and one they ought to learn. Using simple, menu-based Web 2.0 type tools described in earlier chapters, they should be able to assemble relatively sophisticated presentations with ease.

WEB-BASED EXERCISES

The internet is so rich in potential learning materials that traditional instructors would be depriving their students of valuable educational resources if they ignored it altogether. No matter what subject you teach, be it molecular biology or cultural anthropology, a multitude of sites can provide you and your students with information, simulations, or resources to consider, critique, analyze, or discuss. A list of some very useful sites on the internet to search for such resources is provided in the Guide to Resources at the end of this book.

Aside from visiting informational websites, students can participate in global science experiments, perform experiments in online labs, collaborate and communicate with students from another school, state, or nation, analyze and critique articles published online and post reactions to them in a discussion board, and meet and discuss relevant issues with a "guest host" in a discussion board or chat room.

Here are some pointers for incorporating internet resources into your face-to-face on-site class:

- Identify each site you want your students to visit by its URL, both on your website and in the syllabus. Revisit the site just before you begin teaching the class to

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make sure it's still live (sometimes sites are moved to different URLs or simply no longer work).

- Be very clear when defining what you want your students to see or do when visiting a site. Be respectful of the time they must spend online to accomplish the assigned task. Generally, you'll want to avoid the treasure-hunt approach—that is, having your students hunt for information before they can critique it.
- Avoid wasting time displaying websites in the on-site class unless it is for the purpose of discussing a specific assignment focused around that web page or it otherwise requires some explanation that can't be duplicated online. If your internet connection in the classroom is not stable, you may want to prepare screen shots of a website being used for this purpose.

TEAM TEACHING

Just as students can collaborate easily online, so can teachers. Team teaching a large, lecture-style course requires a great deal of advance planning and preparation. Traditionally, this is done in face-to-face meetings, but using the collaborative tools available on the internet can ameliorate the process, speeding up the production of course materials and easing the task of approving them once they are done.

Once a course is under way, using the internet has its advantages as well. Instructors can spell each other at certain tasks, with one instructor handling lectures in the classroom while the other publishes backup materials on the internet and replies to student inquiries on discussion boards.

In less common cases, instructors may be situated too far apart to commute easily to the physical class. Using the internet is an obvious alternative, permitting the use of "experts" to prepare online lectures, but leaving the discussions to the instructor in the on-site class.

A FINAL THOUGHT ON WEB ENHANCEMENT

In this discussion of ways the internet can be integrated in an on-the-ground class, one key thought underlies our comments.

> **Important! Making the use of the internet optional rather than incorporating it into the curriculum dooms it to failure.**

When you make the internet an integral part of the coursework, you automatically make it more relevant and valuable to your students and yourself alike. Treating the

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website, online tools, or LMS site merely as a repository for chance comments or random postings reduces it to the level of a technological appendage and squanders its considerable potential to enrich what you are doing on the ground.

TIPS FOR TEACHING BLENDED COURSES

While many institutions new to online education have surmised that the road to online teaching is made easier by first exposing instructors to blended teaching, there is little or no research that bears this out. In fact, many people who are experienced online teachers might tell you that blended courses can actually be more difficult to teach than fully online ones. Why is this? It is chiefly due to the challenge of integrating the two modalities of teaching in a way that makes both equally meaningful and effective.

Two of the biggest errors made by those attempting blended courses are:

- overloading students with a great deal more work than they would have in either a completely face-to-face or fully online course;
- not giving clear directions about what will be accomplished in each mode and how to coordinate the two.

The first issue has been termed the "course and one-half syndrome." The second is best handled along the same lines as fully online courses—with a comprehensive syllabus and schedule that clarifies how the class will operate, and with timely reminders about the sequencing and due dates for tasks.

The tips offered here in some cases reiterate principles already stated in this book and previously illustrated by examples, while in other cases, tips supply some additional information specially tailored for the blended format.

PREPARING FOR THE BLENDED COURSE

- Take advantage of any training or training resource materials offered on campus (or off- or online) if you are new to online teaching and blended learning. Look for training that not only focuses on how to use online software from the technical point of view, but also offers some insights into approaches to teaching and learning and design for a blended course. See Chapter 15 for some suggested training opportunities for blended teaching.
- Review the face-to-face version of the course if that's what you have been teaching. Consider what is best reserved for face-to-face delivery and be able to explain your rationale. Find the weakest points in the teaching experience as you

see them and consider how these may be improved with the addition of online activities and resources.

- Review the schedule for your blended class. Are the face-to-face meeting dates already determined or can you determine the pattern yourself? The first class should ideally meet face to face so that students can be fully prepared for the blended format. On many campuses, students are accustomed to thinking about the first class day as provisional, a waste of time, or not a "real" class meeting. For this reason, it is a good idea to email your students ahead of time to stress the importance of not missing this first class date. If this would seem to be a losing battle on your campus, strongly consider making both the first and second class meetings face to face.
- Generally speaking, in putting together your syllabus schedule, it's a good idea to plan discussions of the most complex materials for a face-to-face meeting. This doesn't mean that complex issues cannot be handled just as well in a fully online class, only that you may find that it will be relatively quicker for you to clear up misunderstandings if you have the opportunity for a face-to-face session. Many instructors have found that scheduling the first small-group meeting for a face-to-face meeting week greatly facilitates the rate at which groups form and establish cooperation. Some instructors also recommend that groups be scheduled to meet face to face at other critical moments in a group project. Again, this doesn't mean that the same objective cannot be reached purely online, but if you have the opportunity to convene groups face to face, you may find that it simply accelerates the process of forming groups or reaching consensus on key aspects of the project.
- Be prepared to offer an orientation to students on your learning management system or other software if this is not supplied to students elsewhere.
- Define how your blended class operates in the introductory area of your syllabus and what expectations are for students in regard to participation in online and face-to-face activities. Clarify whether the online activities are in real time or asynchronous or both. Explain how the weeks will work in tandem as a fully integrated course. Make sure your syllabus schedule clearly delineates in a graphic manner (through use of bold font or other means) those weeks in which the class meets face to face and what online activities, if any, are expected for those same weeks. (See Chapter 5 for more details about how to do this.)

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DESIGN ISSUES FOR THE BLENDED COURSE

- Pay careful attention to the transition between face-to-face and online activities. Ideally these two modes are not completely separate—*therefore, always have some online activity, no matter how minor or brief, within the week in which the class meets face to face*. For example, you might ask students to go online to the discussion board within forty-eight hours after a face-to-face meeting to continue to reflect on the topics broached at that meeting. This gives students who may be reticent about speaking in the on-campus class a chance to weigh in and it also provides an interval for all students to reflect on the preceding face-to-face discussion. It also signals to the students that what happens in these two modalities is not disconnected, but interrelated. The online work following directly upon the face-to-face meeting helps bridge the topics and activities of the two successive weeks, and can serve as preparation for the entirely online week. The opposite is also true—a carefully planned activity in the online-only week may be designed to provide essential background for the upcoming face-to-face meeting.
- Consider the pacing and time needed to complete each week's activities, both online and face to face—calculate the total time expected for students to be on task—whether that means reading, researching, discussing, or completing other "homework." The total time should be comparable to that expected for a purely face-to-face class. This avoids the problem of "a class and one-half."
- Don't confuse attendance and participation. Generally speaking, attendance is for face-to-face meetings or real-time online ones in which you are able to track the arrival and departure of students. In devising a participation grade, be sure to define what participation means in the context of a face-to-face class meeting and an online discussion. Keep in mind that there generally isn't time for every student to participate in the average one-, two-, or three-hour face-to-face classroom meeting. You may want to give students an opportunity within a face-to-face meeting week for participating in either format. In other words, if you give ten points for participation, you can stipulate that the ten points can be distributed over both the face-to-face and online meetings or confined to just the online. Or you can set up separate criteria or a rubric for each modality. Perhaps there are a certain number of points for participating in three of the fifteen face-to-face discussions with another total number of points for online participation in a face-to-face meeting week and yet another collection of points for those weeks in which the class is only online.
- Carefully incorporate internet resources into your course content and instructional activities to provide more diverse pathways to learning and supply guidelines to help students devise a more critical approach to reviewing information.

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- Avoid scheduling all your face-to-face meeting time for lecturing! The on-campus meeting affords valuable time to explore ideas and gauge understanding by engaging students in active discussion and debate, case studies, or other active learning strategies.
- Unless required to do so by your institution, do not design the new blended course so that online activity is limited only to an hour or two each week of real-time, synchronous meeting. We have seen conversions of face-to-face classes which resulted in 1.5 hours of a Monday lecture in an on-campus classroom followed by 1.5 hours of a Wednesday in a real-time, online session. Then nothing until the following Monday. While this may replace some "seat time," a more profound opportunity for teaching and learning is lost when instructors use all their precious face-to-face time just to deliver a lecture, or when students cannot use the remainder of the week to complete work, review content, or communicate online in an asynchronous mode. So the idea here is to develop a plan to use the entire week. Do not make students wait an entire week or even half the week to have a question answered. Provide a means for students to do some of their "homework" online.

TEACHING THE BLENDED COURSE

- Post your syllabus online but depending on your student audience and expectations for the on-campus meeting, you may want to bring hard-copy printouts to the first class meeting (if that is indeed face to face) as well. At some campuses, students can be emailed in advance and instructed to read and bring the syllabus to the first class (on their laptops or in hard copy).
- At the first and perhaps second class meeting, you will want to review the syllabus for the course. Additionally, here is when you may need to lead that orientation to the learning management software for students. At the very least, you will want to clarify how and when and where to carry out online activities, as well as to point to your syllabus schedule to emphasize the face-to-face meeting dates and the required online activities.
- Provide weekly announcements in the online classroom every week to highlight the week's activities ahead and guide the "handoff" from the face-to-face meeting week to the purely online ones and vice versa.
- Send weekly emails to students to remind students of continuing online activities during weeks in which the class does not meet face to face. Sometimes students in a blended class tend to think of the weeks in which they do not meet on campus as "weeks off." Here is where your syllabus schedule comes into play—you should clearly indicate what is happening in each mode. (See Chapter 5.)

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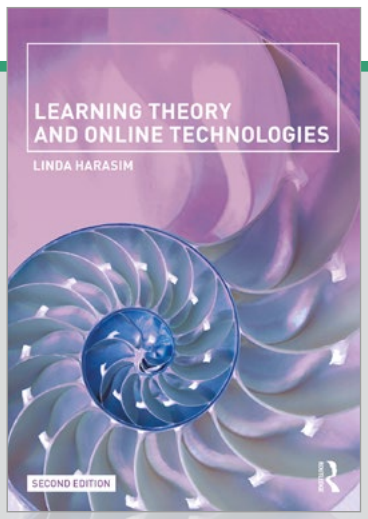
- Send a personal email to provide a friendly reminder to students who at any time are not participating in the online portion of the class or the opposite—to encourage students to come to face-to-face meetings.
- Use an online gradebook to allow students to follow their progress in the class. By grading students on their online activities on a weekly or biweekly basis, it is easier for you to keep track of student learning and for the students themselves to be reminded of an ongoing class in which they may seldom meet face to face. Make sure the percentage of the grade accorded to online activities reflects the importance of the online portion of the blended class.
- Strive to interact with students online every week in some manner. This may range from active facilitation of online discussion to announcements or posted commentary that help illuminate the readings and assignments under way. Let students know that you will be monitoring their online activity. Show your presence by strategic and meaningful postings.
- In addition to any student course evaluations your institution may administer at the end of a course, consider asking students some of your own questions tailored to the blended course design you devised. For example, you may ask students questions such as, "Which assignments provided the best learning experience for you this term and why?" "Was it clear to you what needed to be done in weeks in which the class did not meet face to face?" or "Rate the following internet-based activities from our class..."

Finally, after teaching your first blended class, carefully review it and don't be shy about enlisting the extra pair of eyes that a trusted colleague can provide. It's difficult to get the blended course "recipe" exactly right the very first time, but your effectiveness will improve with feedback from students and colleagues along with reflection and practice.

CHAPTER

3

OCL PEDAGOGIES IN PRACTICE



This chapter is excerpted from
Learning Theory and Online Technologies, 2nd Edition
by Linda Harasim.

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> We are the inheritors, neither of an inquiry about ourselves and the world, nor of an accumulating body of information, but of a conversation, begun in the primeval forests and extended and made more articulate in the course of centuries. It is a conversation which goes on both in public and within each of ourselves. And it is this conversation which, in the end, gives place and character to every human activity and utterance.
>
> —Michael Oakeshott, 1962

Chapter 3 illuminates online collaborative learning (OCL) pedagogies in practice and:

- Introduces four fictional students who are participating in online courses;
- Presents four OCL scenarios to provide a sample of how online courses can be designed and how the students engage:
  a. Scenario One: Online case studies (virtual simulations)
  b. Scenario Two: Student-led online seminars
  c. Scenario Three: Online global training program for third-world union educators
  d. Scenario Four: Online educational games and immersive learning environments.

INTRODUCTION

Chapter 7 offers readers a means to understand online learning, some of its different forms and how differing approaches and processes can be used to support effective learning and educational change. Four scenarios are drawn from online and blended learning models; applications that are appropriate for both formal (K-12 and university) and nonformal (professional development, training) educational contexts around the world.

The use of scenarios allows us to visualize what happens in "virtual classrooms" and online learning contexts. These scenarios offer snapshots of how an online course activity may be designed by an instructor and be experienced by the learner in terms of social and intellectual interaction online. Specific examples from semi-fictionalized online learning applications help readers to envision typical "real" curricula and student interactions. Four OCL pedagogic scenarios from real online schools and courses are presented, although some of the details have been changed for privacy.

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1. online simulations and case studies of virtual organizations;
2. student-led online seminars;
3. co-production of real-world products and programs;
4. online educational games and immersive learning environments.

To get started, we introduce four fictional students who are studying in an undergraduate degree program, online. The fictionalized students' accounts are composites of real student experiences.

LIVING THE ONLINE STUDENT LIFE

Jennifer

Jennifer is a busy professional who nonetheless wants to complete the undergraduate degree that she started some years ago but left when she entered the job market, then married and had a family. Given her responsibilities, a place-based university with courses rigidly scheduled at specific times and locations is not realistic. "For the last ten years, I have been attempting to find the time to go back to school. I attempted the traditional classroom settings, but due to work schedules and demands I never was able to stick to it."

Barry

Barry works in sales and travels extensively, but is serious in seeking a university degree for job promotion and personal satisfaction. He regrets never attending post-secondary education. His challenge is how to pursue a university degree when his job takes him weekly around the world to destinations such as Bangkok, London and Paris, to name a few, as well as numerous cities in the United States throughout the year.

Curt

Curt is in his 12th year serving in the United States Army and, given the demands associated with the role of a soldier, has found it difficult to work toward a degree: "I have attempted many times to complete an undergraduate degree to no avail. I have had to withdraw from a number of college courses due to last minute training requirements and deployments."

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LeAnne

LeAnne was born, schooled and now and works in the high-tech sector in Hong Kong. She is fluent in English and her goal is to move to the United States in a few years to work in the same industry and advance her career. An American degree is important to her and she believes it is essential to realizing her professional plans.

OCL PEDAGOGICAL SCENARIOS: FOUR STUDENTS AND ONLINE STUDY

These four students seek a university program to meet their needs. They found that they have many options to choose from: every year, almost six million students in the United States alone take online courses. Some of the online universities are based on distance education (ODE) or courseware (OC) approaches, so instruction is not provided by a professor. Our four students are seeking courses that have a professor or an instructor and involve peer interaction and collaborative learning. "Having peers to talk to, to share the work, the fun and the challenges makes the learning more enjoyable and more effective for me," writes Jennifer. LeAnne agrees, and adds that learning teamwork skills is important for her professionally as well.

The four found many accredited universities that offer online degrees using the OCL model. There are differences, however, in how each university structures its programs. Some online universities offer undergraduate and graduate degree programs based on 6 weeks per course, with approximately 12 participants in each course. Students are limited to one course at a time. Upon completion of that 6-week course, students move to the next course in their program. Other online university programs offer courses that are 12 or 15 weeks in duration, like traditional university semesters. Still other online degree programs offer a cohort system, whereby courses may start at any time, once a certain number of students have registered. Regardless of how the online courses are scheduled, all of these approaches are based on an OCL model and limit the number of students to between 10 and 25 students per course.

For those of us who are unfamiliar with online study, we are curious to know more about the experiences of these four students and how an online classroom functions. Our fictional four students select to study in the same program at the same university: their online classroom is available 24 hours a day and 7 days a week. They have access to their course any time of the day or night, from anywhere in the world.

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The workload is demanding but well structured and the students feel that they are learning valuable knowledge and work habits. Barry comments that:

> The knowledge I am gaining through the program's curriculum has changed my personal and work habits. The structure almost "forces" you to get regimented to stay on track with your assignments. As a result, I have become more organized at work, which gives me more "free" time to tackle company projects. In my personal life, it's so organized, I sometimes find myself with too much free time (I am not complaining).

All of the courses use a curriculum based on individual and group assignments, and group discussion with topics that change (typically each week), leading the students into deeper and more analytical consideration of the subject matter. Once Jennifer, for example, registers for a course, she receives the textbook and all additional course materials, or resources, either by courier or posted online. Using the Web, Jennifer logs on to the university's password-protected learning environment where each course is accessible. She will gain entry only to the course for which she is registered. While online she "meets" with the instructor and her classmates, exchanging greetings and learning about her fellow students through "self-introductions." The discussions are primarily text-based and asynchronous. The virtual classroom comprises a variety of group conferences or forums (think of "virtual rooms"); the forums or "rooms" change each week according to the topic, task and group size. Some forums are based on a full group discussion of a topic; others involve small-group discussions or projects. One forum may be "write only" where students submit their assignments to the professor, but cannot read one another's submissions. In other cases, students can access and even comment upon the work of their peers. Initially, to help facilitate the dynamics among the students who participate independently on their own time and in their own off-campus setting, the instructor begins with a full group discussion forum based on assigned readings each week. Rather than a question-and-answer format, students are encouraged to reflect on the issues raised by the instructor, consider the readings and send in a thoughtful response online. Students are encouraged to submit multiple comments and ideas, and then to reflect on and respond to one another's comments—agreeing, disagreeing, expanding and advancing the ideas presented. The tone should be considered but not unnecessarily formal. As in any discussion or debate, informed opinions based on the readings or other resources are expected. This sets the tone for the course. Eventually, students will progress to other collaborative learning

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activities such as the virtual simulations described in Scenario One or to lead their own seminars, as described in Scenario Two. Social interaction is encouraged and an online social café is available for students to chat and socialize.

The tone of the seminars is not meant to be rigid but thoughtful and to emphasize evidence over emotion in the group discussions. Still, students are friendly toward one another, use first names and often start their message with a joke or social comment (for example: "Boy, is it ever snowing out here!! I am cozy in my kitchen logging on from home! It has made me reflect on the reading about access ..."). Each week the topic changes as students progress in their learning, advancing from the familiar to the less familiar, and relating the concrete with the conceptual, and the specific with the analytical. Students are introduced to analytical terms relevant to the course topic/field and through their discussions and course readings and resources, they gain fluency in the language of analysis and its application in the field.

Typically students work in learning groups or project teams to complete an assignment. Assignments may be brief or complex, individual or group-oriented. The role of the instructor is to serve as the representative of the knowledge community in that discipline: to provide the learning materials, provide the orientation through presentations on a topic (either by text or audio/video podcast), introduce key analytical terms and concepts through course readings and other resources and organize the learning processes to encourage student learning and problem solving. Group seminars encourage students to learn to apply new terms and concepts and to engage in knowledge-building processes. The instructor plays an important role in organizing the seminars, especially in the case where students will serve as seminar leaders or moderators. Student-led seminars require important instructor input to assist students to learn how to be a moderator, as well as how to be a discussant in the seminars. These are new roles for traditional classroom or distance education instructors and students. Moderators will need to learn about online group dynamics, the subject matter and how to facilitate collaborative learning and intellectual progress. Moderating requires more than group dynamics; it requires that moderators engage the discussants in knowledge building on the topic. In educational seminars or group discussion, the moderators become the most knowledgeable about their particular topic, because they have done significant background study in order to prepare to lead the seminar and facilitate the discussion to advance the discourse from Idea Generating to Idea Organizing to Intellectual Convergence (the OCL framework is discussed in Chapter 6). Moderators must understand how to guide and facilitate the group discussion to ensure that

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there is learning, that the discussants are advancing in their understanding of the topic and that they are engaging with the knowledge problems and contributing to meaningful interaction and improving ideas on the topic. Students are learning to solve problems and construct knowledge together, knowledge that reflects state-of-the-art thinking in their discipline (the knowledge community) and that has real-world relevance. They learn the analytical terms of the field and they learn how to apply these terms and concepts to real-world problems, to generate knowledge artifacts such as new designs, prototypes, processes or solutions. Learning is part of the process of problem solving: students must identify what they need to learn to resolve the problem.

SCENARIO ONE: ONLINE CASE STUDIES (SIMULATIONS)

A case study is an analysis of a system by observing specific situations or processes in order to solve problems. Case studies are used in many higher-education academic and training disciplines to simulate real-life scenarios. Students are assigned cases and typically work in small groups to gain understanding of their case, diagnose and develop solutions to resolve the problems posed. Traditionally, educational case studies have been presented in hardcopy, either in textbook or casebook format.

The use of online case studies is an innovative OCL pedagogy that promotes interaction and use of real problem-solving tools and processes. Online case studies offer important new features and learning opportunities beyond traditional textbook approaches, such as expanded opportunities for interactivity, variety and hence increased realism. In traditional textbook case studies, students are provided with a large amount of background information. The problem with the traditional textbook cases is that students have no way to find additional information, and no one to ask questions of in trying to clarify the problem. "There are none of the simulated interviews, none of the memos, none of the electronic correspondence that we have in the virtual organizations. So if you have questions on a case, the students have to make assumptions" (Wasley, 2008). Another benefit of online case studies is that students can use real software tools to problem solve and become more proficient in applying these tools and behaving as they would in a real-world context.

Given the access to vast arrays of data, online case studies can be designed to be imperfect and thereby encourage significant problem-solving efforts by students. Whereas textbook case studies are by necessity neatly packaged so that students can use the data that is available to problem solve, online case studies may be far

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more complex and provide what is referred to as ill-defined problems, which require students to solve problems by trying out various tools to access and manipulate different data. An ill-defined problem is often considered to be a real-world scenario in that there is no simplistic correct answer. Textbook case studies, in contrast, typically employ "well-defined problems" to facilitate an easier solution, given the constraints of information that can be provided to students.

In the past, if instructors wanted students to engage in typical real-world cases, a major obstacle was the amount of student time required to access and organize the data. A further and very difficult problem was access to the necessary information, which required both time and permission to work with confidential and/or proprietary data.

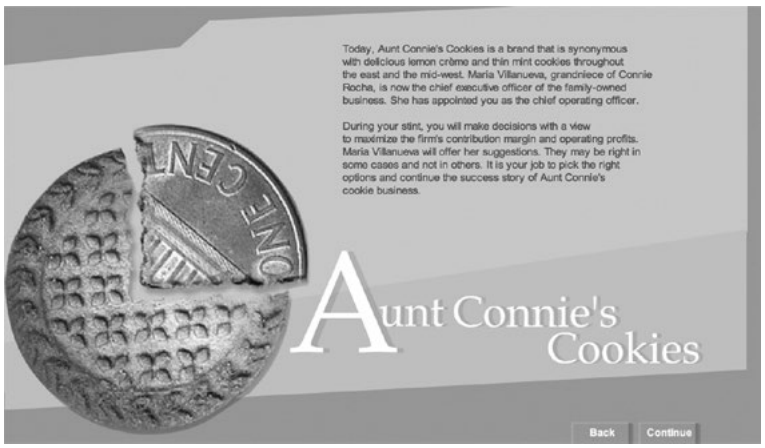

Figure 3.1 • Aunt Connie's Cookies.

An example of the use of a state-of-the art educational simulation is the virtual organizations software developed by the University of Phoenix for their onsite and online students. Hundreds of case studies of virtual schools and businesses have been integrated into the virtual American town of Kelsey. Unlike a static textbook case study,

> Phoenix students, instead, can tap into a virtual world where each fictional school or corporation comes with detailed, simulated scenarios that "real-world" employees are likely to encounter in the workplace. These virtual-world scenarios are not fully interactive like *Second Life*—they do not provide second-by-second feedback—but they do bring real-world problems to life. (Wasley, 2008)

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The use of the online case studies also provides students in a course with a range of issues or knowledge problems, while the ability to access common data enables students to collaborate on assignments. All of the virtual organizations are located in fictional Kelsey, which has a population of 53,000 and features eight corporations, four schools, a hospital and municipal offices. Approximately 500 University of Phoenix courses (online and onsite) feature the virtual organizations in course assignments. Students may do cost–benefit analyses of outsourcing in the hospital or school cafeteria, or rewrite the menus based on new health or policy considerations. Students in Information Technology (IT) courses may analyze the user logs or IT service requests to diagnose software problems. Students in education may be asked to examine the student records to identify learning problems in particular areas and propose activities to address the problems.

"Students say the software gives them a view of how the parts of an organization work together. Most schoolteachers see test scores and other data only for the grade levels they teach," says Katy Wilkins, an assistant principal at a middle school that used Phoenix's virtual school program in two master's level education courses. "The Kelsey schools allow you to access the full picture," she says (quoted in Wasley, 2008).

In a course on instructional design, Wilkins noticed that the parent–teacher communication logs at Kelsey's elementary school mentioned that certain students had comprehension abilities above their grade levels, but that the school district had no program for gifted students. For her final project in the course, she proposed a professional development program to help Kelsey teachers steer gifted students toward more challenging activities.

Wilkins presented a similar proposal to her Arizona middle school, transferring the learning of the Kelsey simulation to her own school district. "With Kelsey schools right there in front of you, it makes you scratch your head and say, I wonder if we actually have something like that in our district," she says (quoted in Wasley, 2008).

SCENARIO TWO: STUDENT-LED ONLINE SEMINARS

Scenario Two depicts student-led online seminars. This pedagogy is appropriate for learners at all levels: secondary school, undergraduate or graduate school, professional development and training or continuing education. The pedagogy could also be used to inform moderating of online communities of practice (discussed in Chapter 9).

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THE ONLINE SEMINARS

Our virtual four students are taking an online course with 12 other students. The course curriculum features four 1-week online seminars, each on a different topic and each moderated by a team of four students. Like all students in this course, our four will engage in two distinct roles, each with specific timelines, activities and assessment:

- moderators work in teams of four to lead a 1-week online seminar;
- discussants participate actively in three 1-week seminars.

MODERATING

Moderating represents 30% of the final grade. Jennifer, Barry, Curt and LeAnne form a team to moderate a 1-week online seminar together. Each seminar involves three distinct activities:

- seminar presentation: 10%
- seminar facilitation: 10%
- summary and transcript analysis of the discourse: 10%.

SEMINAR PRESENTATION

Our team has identified their seminar topic and is now preparing the Presentation to launch their seminar. The Presentation is a very important, in fact critical, component since the quality of the Presentation can determine the quality of the seminar discussion input and the quality of the learning experiences of the seminar discussants. The Presentation provides the background and key information about the topic and includes categories such as those shown in **Figure 3.2**.

Introduction to the topic and related knowledge problems
Discussion Questions (DQs)
Readings related to the DQs
Seminar Design (for example, group discussion, deabate, role play)
About Us (moderator bios)
Glossary of Terms (if needed)

Figure 3.2 • Online Seminar Presentation.

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Once the moderating team has welcomed discussants to the seminar and introduced the topic, they present three Discussion Questions (DQs). Our team realizes that effective Discussion Questions are the key to successful online seminars. Well designed DQs encourage multiple perspectives on the topic, and generate thoughtful discussions that advance intellectual organization and convergence. excellent DQs are fuel for thought; DQs should be relevant and real, and not answerable simply by "yes" or "no." A DQ should not encourage repetitious responses (or a series of "me too!" messages). A seminar, moreover, is not a question-and-answer activity: seminars involve questions that advance understanding. Online seminars benefit from considered and thought-provoking DQs, which provide focus to the discussion, motivate learning new concepts and promote deeper reflection and understanding of a topic. Discussants build on one another's input; they may agree or disagree, but through this process they should arrive at a conclusion or a position on the topic.

Jennifer, Barry, Curt and LeAnne spend considerable time shaping their DQs in relation to what they would like to see discussants accomplish during the seminar. Drafting thought-provoking DQs is a challenge. The team must also seek readings that can help provide discussants with information and data related to the discussions. The team decides to focus DQ 1 on a key problem in the field to stimulate the generating of various ideas or perspectives on the topic. They search for relevant readings. They then teamwork on shaping DQ 2 to encourage the discussants to reflect on the various perspectives that have been generated and identify commonalities among the diverse ideas.

The team is unsure of how to design DQ 3. The final seminar question should lead the discussants to a level of convergence. Jennifer suggests that they bring the seminar to a conclusion by synthesizing all of the discussion into a few points. Curt disagrees, pointing out that it is for the discussants to come to a convergence themselves, not for the moderators to do it for them. The seminar has a fixed timeline, so time is of the essence. Barry suggests using a wiki. "The discussants could each post their position." LeAnne agrees that it would be cool to use a wiki but points out that a wiki does not necessarily encourage convergence. However, using a technique or tool to help discussants come to a final position is a good idea. Jennifer suggests: "What about developing a report card where discussants grade each of the three major options?""Or we could have them rate or rank the three options." The team decides that DQ 3 should link to a voting tool whereby discussants vote on the three major options, and provide a brief rationale for their choice. The final decision (and seminar conclusion) would be the majority vote, with dissenting views. With their Presentation

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completed, the moderators are now ready to launch and facilitate their week-long seminar.

The goal of a good seminar is not unified agreement, but that the discussants learn the analytical language of a field and use the analytical concepts to identify and discuss various perspectives on a topic to arrive at an informed position. Discussants may not agree on one position, and they may agree to disagree. Or, in the case where a single final product is required, as in the case of the team developing three DQs, there is a need to converge on the final product. Whether the conclusion is convergence or consensus, the class has progressed beyond divergence to develop an analytical and informed position.

FACILITATION

It is Day 1 of our team's seminar. They post their Presentation at noon. The seminar is open 24 hours a day for the next 7 days. Already the team is excited to engage in the discussions, but also anxious. What if no one participates? What is taking everyone so long to respond? Are the DQs too difficult or too simplistic? However, it is still early in the seminar: only 1 or 2 hours have passed since the Presentation was posted. Soon the first response arrives: "Great Presentation, Team! The topic is intriguing and I can't wait to get into discussing it. I'll be back online as soon as I do the readings." Another comment is posted and a third and a fourth, and the discussion is launched.

Jennifer, Barry, Curt and LeAnne are encouraged by the participation and camaraderie. They begin to facilitate the comments, to keep the discussion flowing and focused and to help build knowledge about the topic. Facilitating also requires balancing the number, volume and timing of moderator comments. The moderating team must not overwhelm the conference with too many notes, but be active in stimulating discussion, responding to unanswered questions, encouraging others to participate in Idea Generating. They also provide additional questions to either deepen or advance the discussion as needed. Discussants may become too involved in brainstorming; the moderators need to help maintain informed discussion by asking discussants to cite evidence for their views, such as reference the readings and to then advance the discussion to initiate convergence, posing such facilitating questions as: what are the key ideas presented? Are there links among them? By acknowledging valuable ideas, and synthesizing or weaving the contributions thus far, moderators can also encourage Idea Organizing. Some students may have begun to reference one another's comments through referencing, and the moderators build upon those initiatives.

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Idea Organizing can benefit from weaving, a process of synthesizing the discussions to date, highlighting the important areas covered, and suggesting new directions that the discussion might productively cover. Weaving the comments does not mean that moderators should acknowledge each individual's comment, but rather illuminate and highlight the important points made in relation to the DQs and to the topic overall. Encouraging progress from Idea Generating to Idea Organization and on to Intellectual Convergence facilitates the learning process.

Also, the team moderators remind themselves that they are there to facilitate, not to judge or dictate "right" and "wrong." While moderating, they resist the desire to become too involved with the actual debate, keeping in mind that the task is to help each participant to formulate their understanding of the topic with the assistance of the DQs and by facilitating the interaction of the group.

SUMMARY AND TRANSCRIPT ANALYSIS OF THE DISCOURSE

The final portion of the student-led seminar asks moderators to produce a summary of their 1-week seminars; assessing how well their seminar design functioned, level of user activity (volume and pattern of messaging by day, gender, role or other categories) and lessons learned. Moderators also conduct a transcript analysis by categorizing each discussant message as social or cognitive, and if the latter, then whether it is primarily Idea Generating, Idea Organizing or Intellectual Convergence. The data are organized by day of the week to plot number and kind of message each day. The results are input into simple visualization software such as Excel to generate graphic displays such as a line graph showing intellectual change over time.

SCENARIO THREE: ONLINE GLOBAL PROFESSIONAL DEVELOPMENT PROGRAM

Thirty-three participants from 24 developing countries are studying together in an online education course that will last for 8 months. None of these participants have ever engaged in online computer conferencing or online discussion forums. Thirty participants perceive their email usage skills as high, three do not. Most use the Internet regularly and report feeling comfortable with computers. The number of male and female participants is almost equal. While many of the participants have computers at home, few have home Internet access. As this course is work-related, most of the online discussions and online project teamwork are conducted using the workplace computers—usually during the off hours, when the few Internet-based computers are not being used by others for work.

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This scenario is a fictionalized rendition of a real story involving trade unions. Participants in this course access web-based software, which is based on computer forums (also called conferences) that serve as an asynchronous learning environment to support group discussions, team projects, debates and seminars. Participants enter the learning environment, which is open 24 hours a day, 7 days a week, at any time they want. The system is available worldwide through the Web.

Participants log on to the Web and enter a password-protected environment to access the group activities related to their course. The system organizes the topics into different forums. Users send their messages to the particular forum to which they belong, featuring the topic or unit of that week. When participants log on, they read the messages that others have submitted to the forum and they then reply or post a new message. Messages are organized chronologically.

Figure 3.3 • Asynchronous Learning Environment.

Accessing the forums opened by the course instructor, participants log on to text-based "mini-lectures" provided by the instructor and read postings by their peers that relate to the current topic of readings and resources. Participants discuss the topic and, based on the course readings, debate its relevance and consider its application for their first major task.

The course is a nonformal, professional development course for trainers in developing countries. The course curriculum is new to union trainers as is the delivery method. The course comprises four distinct categories of activity:

- seminars based on active reading and discussion of concepts, implications, processes and so on (active reading is when learners are asked to read material with particular, instructor-provided questions to which they must respond);
- seminars based on active reading, as well as discussion and questions and answers;
- technical workshops (learning how to use particular tools);
- teamwork seminars that involve the co-production of a series of documents.

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Participants in this particular course live and work in different countries throughout the Caribbean, Africa and the Middle East. The 8-month course is conducted entirely online.

Much about this example is intriguing, including: the geographic span of the participants; the developing world locations; a supportive organization with meager resources and not generally viewed as "on the cutting edge" with respect to innovation or new technology; and the pedagogical design, which involved significant engagement and commitment throughout the 8 months to apply OCL and knowledge building to solve real-world problems. The OCL model continues and grows among union educators in the developing world.

As learners everywhere, their initial few weeks are characterized by questioning, challenging, brainstorming and divergent thinking: "When I first came across that concept I was skeptical. I wondered what it was about and it left questions in my mind." As other participants begin to share their questions, their experiences and perspectives, the discussion grows richer. One participant writes: "The volume of material folks are churning out is amazing ... we surely have a lot to say and to learn " Another writes: "More folks are logging on and asking the right questions and making important and salient points." Participants begin to come together, to converge as a group and start referencing one another by name."Marc's comments on open source were very valuable and I think that we should ensure that they are included in our first document that we are developing."

Over the first days and weeks, participants each contribute a variety of perspectives, and as they do, they begin to identify linkages among their ideas and perspectives offered by others. Some reflect common viewpoints, others are different. This first round of "idea-generating" sessions will not necessarily present final positions but reflects initial positions with widespread differences. Perhaps as a result, almost everyone feels comfortable in offering a perspective. A typical comment: "I have so far looked at contributions done by many members of the group and they have all presented good cases. Below is my contribution to the debate." Others also contribute reflections on the issues and input new ideas, but often end with a note such as: "My ideas are not final."

As the discussion continues, it advances in terms of the quality of the debate or exchange. New resources are provided to justify a particular position. Increasingly ideas are linked, either in support of a position or debating another: agreement and disagreement become a stimulus to seek further information, and in some cases to

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refine one's own position, recant and/or recognize the value of others' input. Ideas are clarified, associations between ideas are identified, and they become clustered into categories.

As with all real problem-solving scenarios, there is a looming deadline for producing a group document. The participants increasingly focus on and move toward Intellectual Convergence, based on shared understanding. Their messages reflect an increase in substantive comments, closure and a framework for co-production of a document. There is also a shift from the use of the pronoun "I" (which categorized the early weeks of discussion) to the use of the pronoun "we" and "our," as the first sessions converge toward co-producing the document.

Intellectual Convergence, it is important to emphasize, does not signify a homogeneous conclusion. In fact, Intellectual Convergence is often characterized by conjunctions—but, and, or— reflecting a convergence that is rich with multiplicity. Often, there may be two or three final positions and participants agree to disagree. Intellectual Convergence refers not to acquiescence but rather to the fact that participants now understand the various perspectives proposed in the discussion and how these perspectives relate to one another. In the case of co-productions, convergence reflects a consensus or it may represent a range of conclusions.

A common remark might include, "I just want to add this because, like Anikka, I share the views of everyone so far." Closure is evident in this comment: "Frankly I am very impressed with the ability to pull all the varying comments and suggestions into the document and make sure that you captured everyone." Signing off, another participant writes "I think that we have all done brilliantly so far. Thanks for all your comments and input I do believe that we are a great team and group."

SCENARIO FOUR: ONLINE EDUCATIONAL GAMES AND IMMERSIVE LEARNING≈ENVIRONMENTS

Virtual video games are immensely popular among youths and adults. Estimated numbers of players are in the hundreds of millions. One of the most popular online multiplayer games is *World of Warcraft*, a fantasy game with over 10 million current subscribers, of which 2.5 million are in North America. Educational applications of online video games also have tremendous appeal in the market, although many educators and parents are skeptical about the educational benefits. There is justification for skepticism, but emerging research, as well as new developments in online educational games, is providing evidence of positive potential for learning.

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While educational video games are not a magic bullet, teachers and researchers report powerful learning possibilities in games with well designed pedagogies.

Online educational multiplayer games such *Food Force*, produced by the United Nations to educate users on food aid distribution through the use of online role plays, gained one million players in the first six weeks, four million players in the first year, and is now available in 10 languages, according to the United Nations. The game contains six different missions for players, who are faced with a number of realistic challenges. In a race against time, they must feed thousands of people in the fictitious island of Sheylan: they pilot helicopters, while looking out for hungry people; negotiate with armed rebels blocking a food convoy; and use food aid to help rebuild communities. *Food Force* is designed especially for classroom use and offers teaching resources as part of the lesson plans. It can be downloaded without cost.

Online games are typically multiplayer in design, meaning that problems are set up to be solved collaboratively by teams. The online game *Whyville*, oriented to K-12 math and science education, has four million subscribers (90% are North American), with the dominant demographic being 8–14-year-old girls (Mayo, 2009). Teachers and educational researchers report positive outcomes. One teacher on the site reports that

> My sixth graders love it! *Whyville* supports the use of computers by kids the way that scientists use computers: for data collection, data visualization, simulation and modeling and scientific communication. The site also reflects what we know about learning communities and the kinds of interaction kids seek while learning and having fun.

Others who left comments on the site include Joan Korman, author of *Internet Resources for Women*, and professor of English, University of Maryland, who writes:

> *Whyville* is an imaginative web site that aims to help elementary, middle, and high school students understand and enjoy science. It differs dramatically from most science education sites in its use of avatars, games, computer simulation and modeling, a *Whyville* newspaper, and interactivity among *Whyville* participants. Though *Whyville* is not designed specifically for girls, girls make up more than 60% of its users, an exceptionally high percentage for a science-and-technology-focused site.

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Another collaborative, virtual environment for use in school classrooms is *River City*, which uses lifeforms or avatars something like those in *Second Life*. *River City* is targeted at students in grades six through nine and portrays how three diseases simultaneously affect health.

The National Science Foundation-funded *River City* multiuser virtual environment is centered on skills of hypothesis formation and experimental design, as well as content related to national standards and epidemiology. Students learn to behave as scientists as they collaboratively identify problems through observation and inference, form and test hypotheses and deduce evidence-based conclusions about underlying causes. Collaborating in teams of three or four participants, they try to figure out why people are getting sick and what actions can remove sources of illness. They talk to various residents in this simulated setting, such as children and adults who have fallen ill, hospital employees, merchants and university scientists (Dede, 2009, p. 67).

More highly sophisticated game content exists. An example is the games developed by the Federation of American Scientists on such topics as immunology. In the *Immune Attack*, the player controls drones that activate the release of immunity enzymes.

Figure 3.4 • *River City* Multiuser Virtual Environment.

Researchers studying online games have found promising results for the importance of pedagogy. Good pedagogy leads to positive educational outcomes, while weak pedagogical design in the software yields poor results. Mayo's (2009) review of the

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research literature on gaming notes that "where learning benefits appear, they are attributed to effective pedagogical practices embedded in the game design" (p. 80). The collaborative learning pedagogy has increased student engagement and conceptual change. Multiplayer game-based activities require students to work in teams to form a hypothesis, experiment with various options and come to an intellectual convergence on which actions to take and then the consequence of those actions.

Mayo (2009) raises an interesting point about the importance of pedagogy: she notes that students in a typical classroom ask 0.11 questions per hour, whereas educational games offer constant interaction—almost each keystroke yields a response. The active participatory nature of gaming is a vast departure from traditional passive lecture learning. Researchers describe a near universal antipathy to the undergraduate lecture format: 98% of students who leave science and engineering majors and 86% of those who stay report "poor teaching by faculty" (Seymour & Hewitt, 1997) to be a major concern. Mayo cites a meta study of 6,542 students in 62 introductory physics classes that found "switching to any interactive mode of instruction (for example, group projects, Socratic lectures and participatory demonstrations) easily improved learning outcomes in introductory physics by 108 percent" (2009, pp. 80–81). She also reports that other studies have found that video games can yield a 7–40% improvement in learning over lectures (Mayo, 2009). Immersive learning environments are another feature of some video games, in which the user assumes an online persona and engages in a realistic digitally enhanced setting, a 3-D virtual world.

> Immersion is the subjective impression that one is participating in a comprehensive, realistic experience. Interactive media now enable various degrees of digital immersion. The more a virtual immersive experience is based on design strategies that combine actional, symbolic, and sensory factors, the greater the participant's suspension of disbelief that she or he is "inside" a digitally enhanced setting. (Dede, 2009, p. 66)

Dede reports that immersive interfaces aid in designing educational experiences that yield valuable results for learning: digital fluency, engagement, and learning and transfer from classroom to real-world settings. Learning is enhanced through the multiple perspectives enabled by the immersive interface, the situated learning and improved transfer from the classroom to the real-world context (2009, p. 67).

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Online video games for learning are used by many disciplines in schools, universities and training settings. Immersive simulations are also used in corporate and military settings. One of the most successful and the earliest educational immersive simulation was developed for pilot training. Today, airplane flight and surgical simulators demonstrate highly successful transfer of learning from the educational setting to real-world application.

Research has demonstrated that visual skills developed by video games have implications for training in the case of laparoscopic surgery. Greenfield (2009, p. 70) notes that

> surgeons recognize that laparoscopy has changed the required skill profile of surgeons and their training needs. In laparoscopic surgery, a small incision is made, and a viewing tube with a small camera on the eyepiece is inserted through it. The surgeon examines internal organs on a video monitor connected to the tube and can also use the viewing tube to guide actual surgical procedures. Navigating through and operating in a three-dimensional space represented on a two-dimensional screen with minimal tactile feedback constitute basic parallels between laparoscopy and action video games. A study of the relation between video game skill and success in training for laparoscopic surgery yielded positive results: Action video game skill (as demonstrated in the laboratory) and past video game experience (assessed through self-report) predicted laparoscopic skills; in contrast, neither laparoscopic experience in the operating room nor years of training significantly predicted laparoscopic skill. The best game players (the top third) made 47% fewer errors and performed 39% faster in the laparoscopy tasks than the worst players (the bottom third). These results indicate the value of video game play as informal educational background for specific training in laparoscopic surgery, a finding that is applicable to other lines of work (such as piloting a plane) whose skill profiles overlap with those required by action video games.

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SUMMARY

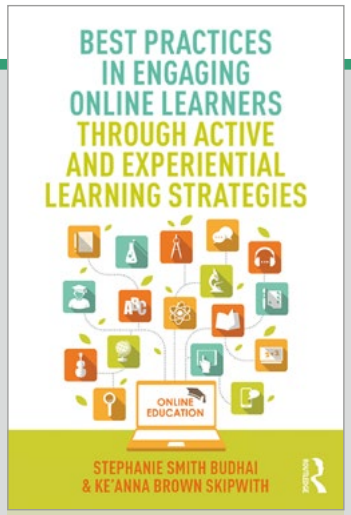
Chapter 7 introduced a discussion and description of OCL pedagogies in practice. The chapter focused in detail on four pedagogic scenarios taken from real educational applications: online simulations and case studies of virtual organizations; student-led online seminars; co-production of real-world products and programs; and online educational games and immersive learning environments.

Four virtual students were introduced as examples to depict the experiences of learners in the first two scenarios. The level of detail provides in-depth illustration of how online pedagogies might function in real-world context.

CHAPTER

4

GAMIFICATION AND SOCIAL MEDIA



This chapter is excerpted from

Best Practices in Engaging Online Leaners

by Stephanie Smith Budhai & Ke'Anna Skipwith.

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Stephanie Smith Budhai & Ke'Anna Skipwith

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Educators cannot just change lesson plans to create such an environment; there must be entire shifts in the way educators teach. Gamification and social media are unique because they create an engulfing learning environment; something that old classroom methods could not do. There needs to be some vehicle, which transports a classroom from the classic lecture to a more interactive and richer environment. Gaming and play are considered great teaching tools for an active learner (see **Figure 4.1**). Digital gaming, a means of participatory culture, presents the opportunity to learn through the direct experience of playing a role or becoming a character and infusing oneself into a virtual situation. Being able to "see the problem in a particular context" affords the learner an increased understanding for using the new knowledge (Brown et al., 1989, p. 35).

Figure 4.1 • This is a visual representation of how games can be used as a learning tool
Source: Image used with permission of Shutterstock, Inc.

One particularly intriguing technology-based platform involves game-based learning, in which individuals play games in different ways, using different gaming strategies and decision-making skills. Game-based learning not only cultivates learner development, but also enhances skills needed in education; such as trouble-shooting, trial and error, team building skills, problem solving, lateral thinking, concentration, memorization, information gathering, analysis, developing and testing solutions (Gros, 2007). Game-based learning is most prevalent in the K-12 environment (covering both primary and secondary schools), where the value of teaching learners in a risk-free environment providesan interactive atmosphere

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that incorporates all of the design elements in which learners can interact with games in a meaningful way (Hew & Brush, 2007). However, there are not many higher education institutions today that have engaged in quality game-based learning for undergraduate and professional learners that are in distance learning programs – which may be due to budget constraints and lengthy course development factors. However, there is a potential role for game-based learning "variables" or limitations to improve a distance education's technology plan that caters to this learner demographic (Chee, 2007). Game-based research is used to study learning environments, which are designed and systematically changed by the researcher (Squire, 2006). We believe that utilizing game-based learning to analyze and understand a particular learning concept is beneficial not only to obtain results but also because it provides the ability to modify the curriculum and to understand how game-based learning can enhance the learning environment for learners.

THE PSYCHOLOGY OF PLAY AND LEARNING

The concept of play, particularly in the context of learning, is complex and multifaceted, but a commonly accepted definition is "free movement" (Vygotsky, 1979, para. IV) which relates directly to learning in that learners can learn in different ways based on their intellect, developmental level, and past experiences. However, the learning process is constrained by rigid structures such as the "correct" answers and processes for the subject.

Play has always been considered a source of learning and can be used as a vehicle to communicate how new knowledge and ideas can be transferred in the classroom. Early philosophers, like Plato, believed that "play in childhood is preparation for future career" (Huang & Plass, 2009). Therefore, seeing that play is an already accepted mechanism for learning and recognizing that play exists in many forms of participatory culture gives rise to the notion that participatory culture is shaping the development of learning. Yet, the real learning challenge lies in connecting knowledge with decisions in the context of our everyday situations (Jenkins et al., 2009).

Play as a learning tool can be implemented in the learning environment. In game play, rules can be established to govern the learning content, but the learners would be free to learn differently. Through ludic activities, learners are engaged by the end-goal of learning something, although exact rules for achieving this goal are not established. In both of these examples we see that play can be transformative. In fact, transformative play, in the context of learning, is optimal for maximizing

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the zone of proximal development, as outlined by Vygotsky (1979). This is because changing the rigid structure of play in response to the participants' progress would effectively change the potential for effective interaction with the environment and instructors. A fitting example of this would be a computer adaptive learning tool that alters the learning framework based on the learners' previous answers. Maximizing learning for the learner would require the tool to recognize a pattern of answering and to develop an assistance module to effectively aid the user when answering subsequent questions.

Using games and simulated virtual worlds to explore is yet another way that participatory culture is shaping the evolution of a new learning landscape. Designing avatars or online characters in virtual worlds causes users to experiment with alternate identities or projective selves (Gee, 2003). These roles or "personas they assume in the game" (Jenkins et al., 2009, p. 47) represent different options for identities not only in the virtual world, but also in the real world. Without challenging the ethical position of identity experimentation in the gaming world, let it suffice to say that participatory culture exposes its users to multiple choices for self-identity which is necessarily a process in self-reflection and a valuable exercise in both social and work situations that generally leads to increased learning and understanding of a particular event. Klopfer (2008) defines games as "purposeful, goal-orientated, rule-based activity that the players perceive as fun" (p. 11). Games are great tools for learning content because they create authentic opportunities for 21st-century learners to build on previous knowledge and develop in-depth knowledge and skills. Games are highly engaging, interactive, and in order for a game to be effective in the learning environment it must be used effectively. Today's online learners desire interactive learning experiences and it is vital that through research, educators explore the possibilities of using emerging digital media technologies like games in the learning environment.

GAME PLAY STYLES AND PLAYER TYPES

Game researchers believe that player styles can be viewed as fluid. Users tend to move from one play style to another and engage in a wide variety of play styles at various times, and in different contexts. The five player types of learning games classified by the studies of Richard Bartle (2004) and Nick Yee (2004) include: Achiever, Explorer, Careless, Lost and Self-Validator. Achievers play games quickly and naturally focus on doing well or finding ways to achieve mastery. Explorers are slow players that tend to enjoy game mechanics rather than following game

guidelines. Careless players play quickly, but tend to make mistakes while doing so. Lost players, like Explorers, play games slowly; however, they make many errors and tend not to enjoy the gaming experience. Finally, Self-Validators are players that do not like failing. They desire easy game play with levels that are not challenging, easy to navigate and have the ability to quickly receive high scores. In learning games, Self-Validators worry about failing which leads to an interference with the learning process. Based on Heeter's (2009) definition of player types, Careless and Lost are considered ineffective learning styles which could be due to their lack of motivation to play games well while making numerous (and repeated) mistakes. In this chapter, we will briefly review the player types of Achiever, Explorer and Self-Validator as examples of successful learning styles for game play.

Achievers. Achievers require strict goals and increasing challenges. They would strive on playing games that offer specific point goals and performance measurements. Achievers thrive on goal-specific constraints that require overcoming obstacles, which in turn, offers them some sort of in-game reward. The game, Food Force, could be considered a game that Achievers would enjoy. In this particular game, players must complete six missions, in which they are tasked with assessing hunger, determining nutritional needs, buying and distributing supplies in order to help a country during a hunger crisis.

Explorers. Explorers do not necessarily need challenges during game play. If challenges are included, they should revolve around in-depth game content. Explorers enjoy testing hypotheses and studying the game-world through customization and free access to more game content. A sandbox game like Minecraft would be a preferred game choice for Explorers. Sandbox games allow players to roam freely through a virtual world. Players are not limited to invisible barriers or loading screens like other genres of games. Minecraft allows a broad range of ways to reach an objective and focuses on player creativity and construction. Players must build structures out of textured blocks in a virtual three-dimensional world, while surviving enemies and overcoming obstacles. Serious game styles can also add content and depth to interest Explorers and encourage players to experience intrinsic rewards from playing and learning (Heeter, 2009).

Self-Validators. Self-Validators require easier challenges where the game adapts to the skills a player is fond of and rewards players implicitly as they make progress through the game (Heeter, Magerko, Medler & Fitzgerald, 2009). Self-Validators also need games that offer them game play hints and clues, provide practice sessions,

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avoid negative feedback and allow them to hide bad performances. A game like Grand Theft Auto would suit the needs of a Self-Validator player type. Here, the player is free to do whatever he or she wants. More, specifically, Grand Theft Auto allows a player to gain points based on performing tasks successfully. A successful completion rewards the player with points and opens the opportunity to complete other tasks to get even higher rewards.

MOTIVATION, LEARNING AND PLAYER TYPES

Intrinsic and extrinsic motivations in games have implications for play styles and learning. Play styles coupled with motivation are what ultimately drive players to choose their game strategy. Achievers are motivated by extrinsic achievement goals like winning and approval. Explorers are motivated by intrinsic goals, taking an interest in the content of games. They also enjoy exploring ideas, role-playing, and game mechanics more than earning top scores (Heeter, 2009). Self-Validators appear to be motivated by rewards, such as achieving the highest score, and desire easy game successes.

Players gain competence through trial, error and feedback. Self-Validators are more likely to play learning games than entertainment games. Learning games offer these players success that is often linked to intelligence, ability and real-world advancement. Teachers can monitor in-game learner achievement while utilizing learning games. Game designers create learning games that often offer less negative feedback in order to cater to the Self-Validator players. Feedback that focuses on player performance can help push Self-Validators towards a mastery orientation.

ROLE OF MOTIVATION IN GAME PLAY

Motivation, whether intrinsic or extrinsic, can increase learning and engagement through the use of games. Games can facilitate choices in learning and have the ability to offer feedback about the effectiveness of the choice being made. In one particular game, CyberBully Avenger, players are presented with scenarios about cyber bullying and they have to make decisions about what to do. The most useful thing is that players get to see how the decisions they make affect others in the game by using real-life situations.

Secondly, games can help with supporting the learner, providing helpful cues to enhance self-directed learning. Games can be used to help learners understand what is relevant to the learning activity before having to complete the assignment. Games

tend to focus on certain topics and information for learning. They can encourage learners to be active learners.

Learners do their best work when engaged in activities such as educational games that are personally meaningful to them (Ryan & Deci, 2000). An example of how games can be used to increase motivation and active participation is through the use of virtual environments, such as Second Life. In this application, learners are avatars that can interact with one another. Educators can allow learners to meet virtually, create learning activities that allow the learners to explore the virtual world in real time (Dede, 2007). It is through this virtual environment that instructors can promote a different learning perspective that evaluates learner performance, monitors the interaction between classmates (peer learning), and fosters intellectual discussions or reflections online.

IMPLICATIONS FOR GAME DESIGN AND CURRICULUM DESIGN

Instructional design and game design deal with motivation, challenge, individual differences and social interaction. Learning outcomes and goals set by teachers are closely related to the goals presented in digital games. Just as different players play games in different ways, different learners learn in different ways. Learning styles influence curriculum design, just as play styles influence game design. Game designers create digital games catered towards player needs and interests. For the most part, game designers try to accommodate one player type.

> Game designers who want to accommodate both Achievers and Explorers can try to include something for everyone, but sometimes Achievers' and Explorers' needs are incompatible, forcing design choices that privilege one or the other form of preferred play.
>
> (Heeter et al., 2009, p. 7)

Game designers must consider the player types and learning styles they want to accommodate and encourage in their game and design games accordingly. The game designer will try to focus on pleasing a certain player type and learning style, rather than trying to please them all.

Educators create instructional strategies based on learner needs and interests. Learner motivation also plays a huge role in education. Teachers utilize learner

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motivation, both extrinsic and intrinsic, in the classroom. When using educational games in the classroom, teachers must consider not only the content and orientation of a game, but also, the individual characteristics like motivation of the learners, or in this case the player types. Characteristics like motivation, competition, social interaction and learning styles must be evaluated prior to introducing games in the classroom. Motivational principles for empowering learners include the "ability to grant power, autonomy, and challenge at a player's level and implications for learners' identity" (Foster & Mishra, 2011, p. 37). The learning style of learners details learner strengths and weaknesses, which must be understood when incorporating not only games in the curriculum, but also any instructional approach. According to Heeter (2009), "because educational games have learning as well as entertainment goals, learning game player types need to incorporate player-learner characteristics such as learning styles, abilities, and achievement orientation" (p. 3).

Digital games not only cultivate learner development, but also enhance skills needed in education, like trouble-shooting, trial and error, team building skills, problem solving, lateral thinking, concentration, memorization, information gathering, analysis, developing and testing solutions. Characteristics of digital games, like competition, challenge, exploration, fantasy, goals, interaction, outcomes, people, rules, and safety, relate to the educational process. Learners can develop a deeper comprehension of content by using trouble-shooting and problem-solving skills while playing games (Wagner, 2012). In conclusion, motivation, whether intrinsic or extrinsic, can increase learning and engagement through the use of games in the classroom. Thus, when games are closely tied to desired learning outcomes, learners are able to transform practical experiences into the classroom environment.

IMPLEMENTING GAMES IN THE ONLINE LEARNING ENVIRONMENT

Game-based learning applications, coupled with e-learning platforms, have created many possibilities for sharing and transferring knowledge and information to learners. This provides a potentially large cohort with games and simulation technologies that can be used more for engaging and supporting practices, as well as moving learning into informal domains, including knowledge management and performance support. Gaming applications that integrate learning and technology foster communication, problem-solving, and critical thinking skills and can be used especially in the distance environment to meet the required learning performance goals and standards.

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Games are great tools for learning content because they create authentic opportunities for 21st-century learners to build on previous knowledge and develop in-depth knowledge and skills. It is through gamification that the motivational power of games can be applied to real-world problems such as, in our case, the motivational problems of schools. Motivation and engagement are major challenges for the American educational system (Bridgeland, Dilulio & Morison, 2006). American schools also face a shockingly high dropout rate: approximately 1.2 million learners fail to graduate from high school each year (All4Ed, 2010). Understanding the role of gamification in education, therefore, means understanding under what circumstances game elements can drive learning behavior. Making use of Salen and Zimmerman's Rules, Play, and Culture framework (2003), we can better break down the impact of gamification. Gamification can change the rules, but it can also affect learners' emotional experiences, their sense of identity and their social positioning. Thus, this game-based approach to learning is supported by Leblanc's (2004) intrinsic motivation theory in which learners can change their identities as learners based on how motivated they are to learning the content.

TOOLS FOR GAMING

During your course, you may decide to use gaming as a way to actively engage your learners in the course. In addition to using gaming to engage learners, you can also develop summative assessments that look at certain skills of the learners, depending on the course. **Table 4.1** provides some examples of games that have been implemented into the learning environment.

THE ROLE OF SOCIAL MEDIA IN LEARNING

Learning in the 21st century now requires classrooms to be more participatory and collaborative, allowing learners to use social media technologies to network and to transfer material. And communication has allowed learners of differing perspectives to enter into a social platform where every learner has a voice, where learners have a learning community where:

- They believe that their contributions to the content matter.
- They feel more socially connected with one another and the instructor.
- They appreciate the feedback and responses they receive that shapes their learning perspectives and perceptions.

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Table 4.1 • Examples of games that have been implemented in the learning environment

Discipline	Game Type	Learning goal(s)
Architecture, Design, and Animation	Minecraft https://minecraft.net	Learners will be able to practice vital skills related to the subject-area, and produce a final product that can be used to assess their mastery.
Information Technology	Code Spell http://codespells.org	Learners can practice their coding skills, and the instructor can assess their process and final product.
History and Politics	iCivics www.icivics.org/games	Learners are given different civic roles which allows them to address real-world issues.
Mathematics	Dreambox Learning www.dreambox.com/k-8-math-lessons	Learners can practice math skills using games.
Social Science	Food Force www.download-free-games.com/freeware_games/food_force.htm	Learners can complete missions to help end world hunger. Basic skills include identifying the community and land areas, air assessment, and then must strategize a plan to resolve hunger issues.
Science	Quest Atlantis Remixed http://atlantisremixed.org	Learners can complete certain quests in a community-based virtual environment.
Engineering	Design a Parachute https://tryengineering.org/students/games	Learners are provided with the specific requirements and data in order to design test their prototype.

Cognitive development through participatory culture has a great advantage over traditional learning methods. Since around 2012, social media has been widely accepted by educators. Gee (2004) mentioned that "people learn best when their learning is part of a highly motivated engagement with social practices which they value" (p. 77). In fact, according to Jenkins et al. (2009), "educators have always known that learners learn more through direct observation and experimentation than from reading about something in a textbook or listening to a lecture" (p. 25). When social media tools are effectively incorporated into the learning environment,

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learners tend to be more engaged – this is a true example of learning mediated by the social positions and community contexts.

Figure 4.2 • A graphical representation of the types of social media applications used for learning
Source: Image used with permission of Shutterstock, Inc.

Table 4.2 provides some examples of social media tools that have been implemented in the learning environment.

Table 4.2 • Some examples of social media tools that have been implemented in the learning environment

Types of social media tools	Learning outcomes
Twitter	A tool that allow learners to interact and share ideas, post images, and communicate with each other in real time.
Instagram	An image capturing tool that learners can use to showcase their projects/sample work as well as post images from a city or local exploration.
Piazza	An online discussion area where learners can post questions and answers in real time. Mostly computer science and engineering learners like this tool because it includes LaTeX editor to allow coding and computations.
Pinterest	A bookmarking tool that allows learners to create and document their ideas visually using images/graphics.
YouTube	A tool that allows learners to create, post, and watch video presentation and provide feedback.

SUMMARY

Implementing gamification and social media in higher education is changing how courses are being designed and developed, especially with the rise in the use of mobile technologies. Today, learners more than ever have the opportunity to engage not only with the course material (within the classroom environment) but they are

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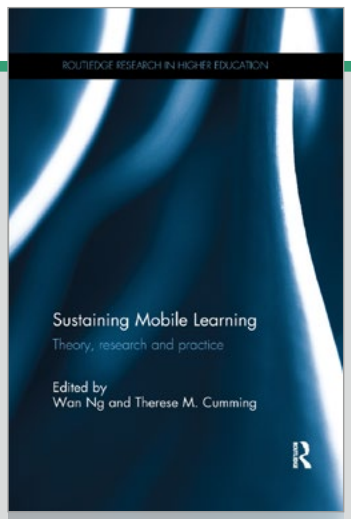
also able to create, collaborate, and articulate their practical experiences (outside the classroom environment). In this form of active learning, the roles of the instructor and student can be defined as either learning designers or players in which they are tasked to use game-based elements and social media to make decisions on how to use the course materials to demonstrate their learning in meaningful ways. In the next chapter, we will focus on the benefits and challenges of building social presence and participatory learning opportunities in online courses.

CHAPTER

5

ACHIEVING SUSTAINABLE MOBILE LEARNING

THROUGH STUDENT-OWNED DEVICES AND STUDENT-GENERATED MULTIMEDIA CONTENT



This chapter is excerpted from

Sustaining Mobile Learning: Theory, research and practice

edited by Wan Ng, Therese M. Cumming.

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INTRODUCTION

Despite a growing interest in mobile learning by both teachers and researchers, there yet remain many issues to be resolved before it becomes embedded in the normal educational practice of most institutions. As Ng and Nicholas (2013, p. 696) note, few mobile learning studies "conceptualise sustainable learning", and indeed few have sustainability as a central aim. Rossiter and Crock (2006, p. 287) remind us that sustainability has at its core "the capacity for an innovation … to grow and mature (rather than merely survive) within a particular system, without undue reliance on external interventions". It thus embodies the concept of long-term viability, rather than the typically limited duration of a subsidised project.

Achieving sustainability and knowing when it has been achieved are, no doubt, complex issues. Sustainability is not a one-dimensional concept but incorporates notions of widespread usage, integration into the institutional culture, legitimisation, and evaluation as to its effectiveness (Rossiter & Crock, 2006). However, evaluation of sustainability is often difficult. Traxler and Vosloo (2014) write of the paradox that evidence for sustainability is most often claimed from small-scale projects with short-term funding, which can tell us nothing of sustainability over time or of the potential of mobile learning on a larger scale. They further critique how mobile learning is usually evaluated in schools rather than outside school; and in formal educational settings rather than in informal or lifelong learning contexts. The greater difficulty of rigorous evaluation outside the controlled environment of the institutional setting is obviously the reason for this bias.

The literature cites a number of barriers which contribute to the lack of sustainability of mobile learning. Certainly costs associated with implementing mobile learning are often cited, and these include the more defined expense of purchasing mobile devices and off-the-shelf applications, as well as usage charges which, due to their unpredictability, educational institutions are rarely willing to fund (Dyson et al., 2009). The rapid evolution of mobile technology exacerbates this issue, with devices becoming obsolete in a short time span, so that choice of and support for technology becomes an issue (Traxler, 2005). In addition, teachers often have little money to pay for the development of content or applications, and seldom have the time or skills to create the sophisticated multimedia resources that the current generation of students increasingly expects. Whilst there is a wide range of multimedia resources and apps available for free or at only a small cost for school education, the availability of mobile learning resources suitable for higher education is less clear. Given the more specialised nature of university courses and the tendency of academics not

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to follow a standardised curriculum, but instead to build their courses around their own research and expertise, there is a need to develop new multimedia content for university-level programs. Thus there is a pedagogical issue, both from the teachers' point of view but also with regard to students' preferred ways of learning. These barriers fall roughly into three aspects of Ng and Nicholas' (2013) framework for sustainable mobile learning: economic sustainability, technological sustainability and pedagogical sustainability. These will be the focus of this chapter.

Notwithstanding the previously mentioned obstacles to sustainable practice, in the sphere of higher education these barriers can be overcome. On the one hand, almost all university students own a mobile device, such as a smartphone or tablet computer, which owing to convergence possesses a range of functions which lend themselves to various learning activities. This can reduce the need for institutions to buy devices in the first place or replace devices when they become obsolete (Dyson et al., 2009). On the other hand, the interest and capabilities of our students in creating user-generated content in their private lives (for example, uploading photos and videos to social networking sites such as Facebook and YouTube) can be harnessed by having students create podcasts and other content as part of rich learning activities and also for later re-use as resources by their peers (Dyson, 2012). This can save the time and cost of producing or buying multimedia resources while keying into the power of peer learning. It further reduces the need for teachers to develop the multimedia production skills required to make resources which provide a compelling listening or viewing experience.

To illustrate these opportunities, two examples from the author's research and teaching will be given. Both of these have resulted in sustainable practice over a period of several years since they were initially introduced, and well beyond the period of initial project funding. The first case study examines the Bring Your Own Device (BYOD) strategy where accounting students use their own smartphones, laptops or tablets as an alternative to "clickers" to respond to questions in lectures. In this way students have become more actively engaged in their learning and gained formative feedback. The second case study involves student-generated multimedia content where Information Technology (IT) students create vodcasts (video podcasts) of interviews with IT professionals as part of an assignment to enable students to learn more about careers in their future profession and to contribute to an ongoing resource library of career vodcasts. These case studies provide two examples of how to move forward in seeking sustainable mobile learning in the university sector.

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OPPORTUNITIES FOR SUSTAINABLE MOBILE LEARNING

BRING YOUR OWN DEVICE (BYOD)

BYOD has gained a growing number of advocates over recent years. Prensky (2004) was one of the first to suggest using students' own mobile phones in education, posing the challenge: "How to use the 1.5 billion computers already in our students' and trainees' pockets to increase learning?" The technological development of easy-to-use, multifunction, networked mobile devices at low cost, together with practically ubiquitous WiFi and cellular networks, has resulted in their widespread adoption by consumers and their embedding in personal and business use. Now that nearly all university students own a mobile device of some kind, there is a huge opportunity to extend this practice to the educational sphere.

The shift from university supplied devices to BYOD has several advantages. Most obviously it saves on the purchase price of equipment for student use, but student-owned devices inevitably come with software, storage and access to a telecommunications provider, so that the savings extend beyond the actual hardware. One university IT administrator noted, it is "really BYOE ('E' for everything)" (McPherson, quoted in German, 2013, p. 24). Moreover, the devices that students are bringing with them to university replicate to a large extent the capabilities of the technology provided by universities, technology which is largely paid for by students themselves in their tuition fees. Given this duplication, the university's provision of desktop computers does not represent a sensible allocation of university funds. Instead, German (2013, p. 18) recommends that, "[w]e need to embrace BYOD not to save money but to be able to spend money instead on specific technical capabilities that our community members really need from us and that they find unquestionably valuable".

The BYOD movement represents a change in the way that universities think about students and technology. It replaces the standardised roll-out of desktop computing and fixed-line connections with a more personalised approach which reflects students' preferences in terms of device type, platform, apps (applications), interaction styles and ubiquitous connectivity. Campbell (quoted in German, 2013, p. 12) sees it as promoting "agency, customization, and improvisation" and an expression of the "meaningful learner individuation" that we associate with a democratic system. As such, BYOD, as a means of addressing concerns about the cost of mobile learning, also addresses the needs of students living in a mobile world. At this time, it means mobile learning with smartphones, since this is the number one device in terms of student ownership (Norris, & Soloway, 2011), but in the future this could well change

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since the sale of tablet PCs and iPads is growing rapidly, with these devices being now owned by more than half of Australian adults, for example (AIMIA, 2013).

Shifting to a BYOD strategy is not without its potential difficulties, of which the various stakeholders will need to be aware. Some challenges highlighted in the research literature include (Adams, 2012; German, 2013; Patten & Harris, 2013):

- the need for greater bandwidth as students potentially connect to the university wireless network with multiple devices simultaneously;
- issues of providing support for a diversity of devices and operating systems;
- how to maintain security of data when the devices accessing the network are outside the control of the IT administration and often poorly managed by students from a security point of view; and
- the equity issue, if students from low socio-economic backgrounds do not own devices required for the mobile learning activities designed by their teacher.

Some of these issues will be addressed in the BYOD case study presented later.

STUDENT-GENERATED MULTIMEDIA CONTENT

There is an increasing interest in student-generated multimedia content, paralleling the rise in user-generated content on the Web. Technological convergence has, no doubt, been a major enabler of this phenomenon (Dyson, 2012). Smartphones and tablet PCs or iPads are prime examples of the converged device, combining computing, communication, Internet connectivity and recording functions. These characteristics allow for:

- capture of content in and out of the classroom;
- short-term storage of this content on the device;
- sharing of content with other students and with the teacher; and
- the ability of most students to purchase a device in the first place (Dyson, 2012).

These devices have an affordance "as tools for complex and sustained tasks and problem solving", including authentic learning activities, data gathering in the field and the creation of multimedia content (Herrington & Herrington, 2007, p. 7).

Many approaches to student-generated multimedia have been developed, although some have been more widely adopted than others. One of the earliest and most successful approaches was digital storytelling (Lambert, 2002), a very powerful way

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of engaging students, more often used in school education than higher education. Slowmations are a more recent approach, a type of simple stop-go animation, which has been developed for use in primary school science education or for educating trainee primary school teachers about science concepts (Hoban, Loughran, & Nielsen, 2011; Hoban & Nielsen, 2013, 2014). Screencasts are a form of multimedia content which began as expert-generated but have started to shift in recent years to student-generated (Mohorovičič, 2012; Rocha, & Coutinho, 2011; Shafer, 2010). Podcasts and vodcasts are likewise media most often made by experts, either teachers or content developers, for students to listen to or view. More recently, examples of student-generated pod- and vodcasts have appeared in the literature (Dyson, 2014; Lee, McLoughlin, & Chan, 2008; McGarr, 2009).

The contribution of student-generated multimedia content to sustainability may be examined from two different perspectives. First, it reduces the cost to the educational institution of buying or commissioning multimedia content for the creation of learning resources and thus makes mobile learning more sustainable economically. Second, given that institutions seldom have sufficient money to pay for the development of custom-made multimedia resources and the burden for this more often than not falls on the teacher, it contributes to pedagogical sustainability in saving teacher time: both the time for teachers to develop the skills in multimedia design, production and editing, as well as the actual time producing the resources once the teacher possesses the necessary skills.

Like the BYOD approach, student-generated multimedia projects recognise that students' everyday technology preferences and practices should be incorporated into their learning. Students who have been exposed to technology for most of their lives require new pedagogical methods to engage them (Tapscott, 1998). Students' interest in and skills for producing user-generated multimedia in their spare time can be harnessed in creating student-generated learning resources for teaching discipline-specific content to their peers.

In order to do this well, they must have a deep understanding of the topic since to explain a concept one must know it (Frydenberg, 2006; McGarr 2009). Some authors go so far as to suggest that it is the very awareness of their peer audience that spurs students on to produce their best work in order to maintain the respect of their fellow students (Wheeler, Yeomans, & Wheeler, 2008). The authentic voice of the students emerges as they express their creativity, sense of humour and individuality (Frydenberg, 2006).

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CASE STUDY 1: A BYOD STRATEGY TO REPLACE CLICKERS IN LARGE LECTURES

BACKGROUND: INTERACTIVE CLASSROOM SYSTEMS

Interactive classroom systems have been in use at universities since the 1960s for improving student engagement, interactivity and formative feedback in large lectures (Judson & Sawada, 2002). They are known under a number of names, including personal response systems, electronic voting systems or simply "clickers", from the wireless devices that students regularly use to input their answers. They allow the instructor to put a question to the class which students answer electronically, and the combined class response is displayed on a large screen in the lecture hall, usually in the form of a histogram. This is followed by immediate feedback from the instructor and if necessary questions from the students and a discussion. These interactive systems recast an otherwise usually passive, teacher-centred instructional situation (where the lecturer talks and students listen) into a more active learning process. They have been deployed in a range of disciplines where large lectures are the norm, such as business, science, medicine, information technology and engineering (Carnaghan et al., 2011; Draper, & Brown, 2004; Laxman, 2011).

Despite their many pedagogical benefits, their use in large lectures is still comparatively low (Carnaghan et al., 2011). There are several issues with the current clicker-based technology which act as major disincentives to academics. Firstly, cost is an issue, both in terms of the price of the clickers and receivers as well as the cost of technical support to install and maintain the software and hardware (Mundy, Stephens, & Dykes, 2010). If the university is subscribing to a commercial provider, then the cost of subscription (which includes access to the management system for uploading questions and viewing individual student performance, as well as technical support from the vendor) needs to be taken into account. Moreover, academics may find the management software complex to use, particularly as vendors introduce more functionality into their systems: Carnaghan et al. (2011, p. 279) note that "[w]hile the range of options allows the instructor great latitude in how to personalize usage, learning how to access and effectively use all the possibilities can be challenging". Perhaps the most important challenge associated with clickers is their cumbersome nature: carrying enough clickers to class to serve all the students and the time taken to distribute them at the beginning and collect them at the end of the lecture may be beyond the capabilities of the lecturer unless a teaching assistant is employed, which obviously adds to the cost (Freeman et al., 2007).

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A more sustainable approach to interactive lectures is asking students to respond using their own technology. This eliminates the cost of buying clickers, the logistics and security challenges with the issue and return of devices, and the technical problems reported with software installation (Freeman et al., 2007). One approach is to collect students' responses to short answer or multiple-choice questions via SMS, with students texting from their mobile phones to a system installed on the lecturer's computer (Lindquist et al. 2007; Scornavacca, Huff, & Marshall, 2009). An alternative approach, that has gained traction in recent years with the rise in student ownership of smartphones, is for students to communicate via the Internet. The students usually log onto a designated website to answer questions using their smartphone, tablet or laptop, or less commonly they use a smartphone app to answer (Rubner, 2012). If lecture halls have access to a campus-wide wireless network, students can answer questions for free, or otherwise pay a small charge to their mobile service provider. Lecturers also access the system via a website to upload questions prior to class, and in the lecture activate the display of class results directly from their slides using an embedded link. Some commercial vendors of clicker-based systems are now offering proprietary Internet-based systems as an alternative (Carnaghan et al., 2011). In addition, there are several Internet-based systems reported in the literature that have been developed by universities or research institutions, some of them restricted to in-house use (e.g., *mbclick*: Rubner, 2012), while others are available to anyone for free (*VotaPedia*: Habel, 2011).

THE CASE: AN INTERNET-BASED INTERACTIVE CLASSROOM SYSTEM USING STUDENTS' OWN DEVICES

The case reported here concerns an Internet-based interactive system that was first developed in late 2007 at the author's university. In 2008 it was implemented in an introductory accounting course and has been used continuously ever since. Because the subject in which it was introduced was very large, with one two-hour lecture per week repeated across four groups of approximately 300–400 students each, the lecturer was concerned about the need for a system that was simple to use, both from his and the students' point of view. He recognised that, with such large numbers of students taking the subject, the logistics of distributing and collecting clickers before and after the lecture would be too unwieldy.

In 2008 most students owned mobile phones, so that asking them to use their phones or laptops to answer questions seemed a reasonable alternative. A major Australian survey of first-year university students at the time had shown that 97.3%

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owned or had access to a mobile phone (Kennedy et al., 2008). Despite this, the lecturer was disappointed the first semester the system was introduced to find that on average only about 15% of the class used the system to answer questions, with a maximum of 33% electronic participation at any one time. various reasons were given by students when surveyed as to why they were not logging in: some did not have Internet-enabled mobile phones or laptops; some were put off by concerns over cost since they believed that all Internet use on mobile phones was very expensive; while others did not know how to log onto the Internet from their phones as they had never done it before or were not even aware as to whether their mobiles were Internet-enabled or not (Dyson et al., 2009). However, there was a high level of satisfaction with the system, since students who did not answer electronically often participated by answering "in their head" and appreciated the feedback and interactivity. So, in spite of the low electronic participation, the BYOD strategy was deemed to have been sufficiently successful to warrant its continuation.

In subsequent years, student ownership of mobile devices with Internet capability has increased and students have begun to access the Internet from their devices as a matter of everyday practice. A survey of the first-year accounting students in 2013 showed that students brought the following mobile devices to lectures: 99.9% brought a mobile phone, 45.6% brought a laptop, and 17.2% brought a tablet PC or iPad. Only 3.7% of the students had no Internet-enabled device with them in lectures. When asked how often they normally accessed the Internet from their phone, most stated that they accessed it several times every day. As might logically be expected from these new figures, the level of electronic participation in class with the interactive system grew enormously compared to 2008. At the end of semester, only 6.5% of students stated that they had never answered a question electronically in lectures, with a further 9.3% who had only answered the questions once or twice. Of these students who had never or seldom answered the questions electronically, 3.8% stated that they found the system useful even though they did not use it, leaving a remaining 12% who neither used it nor found it useful. Thus the BYOD strategy had proved highly successful as the technology and students' familiarisation with it matured over time. For all but a small proportion of students the interactive classroom system operating from students' own devices was recognised by them as a worthwhile innovation in the large lectures.

With respect to the equity concerns that are often raised with BYOD approaches, these were addressed in two ways, one a technological approach, the other a pedagogical one. First, the system was designed to minimise the cost to students

of their interactions through a very plain student web interface which reduced data transmission. If students were unable, for whatever reason, to access the university wireless network to answer the questions, and had to answer using their own mobile service provider, the minimalist design meant that costs to them were very low. The calculation of transmission costs in 2008 showed that answering a single multiple-choice question using one's mobile service provider cost two cents when measured on a prepaid phone. With the lecturer normally asking three or four questions per lecture, this resulted in a cost to students of less than one dollar per semester. With changes to billing practices since 2008, costs have in fact declined and the cost of interactions is now regarded as a negligible part of most students' data plans: when an attempt was made to ascertain the cost of an interaction in 2013, it was so low that it could not be measured. Second, students have always been allowed to choose whether they answered individually or discussed the question with those sitting next to them and input one answer for the group. This is possible as students are not required to register to use the system and their answers are not graded, unlike the practice sometimes adopted with clickers. As well as removing the equity issue and allowing every student to participate, even if they do not own a device with Internet connectivity or are unsure about incurring transmission costs, this strategy fosters collaborative learning for those who choose it.

Therefore, the adoption of a BYOD approach to improving interactivity and feedback in large lectures proved successful and continues to the present day in this introductory accounting subject. It has also proved sustainable on a number of levels:

- It is economically sustainable, in that the university did not need to purchase clickers and the management software that is required to support them. Importantly, the university does not need to find the necessary recurrent funding for accessing the services of clicker vendors. Although there was a cost in developing the Internet-based interactive classroom system, since no software of equivalent technical sophistication was available at the time, this was a once-off development that fitted within university grant funding models.
- It is technologically sustainable, since students provide their own devices which they know how to use, without requiring support from the university, and which they will replace if their devices become obsolete or dysfunctional. The interactive system has proved robust and, should it fail, there are now very similar interactive systems available for free on the market which could replace the in-house system if necessary (e.g. *mQlicker*).

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- It is pedagogically sustainable, since the lecturer was able to introduce an improved learning and teaching approach on a permanent basis without the logistic difficulties of distributing and collecting clickers and worrying about loss of devices in the process. From the viewpoint of the students, they have benefited from a more engaging style of lecturing, and have voiced their appreciation in surveys of receiving immediate feedback and correction of misunderstandings

CASE STUDY 2: STUDENT-GENERATED VODCASTS AS A MEANS OF PROVIDING MULTIMEDIA CONTENT

In recent years there has been an increased demand for the provision of self-study learning resources to students. Certainly, major drivers of this demand include both the increased interest in MOOCs (Massive Open Online Courses) and flipped learning, where students study lecture content before the lecture and then the lecture time is spent discussing the pre-studied content. This is over and above the need for learning resources for distance education and e-learning that has been in existence since the introduction of the Internet to education in the 1990s. Even in face-to-face courses, supplementary materials are often provided to enhance opportunities for learning. This case study deals with the latter: the provision in a face-to-face course of non-standard learning resources which were found difficult to locate either in books or in a suitable form on the Internet.

The IT Careers vodcast Project, which is the subject of this case, began with the recognition that students choosing to pursue a degree in IT often know very little about the types of employment to which their course of study is leading them. In order to address this situation, a careers assignment was introduced as a collaboration between the faculty and the university Careers Service in which students interviewed IT professionals in their workplace to find out more about their career. It was placed in a core subject, in which enrolment numbers are large, approximately 400 students in the first semester of the year when most school leavers enter university, and about 130 students in the smaller mid-year intake. Thus, like the accounting course discussed above, it was challenging in terms of the scale of enrolments.

In the first iteration of the assignment an attempt at sustainability was made by forming students into large teams of nine members each. In addition, only one student from each team went to the workplace to interview an IT professional about their career, with several students from different teams interviewing the same person simultaneously. This greatly reduced the number of IT professionals whom

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the Careers Service had to locate who were willing to be interviewed. Furthermore, the large team size decreased the number of presentations that the IT lecturer needed to schedule when teams were asked to present their findings orally to all the other students enrolled in the subject in a joint presentation schedule.

Following this first attempt, the assignment was withdrawn as it was deemed a failure from a pedagogical point of view. Ironically, the very measures that had been introduced in an attempt to make the project sustainable undermined its educational effectiveness (Dyson, 2014). For the students, the teams were too large so that many complaints about "loafing" were voiced since most of the work had been carried out by the students who conducted the interviews. Furthermore, these students were the only ones to gain the benefit of talking to an IT professional and seeing how the IT workplace functioned. Having these students tell their team members what they had found out was not nearly as powerful as the fieldwork experience itself. For the lecturer, the main issue was the logistics of organising a mass presentation in which all teams presented their findings to all other teams. Trying to find times that suited all students, given their different timetables, and a lecture theatre that was available was not easy.

The basic premise of the assignment, however, was still seen to be valuable and therefore was revived the following year in mid-2009, once the lecturer and tutors had had time to reflect on what had been learnt. various pedagogical improvements were introduced including reduction of team size and allowing all students to take part in the fieldwork. The main change in terms of sustainability was the video-recording of the interviews in the workplace. The videos were shown in the students' tutorials and edited to create short vodcasts for sharing via the LMS with all students enrolled in the subject. This eliminated the need to organise a single large face-to-face presentation. A small university grant supported the reintroduction of the assignment, and this allowed for the purchase of some high quality, professional-grade video and sound recording kits. In addition, it facilitated the hire of a video expert, who located free resources on the Internet regarding appropriate file formats and editing. Links to these were made available to students, and continue to be used to the present day. Over time, the sharing extends beyond the semester in which students are enrolled as a library of vodcast resources about a wide range of IT careers has gradually evolved for viewing by students in subsequent semesters.

With the success of the IT Careers vodcast Project, some further measures were introduced to ensure sustainability and scalability with the larger intake of students

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at the beginning of the year. The two challenges were locating sufficient interviewees, and providing enough video kits for all student teams. The first issue was solved through a request by the university Careers Service to the Australian Computer Society (the leading IT professional society in Australia) to assist with locating willing interviewees, in addition to using the faculty's existing IT industry contacts. Also, students were asked to find their own interviewees if they knew someone working in the field, while some part-time students who were already working in IT volunteered to be interviewed by other student teams. The second challenge regarding video equipment was solved by purchasing second-hand video cameras that another faculty no longer needed; the success of the assignment meant that funding was readily obtained for this. Moreover, the BYOD strategy was brought into play: some students used video cameras they or their families owned, or used their smartphone. The increased ownership of smartphones, as described earlier, meant that most teams had access to one and the video quality was quite sufficient for the purpose. (To reduce file size for upload to the LMS and easy download for viewing, students were advised against high definition video.)

The assignment has now been offered continuously, twice per year, since it was introduced as a student-generated vodcast project in 2009. It has achieved sustainability in the following ways:

- It is economically sustainable, in that students make the content for free for their peers to view, and enjoy being asked to do this. In addition, some students have been happy to follow the BYOD approach, even if many like using the high quality video recording kits provided, usually their first experience of using professional grade video equipment. The cost of purchasing new and second-hand equipment has been able to be borne by the faculty, given efficient arrangements for its hiring and return to minimise the quantity of equipment required.
- It is technologically sustainable, since students produce their vodcasts in standard file formats viewable on any computer.
- It is pedagogically sustainable, since the activity is highly motivating, provides rich learning experiences for the students and has resulted in statistically significant achievement of the target learning outcomes, as self-assessed by the students (Dyson, 2014; Litchfield et al., 2010).

For the lecturer, the main effort was in carefully designing the assignment and providing a comprehensive description for students to follow, and in hiring someone to source free support materials on the Internet during the first semester it was offered. The marking of the vodcasts is mostly an enjoyable and fairly quick task

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for tutors. Moreover, students work in teams, supporting each other on a largely self-directed project, with little need of help, apart from assistance from the Careers Service in locating interviewees at the beginning of each semester, which it sees as part of its role.

CONCLUSION

Though there are many challenges to achieving sustainability in mobile learning, there are also solutions to overcoming these challenges, if teachers and institutions are willing to embrace them. Two strategies for achieving sustainability, which are particularly suitable to higher education, are the BYOD approach to reducing or eliminating the cost of mobile devices, and adopting student-generated multimedia content as a way of providing resources to support students' learning. The application of these approaches to other areas of education is also a possibility. Certainly, student-generated multimedia, such as screencasts and slowmations, have been implemented successfully at the primary school level (Kervin, 2007; Rocha & Coutinho, 2011). However, BYOD is still not a reality in many schools due to policies banning student-owned mobile devices, particularly mobile phones, to manage what are perceived as ethical risks. However, these bans do not serve student interests well, either in terms of providing students with the benefits of mobile learning or preparing students for living in a mobile world (Dyson et al., 2013).

Both the BYOD and student-generated multimedia approaches fit well with widely accepted learner-centred pedagogies. They acknowledge students' agency in choosing which digital devices they should use in their education as much as in their private lives. Moreover, they recognise students' right to individual expression through multimedia content production, a practice consistent with the user-generated content that is now part of their world. The two case studies presented here demonstrate the sustainability of these two approaches economically, technologically and pedagogically. Sustainability has been achieved over a period of over five years and hopefully will inspire other teachers to adopt these innovative techniques.