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A.W. (TONY) BATES

TEACHING IN A DIGITAL AGE

Guidelines
for designing
teaching and

2ND EDITION learning

Teaching in a Digital Age - Second Edition

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Guidelines for designing teaching and learning

A.W. (Tony) Bates

TONY BATES ASSOCIATES LTD.
VANCOUVER, B.C.



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Scenario A: A university professor addresses change

Overheard in a coffee shop near campus:

Hey, Frank, you don't look too happy.

Yeah, I'm mad as hell. Our Dean called a meeting yesterday of all faculty to discuss the university's new academic plan, and what it means for all the academic departments in the Faculty. I knew there had been meetings earlier in the year, a few of which I'd attended, but it seemed to be the same old waffle about building a university fit for a new age, and revolutionizing the way we teach. But those discussions didn't seem to affect the courses I'm teaching – it was clear early on that there was no threat to the department being closed down. If anything, it looked like my classes would be getting even bigger, with the usual statements about having to do more with less. My research is going well, and there was no talk this time round about having to take on an increased teaching load. At that point, I'd switched off: I'd been through all this many times before.

But as soon as the dean started yesterday, I sensed trouble. He started talking about the need for the department to be more 'flexible' in its teaching. What the hell does that mean – yoga exercises at the beginning of each lecture? Then he went on to talk about 'defining clear learning outcomes' and 'personalizing learning.' Well, that's stupid. Anyone knows that you have to internalize what you learn or it doesn't happen. And my courses are changing all the time – if I set outcomes even at the beginning of a course, they'll probably be different by the time we get to the end.

But then the real kicker, when I knew things were going to be difficult. 'We want to have at least 50 per cent of all classes taught in a blended or hybrid manner within the next five years.' OK, I guess I could handle that – I've been using the LMS to back up my lectures already, but when he said that means offering the same content across different courses, and getting rid of most lectures, I really started to worry. He started rambling on about needing to serve all kinds of learners from high school entrants to lifelong learners, and for us all to teach in teams, with the senior faculty member as a teaching consultant. Now if he thinks I'm going to let some of the other idiots in this department decide what I'm going to teach, he's out of his mind. The scary part is that I think the Dean really believes all this claptrap.

But when I really started to panic is when he said we would all have to start taking courses on how to teach. Now I get pretty good student ratings for my lectures – they just love my jokes – and I'm NOT having anyone telling me how to teach my subject. I'm one of the top people in my area of research in this country, and what the hell does the administration know about how to teach it? And when am I going to find the time, anyway, to take courses? I'm already working flat out. Why don't they just leave us alone, and trust us to get on with the job we're paid to do?'

If any of that rings a bell, this is the book for you.



*For my comments
on the scenario,
click on the
podcast below*



About the book – and how to use it

This is the second edition of *Teaching in a Digital Age*. The first edition was published in April 2015. All changes to the first edition are in this green colour text.

i. Why this book?

Teachers, instructors and faculty are facing unprecedented change, with often larger classes, more diverse students, demands from government and employers who want more accountability and the development of graduates who are workforce ready, and above all, we are all having to cope with ever changing technology. To handle change of this nature, teachers and instructors need a base of theory and knowledge that will provide a solid foundation for their teaching, no matter what changes or pressures they face.

Although the book contains many practical examples, it is more than a cookbook on how to teach. It addresses the following questions:

- is the nature of knowledge changing, and how do different views on the nature of knowledge result in different approaches to teaching?
- How do I balance the demands of my discipline with developing the skills that students will need in a digital age?
- what is the science and research that can best help me in my teaching?
- how do I decide whether my courses should be face-to-face, blended or fully online?
- what strategies work best when teaching in a technology-rich environment?
- what methods of teaching are most effective for blended and online classes?
- how do I make choices among all the available media, whether text, audio, video, computer, or social media, in order to benefit my students and my subject?
- how do I maintain high quality in my teaching while managing my workload?
- what are the real possibilities for teaching and learning using MOOCs, OERS, open textbooks?

In summary, the book examines the underlying principles that guide effective teaching in an age when everyone, and in particular the students we are teaching, are using technology. A framework and a set of guidelines are suggested for making decisions about your teaching, while understanding that every subject is different, and every teacher and instructor has something unique and special to bring to their teaching.

In the end, though, the book isn't really about teachers and instructors, although you are the target group. It's about helping your students to develop the knowledge and skills they will need: not so much digital skills, but the thinking and knowledge that will bring them success in a digital age. For that to happen, though, your students need you to be on top of your game. This book is your coach.

ii. The audience for the book

The audience I am reaching out for are primarily college and university instructors anxious to improve their teaching or facing major challenges in the classroom, such as very large numbers of students or rapidly changing curricula, and also to many school teachers, particularly in secondary or high schools anxious to ensure their students are ready for either post-secondary education or a rapidly changing and highly uncertain job market. In particular the book is aimed at teachers and instructors anxious to make the best use of technology for teaching.

I draw many of my examples from post-secondary education, but many of the principles will also apply to teachers in the school or k-12 sector. However, as a former elementary/primary school teacher, I am well aware that schools have far fewer resources and less technology support than colleges or universities.

Throughout this book, I have struggled with the term ‘instructor’, because I argue that we need to move from a transmission model of education (‘instruction’) to the facilitation of learning (‘teaching’), even or especially in post-secondary education. However, the term ‘instructor’ is often used to distinguish between post-secondary and school or k-12 systems, with ‘teachers’ being used for the latter, so throughout the book, I’ve tended to use both terms almost inter-changeably. However, my hope is that we will all eventually become teachers rather than instructors.

Lastly, although technology is a core focus of this book, I am not advocating ripping up the current human-based educational system and replacing it with a highly computerised model of teaching. I believe that although there is a great need for substantial reform, there are many enduring qualities of a well funded and publicly supported education system based on well trained and highly qualified teachers that will be hard if not impossible to replace by technology. The focus here is in making technology work for both learners and teachers.

iii. Why an ‘open’ textbook?

Although I retain the copyright through a Creative Commons CC BY-NC license, this book is ‘open’ in all five ways described in [Chapter 11, Section 2](#):

- re-usable: you are allowed to use all or part of the work for your own purposes (for example, you can download any part or the whole of the book, and use it in your own teaching or studies, without needing to ask for permission or to pay anything);
- re-distributable: you can share the work with others (for example, you can e-mail a section of the book to a colleague or fellow student);
- revisable: you can take any part of the book, and change it for your own purposes, or translate bits of it or all of it into another language, again without needing to ask for permission;
- re-mixable: you can take parts of this book and combine them with other ‘open source’ material or resources to create a new resource (for example, take some of the podcasts from this book and combine them with text from another open textbook to create a new work);
- retainable, which means there are no digital rights management restrictions (DRM), the content is yours to keep, whether you’re a teacher or student.

There is only one restriction on all five activities, and that is that you acknowledge me as the source

(unless I am quoting someone else, or using someone else's material, of course). Full attribution is particularly important as an example for your students, who need to acknowledge their sources! Also, if you do find the material in this book useful, I would appreciate your sending an e-mail to tony.bates@ubc.ca with any feedback about how you are using the content, and how the book could be improved, but this is just a request, so I can improve the book and track how it is being used.

The first edition was published as I wrote it, a chapter at a time. I published the first draft of most sections in my blog, [Online Learning and Distance Education Resources](#), to get feedback. I did the same for the new sections of this edition. This book is published as an open textbook for many reasons, but the main one being that I see open publishing as the future for education. In a way, this book is a proof of the concept of open publishing. I could not have done this without excellent support from [BCcampus](#), which at the time of writing is leading a major [open education initiative](#) for the provincial government of British Columbia in Canada, and without additional support from [Contact North](#), Ontario.

iv. Independent reviews of the book

Shortly after publication of the first full draft of the book, I requested three independent experts in the field to review the book. The process that was followed, and the full, unedited reviews, can be seen in [Appendix 3. This book was also independently selected and reviewed by MERLOT.](#)

v. Different ways to use the book

If you have found your way to this book website, you can read it off the screen at any time and anywhere. Just bookmark the [home page \(https://pressbooks.bccampus.ca/teachinginadigitalagev2/\)](https://pressbooks.bccampus.ca/teachinginadigitalagev2/) then click on any chapter heading or any section in the content list.

The book will download in pdf and ebook versions, so you can print out or download the whole book if you wish, for straightforward reading. In general, it is best to read the book online direct from this website, if you can, as when it exports to different versions, sometimes the illustrations get moved around to fit the page or screen layout. Also reading on the small screen of a mobile phone may be somewhat frustrating as the graphics will be very small. Reading on tablets should not be a problem, except the graphics may not always fit as intended.

You can also buy a print copy – just click on the relevant button. However, if your institution has print-on-demand facilities, it will be cheaper to download the pdf version and print locally.

The book can also be cloned, so you can edit or adapt the book or parts of the book for your own use.

You will see from the book website that the book is now available in at least seven languages. More are being added. All these translations have been done by volunteers in their own language, again demonstrating the power of open publishing. If you wish to do a translation, please let me know but otherwise you are free to do so. Just remember though that the book cannot be sold commercially under the terms of the license, even in translation.

The book is written on the assumption (based on research) that most reading will be done in chunks of one hour or less, so each section of a chapter can be completed in one hour at the maximum (some sections will be much shorter).

Many of the sections will have suggested activities, which mainly require you to reflect on how what you have read relates to your own work or context. These activities will usually take no more than 30 minutes each.

Each chapter begins with a set of learning goals for the chapter, the topics covered, a list of activities for the chapter, and the key takeaways or main points made. To access this, just click the chapter heading

(e.g. [Chapter 1: Structural Changes in the Economy](#)). [Note that text in red indicates a live link/url – just click on it to activate it. This doesn't always show clearly on screens under certain conditions so run your cursor – or finger on mobile devices – over the text to see where the links are.] The arrows [in the red section at the bottom](#) of the page will take you either to the previous page or the next page.

There are many different ways this book could be used. Here are some suggestions:

- straight read through (over several days) for personal use: this is probably the least likely, but there is a logical sequence and a continuous, coherent argument that builds up through the book;
- read a specific chapter or section that is useful for you, and come back later to other sections or chapters as you need them (use this preface and/or the list of contents on the home page as a guide);
- do the activities that follow most sections;
- use the book as the core reading for a course (or part of a course) on how to teach in a digital age. You can use the activities I have suggested, or, [if you clone the book, you can edit it](#) and replace the activities with your own.
- at the time of writing it is NOT possible to [clone just sections of the book, but you can use the Pressbooks XML file to import specific chapters.](#)

There are also:

- [podcasts and occasionally a video giving my personal spin on each chapter,](#)
- [a search facility at the top right corner of each page – just type in the word or phrase you are looking for,](#)
- [a full bibliography containing all the references in the book](#)
- [there is no index: use the search engine \[Search in book \(Q\)\] located at the top right of each section. Type in the term or name you are looking for. It will provide a list of the sections where this term or name is used..](#)

This book – as indeed are open textbooks in general – is a work in progress, so keep checking back to see what new features are being added over time. As new developments occur, I will try to ensure that they are incorporated so that the book stays up to date (also you can follow [my blog](#)). I will also make changes based on feedback from readers.

vi. An overview of the content

[Chapter 1 Fundamental change in Education](#)

This sets the stage for the rest of the book. Chapter 1 looks at the key changes that are forcing teachers and instructors to reconsider their goals and methods of teaching, In particular it identifies the key knowledge and skills that students need in a digital age, and how technology is changing everything, including the context in which we teach.

Chapters 2-4: Epistemology and teaching methods

These chapters address the more theoretical and methodological aspects of teaching and learning in a digital age.

[Chapter 2](#) covers different views on the nature of knowledge and how these understandings of knowledge influence theories of learning and methods of teaching.

[Chapter 3](#) analyses the strengths and weaknesses of different campus-based methods of teaching and

[Chapter 4](#) does the same for blended and fully online methods. These chapters form a theoretical foundation for what follows.

Chapters 5-9: Media and technology

The focus in these five chapters is on how to choose and use different media and technologies in teaching, with a particular focus on the unique pedagogical characteristics of different media.

[Chapter 5](#) looks at the strengths and weaknesses of MOOCs.

[Chapter 6](#) looks at the main components of an effective learning environment (this was Appendix 1 in the first edition).

[Chapter 7](#) examines the difference between ‘media’ and ‘technology’ in educational contexts and provides an analytical framework for understanding the differences between media.

[Chapter 8](#) then applies the analytical framework to identify the educational ‘affordances’, the strengths and weaknesses, of different media, then examines three emerging technologies (artificial intelligence, virtual/augmented reality, and serious/educational games).

[Chapter 9](#) offers a set of criteria and a model (SECTIONS) for making decisions about different media and technologies for teaching.

Chapters 10-11: Modes of delivery and open education

These two chapters look at the impact of recent digital learning developments for the design of teaching and learning in a digital age.

[Chapter 10](#) addresses the question of how to determine what mode of delivery should be used: campus-based, blended or fully online.

[Chapter 11](#) examines the potentially disruptive implications of recent developments in open content, open publishing, open data and open research. This chapter above all is a messenger of the radical changes to come to education.

Chapters 12-13: Ensuring quality in teaching in a digital age

These take two different but complementary approaches to the issue of ensuring high quality teaching in a digital age.

[Chapter 12](#) suggests nine pragmatic steps for designing and delivering quality teaching in a highly digital teaching context.

[Chapter 13](#) very briefly examines the policy and operational support needed from schools, colleges and universities to ensure relevant and high quality teaching in a digital age.

Appendices

[Appendix 1](#) is a set of questions, to be used in conjunction with the SAMR and SECTIONS models, to help you make decisions about the choice and use of media within your own teaching context.

[Appendix 2](#) is a list of different online learning quality standards, organisations and research

[Appendix 3](#) includes three independent peer reviews commissioned at the completion of the first edition of this book, as well as an unsolicited review for [MERLOT](#) by its Teacher Education Editorial Board.

Finally, there is a section that provides feedback on activities set at the end of several sections of the book.

Scenarios

There are **nine** ‘what if’ scenarios scattered throughout the book. These are semi-fictional, ‘semi-’, because in almost every case, the scenario is based on an actual example. However, I have sometimes combined one or more cases, or extended or broadened the original case. The purpose of the scenarios is to stimulate imagination and thinking about both our current ‘blocks’ or barriers to change, and the real and exciting possibilities of teaching in the future.

Other features

Each chapter ends with a set of key ‘takeaways’ from the chapter, and a complete set of references. Most chapter sections end with an activity. For many of these I have provided a podcast to give my views on the topics of the activities.

vii. Acknowledgments and thanks

This book could not have been done without tremendous support from a number of people and institutions. First of all, I am truly indebted to BC campus. BCcampus hosts the site and has allowed me to use their own version of Pressbooks. In particular Clint Lalonde, assisted by Brad Payne, and with the support of Mary Burgess, has provided wonderful help and support. I was completely new to the technology of open publishing, and Clint and Brad held my hand through all my struggles. I could not have done this without them. **BCcampus’s help desk also provided essential support in setting up this second edition.**

Open textbooks may be free to end users but they do not become a reality without professional technical support. As part of its mandate to support innovation in education and learning, Contact North | Contact Nord, Ontario’s Distance Education & Training Network, provided essential support and help with instructional design/editing, graphics, copyright clearance and is assisting with marketing and promotion. Contact North | Contact Nord has also made it possible to make **the first edition of the textbook** available in French.

I also received unexpected but very welcome assistance from Leonora Zefi and her instructional design team at the Digital Education Strategies, The G. Raymond Chang School of Continuing Education, Ryerson University, Toronto, who volunteered to read the drafts of each chapter and provided incredibly valuable feedback. Katherine McManus provided instructional design and copy editing advice, and Elise Gowen did all the dirty work in checking copyright and getting permissions. **For the**

second edition I drew heavily on the work of Naza Djafarova and her colleagues on serious games at the Chang School at Ryerson University.

I also want to acknowledge the huge influence of my colleagues from the Open University UK, the Open Learning Agency, and the University of British Columbia, who did much of the research and innovation from which I have drawn. Throughout my career, I have been immensely supported by two overlapping communities of practice: distance educators; and educational technologists/instructional designers. This is really their book; I'm merely a spokesperson for all their ideas and work. I just hope I have represented their knowledge accurately and clearly.

Lastly, there was all the valuable feedback I received from my blog readers. I published the first draft of most sections of the book in my blog as I wrote them. Instead of a peer review team of two or three, I had a review team of many hundreds – indeed thousands – of readers of my blog. The advice I received from everyone was really helpful and much appreciated. However, I didn't always follow all the advice I got, and I take full responsibility for any errors or misjudgements you may come across.

viii. Over to you

The great thing about an open textbook is that it is a dynamic, living project. Changes can be made immediately. I would really like to hear from you, by e-mail to tony.bates@ubc.ca. Constructive criticisms and feedback will be very welcome.

Above all, I hope you find this book interesting and helpful and that it inspires you and/or your colleagues to develop the knowledge and skills our students need in this challenging age.

About the author



I graduated from the University of Sheffield, U.K, with a B.A. (Hons.) in psychology in 1962, obtained a post-graduate certificate in education from Goldsmiths College, the University of London, and a Ph.D. in educational administration from the Institute of Education, the University of London (now part of University College, London).

On leaving university, I taught a class of 42 children aged between 8 and 11 in a small rural school, then went on to teach students with special needs in a large urban secondary (high) school in England. I was then recruited to work on a government research project looking at the administration of very large high schools.

When this contract ended in 1969, I was appointed the 20th member of staff at the newly created Open University in the United Kingdom, where I spent 20 years, ending as a Professor of Educational Media Research, primarily evaluating first the learning effectiveness of the television and radio programs made for the OU by the BBC, then other new media as they became adopted by the Open University. During that period, I was also a course author/instructor on several courses on social science and technology

At the end of 1989, I emigrated to Canada, where I worked for five years as Executive Director of Strategic Planning at the Open Learning Agency in British Columbia. I left to become Director of Distance Education and Technology at the University of British Columbia, where I designed, developed and taught their first online courses and then helped initiate the first fully online degree programs at UBC. In 2003, I took mandatory retirement from UBC and set up my own consultancy company specialising in advising universities, colleges and government agencies on strategies for online and blended learning. I have worked with more than 50 universities and colleges, and several governmental agencies, in Canada, the USA, and Europe, and undertaken other contracts worldwide with the World Bank, UNESCO and the OECD.

I decided to retire from paid work in 2014 in order to write this book. (That retirement didn't last for long.) I am also the author of [11 other books](#) on educational technology, online and distance learning, some of which have been translated into French, Spanish, Chinese, Korean, Arabic and Serbo-Croat.

I have also been awarded honorary degrees by the Open University of Portugal, the Open University of Catalonia, the Open University of Hong Kong, Athabasca University, and Laurentian University.

I have a private pilot's licence, and have flown across Canada and back in a Cessna 172, and I play golf badly but regularly. I am married, with two sons and four grandchildren, all living in England.

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Updates and revisions

An open textbook is a dynamic project. New developments, such as relevant new publications, can be added, urls go dead and new ones have to be found, and reader feedback in the form of comments to sections of the book get added almost on a daily basis. This second edition includes the changes made to the first edition.

Here I will keep track of changes, using 10 October 2019, when this second edition was first made available in its ‘final’ form, as the baseline.

Chapter 1: Fundamental Change in Education

The purpose of this chapter

When you have read this chapter you should be able to:

- describe and discuss some of the structural social and economic changes that are affecting education in a digital age
- describe and discuss some of the key skills that are needed in a digital age
- identify and discuss some of the ways technology is leading to changes in teaching and learning
- discuss the extent to which contemporary developments require changes in how we teach and how students learn

What is covered in this chapter

In this chapter, I will be discussing the pressures that are mounting on post-secondary institutions to change, particularly with regard to the way they deliver one of their core activities, teaching. I will be arguing that although our institutions will need to change if they are to survive, it is important to maintain and strengthen their core values. Thus it's not a question of throwing out everything and starting afresh, but managing that change in such a way that the core values are protected.

In particular, this chapter covers the following topics:

- [1.1 Structural changes in the economy: the growth of a knowledge society](#)
- [1.2 The skills needed in a digital age](#)
- [1.3 Should education be tied directly to the labour market?](#)
- [1.4 Change and continuity](#)
- [1.5 The impact of expansion on teaching methods](#)
- [1.6 Changing students, changing markets for higher education](#)
- [1.7 From the periphery to the center: how technology is changing the way we teach](#)
- [1.8 Navigating new developments in technology and online learning](#)
- [Key takeaways](#)

Also in this chapter you will find the following activities:

- [Activity 1.1 Thinking about skills](#)
- [Activity 1.2 What skills are you developing in your students? Part 1](#)

- [Activity 1.3 What skills are you developing in your students? Part 2](#)
- [Activity 1.4 Change and continuity](#)
- [Activity 1.5 How much wriggle room do you have?](#)
- [Activity 1.6 Dealing with diversity](#)
- [Activity 1.7 The consequences of change](#)
- [Activity 1.8 Your main conclusions from Chapter 1.](#)

Key Takeaways from the Chapter

- Teaching methods need to be used that help to develop and transfer specific skills that serve both the purposes of knowledge development and dissemination, while at the same time preparing graduates for work in a knowledge-based society
- As student numbers have increased, teaching has regressed for a variety of reasons to a greater focus on information transmission and less focus on questioning, exploration of ideas, presentation of alternative viewpoints, and the development of critical or original thinking. Yet these are the very skills needed by students in a knowledge-based society.
- The wide diversity of the student body is a major challenge for institutions. This requires more focus on teaching methods that provide support for learners, more individualization of learning, and more flexible delivery.
- Online learning is a continuum; every instructor and every institution now needs to decide: where on this continuum of teaching should a particular course or program be?
- As more academic content becomes openly and freely available, students will look increasingly to their local institutions for support with their learning, rather than for the delivery of content. This puts a greater focus on teaching skills and less on subject expertise.
- Faculty and instructors need a strong framework for assessing the value of different technologies, new or existing, and for deciding how or when these technologies make sense for them (and/or their students) to use.

1.1 Structural changes in the economy: the growth of a knowledge society



Figure 1.1.1 Learning in a digital age
Image: © CC Duncan Campbell, 2012

1.1.1 The digital age

In a digital age, we are surrounded, indeed, immersed, in technology. Furthermore, the rate of technological change shows no sign of slowing down. Technology is leading to massive changes in the economy, in the way we communicate and relate to each other, and increasingly in the way we learn. Yet

our educational institutions were built largely for another age, based around an industrial rather than a digital era.

Thus teachers and instructors are faced with a massive challenge of change. How can we ensure that we are developing the kinds of graduates from our courses and programs that are fit for an increasingly volatile, uncertain, complex and ambiguous future? What should we continue to protect in our teaching methods (and institutions), and what needs to change?

To answer these questions, this book:

- discusses the main changes that are leading to a re-examination of teaching and learning;
- identifies different understandings of knowledge and the different teaching methods associated with these understandings;
- analyses the key characteristics of technologies with regard to teaching and learning;
- recommends strategies for choosing between media and technologies;
- recommends strategies for high quality teaching in a digital age.

In this chapter I set out some of the main developments that are forcing a reconsideration of how we should be teaching.

1.1.2 The changing nature of work

Of the many challenges that institutions face, one is in essence a good one, and that is increased demand, particularly for post-secondary education. Figure 1.1.2 below represents the extent to which knowledge has become an increasingly important element of economic development, and above all in job creation.



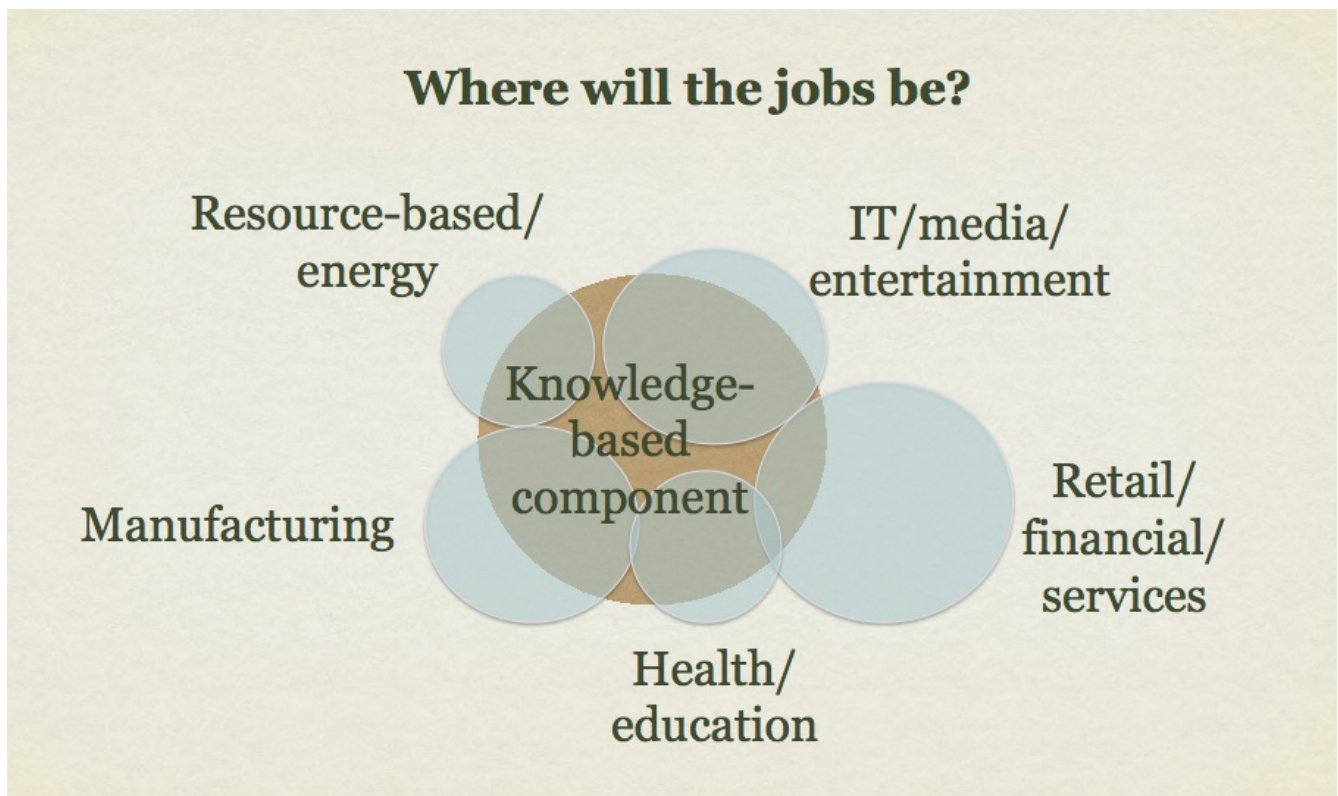


Figure 1.1.2: The knowledge component in the workforce

The figure is symbolic rather than literal. The pale blue circles representing the whole work force in each employment sector may be larger or smaller, depending on the country, as too will be the proportion of knowledge workers in that industry, but at least in developed countries and also increasingly in economically emerging countries, the knowledge component is growing rapidly: more brains and less brawn are required (see [OECD, 2013a](#)). Economically, competitive advantage goes increasingly to those companies and industries that can leverage gains in knowledge ([OECD, 2013b](#)). Indeed, knowledge workers often create their own jobs, starting up companies to provide new services or products that did not exist before they graduated.

From a teaching perspective the biggest impact is likely to be on technical and vocational instructors and students, where the knowledge component of formerly mainly manual skills is expanding rapidly. Particularly in the trades areas, plumbers, welders, electricians, car mechanics and other trade-related workers are needing to be problem-solvers, IT specialists and increasingly self-employed business people, as well as having the manual skills associated with their profession.

Artificial intelligence (AI) is another development that is already affecting the workforce. Routine work, whether clerical or manual, is being increasingly replaced by automation. Although all kinds of jobs are likely to be affected by increased automation and applications of AI, those in the workforce with lower levels of education are likely to be the most impacted. Those with higher levels of education are likely to have a better chance of finding work that machines cannot do as well – or even creating new work for themselves.

1.1.3 Knowledge-based workers

There are certain common features of knowledge-based workers in a digital age:

- they usually work in small companies (less than 10 people);
- they sometimes own their own business, or are their own boss; sometimes they have created their own job, which didn't exist until they worked out there was a need and they could meet that need;
- they often work on contract or are self-employed, so they move around from one job to another fairly frequently (the gig economy);
- the nature of their work tends to change over time, in response to market and technological developments and thus the knowledge base of their work tends to change rapidly;
- they are digitally smart or at least competent digitally; digital technology is often a key component of their work;
- because they often work for themselves or in small companies, they play many roles: marketer, designer, salesperson, accountant/business manager, technical support, for example;
- they depend heavily on informal social networks to bring in business and to keep up to date with current trends in their area of work;
- they need to keep on learning to stay on top in their work, and they need to manage that learning for themselves;
- above all, they need to be flexible, to adapt to rapidly changing conditions around them.

It can be seen then that it is difficult to predict with any accuracy what many graduates will actually be doing ten or so years after graduation, except in very broad terms. Even in areas where there are clear professional tracks, such as medicine, nursing or engineering, the knowledge base and even the working conditions are likely to undergo rapid change and transformation over that period of time. However, we shall see in [Chapter 1 Section 2](#) that it is possible to predict many of the *skills* they will need to survive and prosper in such an environment.

This is good news for the higher or post-secondary education sector overall (universities and colleges) as the knowledge and skill levels needed in the workforce increases. It has resulted in a major expansion of post-secondary education to meet the demand for knowledge-based work and higher levels of skill. The post-secondary enrolment rate of 19-year-olds across all Canadian provinces increased steadily from 53% in 2001 to 64% in 2014, equivalent to a 21% rise over the 13-year period (Frenette, 2017). This means more students for universities and colleges, even where population trends are flat or even declining.



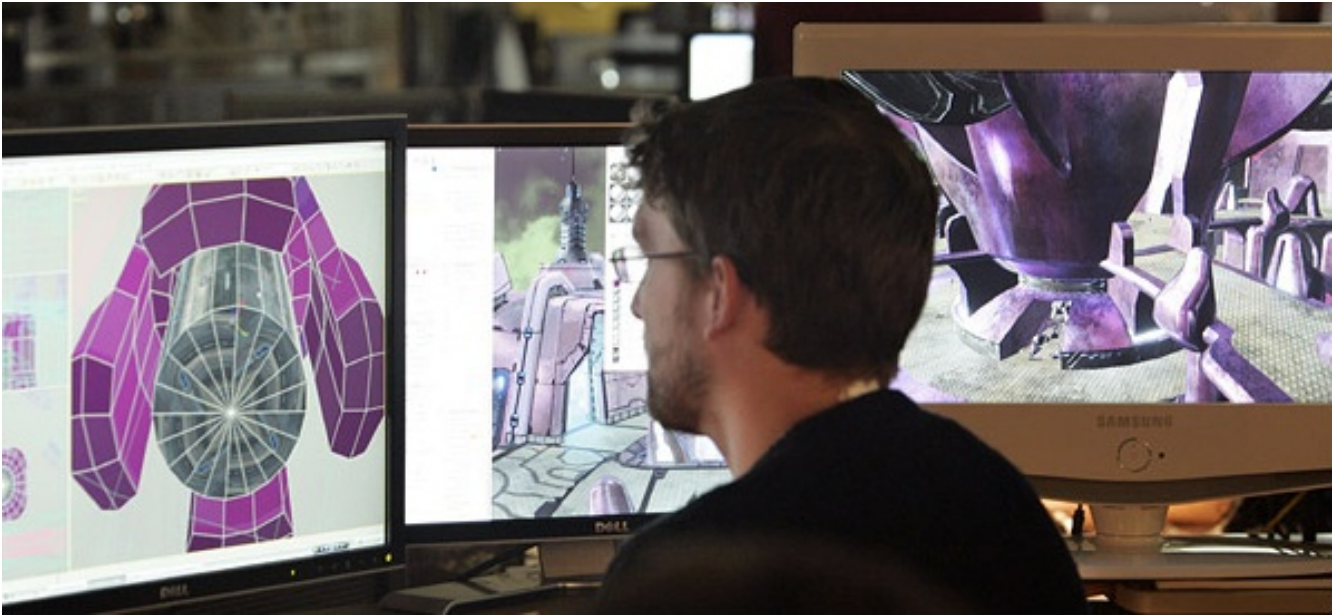


Figure 1.1.3 A video animator: a typical knowledge worker. Photograph: Elaine Thompson/Associated Press, 2007.

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Activity 1.1 Thinking about skills

1. What kind of jobs are graduates in your subject discipline likely to get? Can you describe the kinds of skills they are likely to need in such a job? To what extent has the knowledge and skills component of such work changed over the last 20 years?
2. Look at the family members and friends outside your academic or educational field. What kind of knowledge and skills do they need now that they didn't need when they left school or college? (You may need to ask them this!)
3. Exactly how are you assisting your students develop such skills through your teaching? Is this centre or peripheral to your work? Is this part of your job – or someone else's?

There is no feedback on this activity.

1.2 The skills needed in a digital age

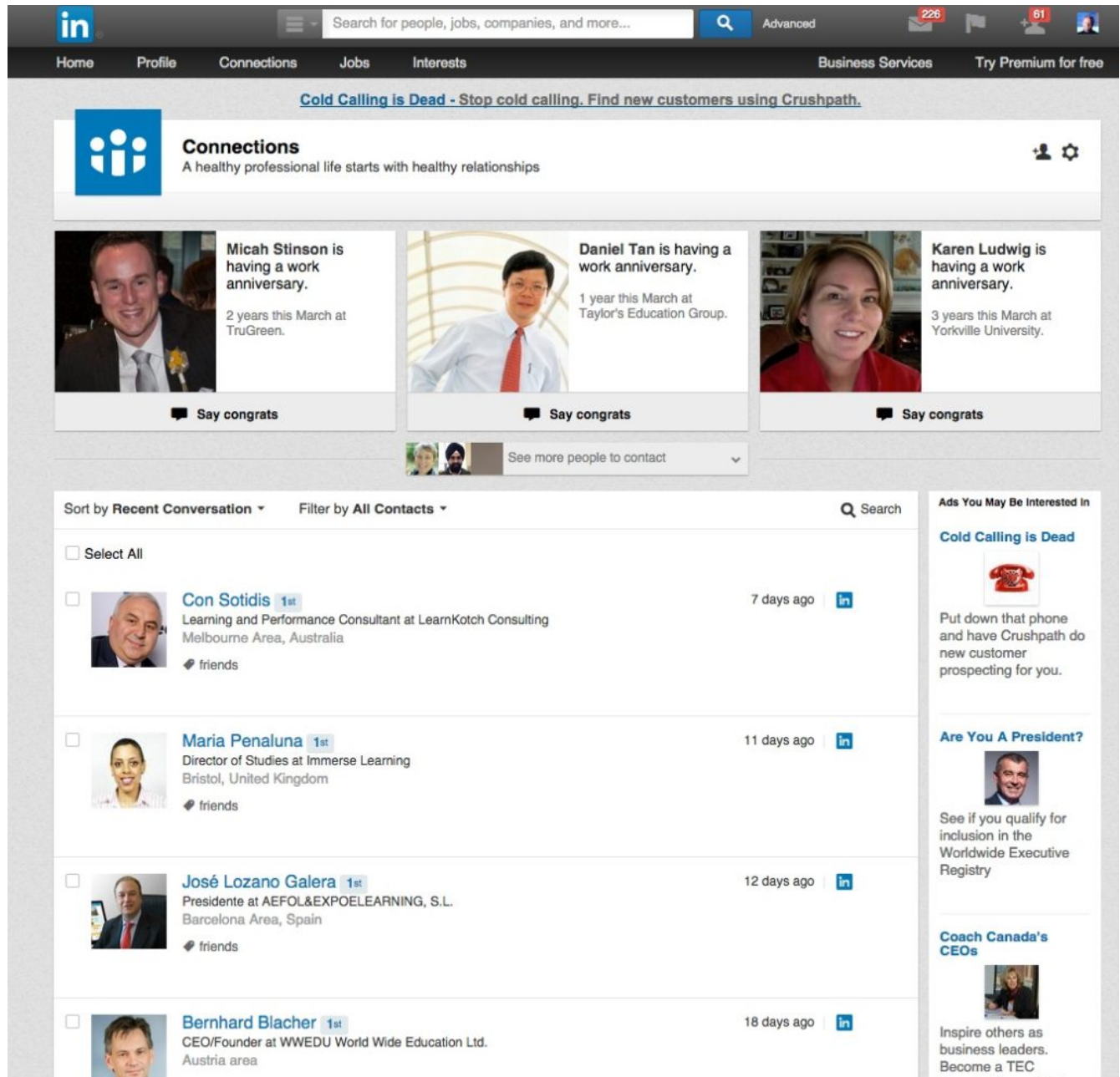


Figure 1.2.1 Using social media for communication is an essential skill for a digital age

1.2.1 The growing importance of skills development

Knowledge involves two strongly inter-linked but different components: content and skills. Content includes facts, ideas, principles, evidence, and descriptions of processes or procedures. Most instructors, at least in universities, are well trained in content and have a deep understanding of the subject areas in which they are teaching. Expertise in skills development though is another matter. The issue here is not so much that instructors do not help students develop skills – they do – but whether these intellectual skills match the needs of knowledge-based workers, and whether enough emphasis is given to skills development within the curriculum.

1.2.2 The needs of a digital society

Prediction is always risky, but usually the big trends in the future can already be seen in the present. The future will merely magnify these current conditions, or current conditions will result in a transformation that we can see coming but is not here yet. Examples are many:

- the Internet of Things where almost everything is digitally connected
- autonomous vehicles and transportation
- massive amounts of data about our personal lives being collected and analysed to anticipate/predict/influence our future behaviour
- automation replacing and/or transforming human work and leisure
- state agencies and/or commercial oligopolies controlling access to and use of data
- lack of transparency, corruption of messaging, and magnification of these distortions, in digital communications.

One thing is clear. We can either as individuals throw up our hands and leave all these developments to either state or commercial entities to manage in their own interests, or we can try to prepare ourselves so that we can influence or even control how these developments are managed, for the greater good.

This is what I mean when I talk about developing 21st century skills, or preparing for a digital society. We have a responsibility for ensuring our students are educated sufficiently so that they understand these issues and have the means by which to address them. This is a responsibility of every educator, because it affects all areas of knowledge.

For instance the science professor needs to instill in her students an ability to identify reliable and unreliable sources of scientific data, and an ability to apply that knowledge in ethical ways that benefit mankind. This is a particularly important responsibility for those teaching computer sciences. We need to teach about the dangers of unintended or unknown consequences of artificial intelligence applications and of automated analyses of mass data, potential biases in algorithms, and the need to audit and adjust automated procedures to avoid unforeseen but harmful consequences before they do damage.

Digital (rather than purely online) learning has a critical role to play, because in order to develop these skills our students' learning itself needs to be digitally embedded. Only by mastering technology can we control it.

1.2.3 What skills?

The skills required in a knowledge society include the following (adapted from [Conference Board of Canada, 2014](#)):

- *communications skills*: as well as the traditional communication skills of reading, speaking and writing coherently and clearly, we need to add social media communication skills. These might include the ability to create a short YouTube video to capture the demonstration of a process or to make a sales pitch, the ability to reach out through the Internet to a wide community of people with one's ideas, to receive and incorporate feedback, to share information appropriately, to identify trends and ideas from elsewhere;
- *the ability to learn independently*: this means taking responsibility for working out what you need to know, and where to find that knowledge. This is an ongoing process in knowledge-based work, because the knowledge base is constantly changing. Incidentally I am not talking here necessarily of academic knowledge, although that too is changing; it could be learning about new equipment, new ways of doing things, or learning who are the people you need to know to get the job done;
- *ethics and responsibility*: this is required to build trust (particularly important in informal social networks), but also because **generally ethical and responsible behaviour is in the long run more effective** in a world where there are many different players, and a greater degree of reliance on others to accomplish one's own goals;
- *teamwork and flexibility*: although many knowledge workers work independently or in very small companies, they depend heavily on collaboration and the sharing of knowledge with others in related but independent organizations. In small companies, it is essential that all employees work closely together, share the same vision for a company and help each other out. In particular, knowledge workers need to know how to work collaboratively, virtually and at a distance, with colleagues, clients and partners. The 'pooling' of collective knowledge, problem-solving and implementation requires good teamwork and flexibility in taking on tasks or solving problems that may be outside a narrow job definition but necessary for success;
- *thinking skills* (critical thinking, problem-solving, creativity, originality, strategizing, for example): of all the skills needed in a knowledge-based society, these are the most important. Businesses increasingly depend on the creation of new products, new services and new processes to keep down costs and increase competitiveness. Also, it is not just in the higher management positions that these skills are required. Trades people in particular are increasingly having to be problem-solvers rather than following standard processes, which tend to become automated. Anyone dealing with the public in a service function must identify needs and find appropriate solutions. Universities in particular have always prided themselves on teaching such intellectual skills, but the move to larger classes and more information transmission, especially at the undergraduate level, undermines this assumption;
- *digital skills*: most knowledge-based activities depend heavily on the use of technology. However the key issue is that these skills need to be embedded within the knowledge domain

in which the activity takes place. This means for instance real estate agents knowing how to use geographical information systems to identify sales trends and prices in different geographical locations, welders knowing how to use computers to control robots examining and repairing pipes, radiologists knowing how to use new technologies that ‘read’ and analyze MRI scans. Thus the use of digital technology needs to be integrated with and evaluated through the knowledge-base of the subject area;

- *knowledge management*: this is perhaps the most over-arching of all the skills. Knowledge is not only rapidly changing with new research, new developments, and rapid dissemination of ideas and practices over the Internet, but the sources of information are increasing, with a great deal of variability in the reliability or validity of the information. Thus the knowledge that an engineer learns at university can quickly become obsolete. There is so much information now in the health area that it is impossible for a medical student to master all drug treatments, medical procedures and emerging science such as genetic engineering, even within an eight year program. Thus knowledge management is the key skill in a knowledge-based society: how to find, evaluate, analyze, apply and disseminate information, within a particular context. Above all students need to **know how to validate or challenge sources of information**. **Effective knowledge management** is a skill that **all** graduates will need to employ long after graduation.

In 2018, the Royal Bank of Canada issued a report, called ‘**Humans Wanted.**’ This was based on an analysis of big data derived from job postings over a 12 month period on LinkedIn, in which the actual skills being requested by employers were identified and analysed, and from which an analysis of the demand for different types of labour was conducted.

The main conclusion of the report was that there will be plenty of jobs in the future, but they will require different skills from those generally required at the present. In particular, many of the new skills needed will be what are perhaps confusingly called soft skills, such as attentive listening, critical thinking, digital fluency, active learning, etc. (confusing, because these ‘soft skills’ are often as difficult to cultivate as ‘hard skills’.) These are skills that automation and AI cannot easily replicate or replace but which will be needed in the new digital economy. The Royal Bank identified the following as key skills that will be in high demand between 2018 and 2023 (dark blue = very important; lighter blue = important):



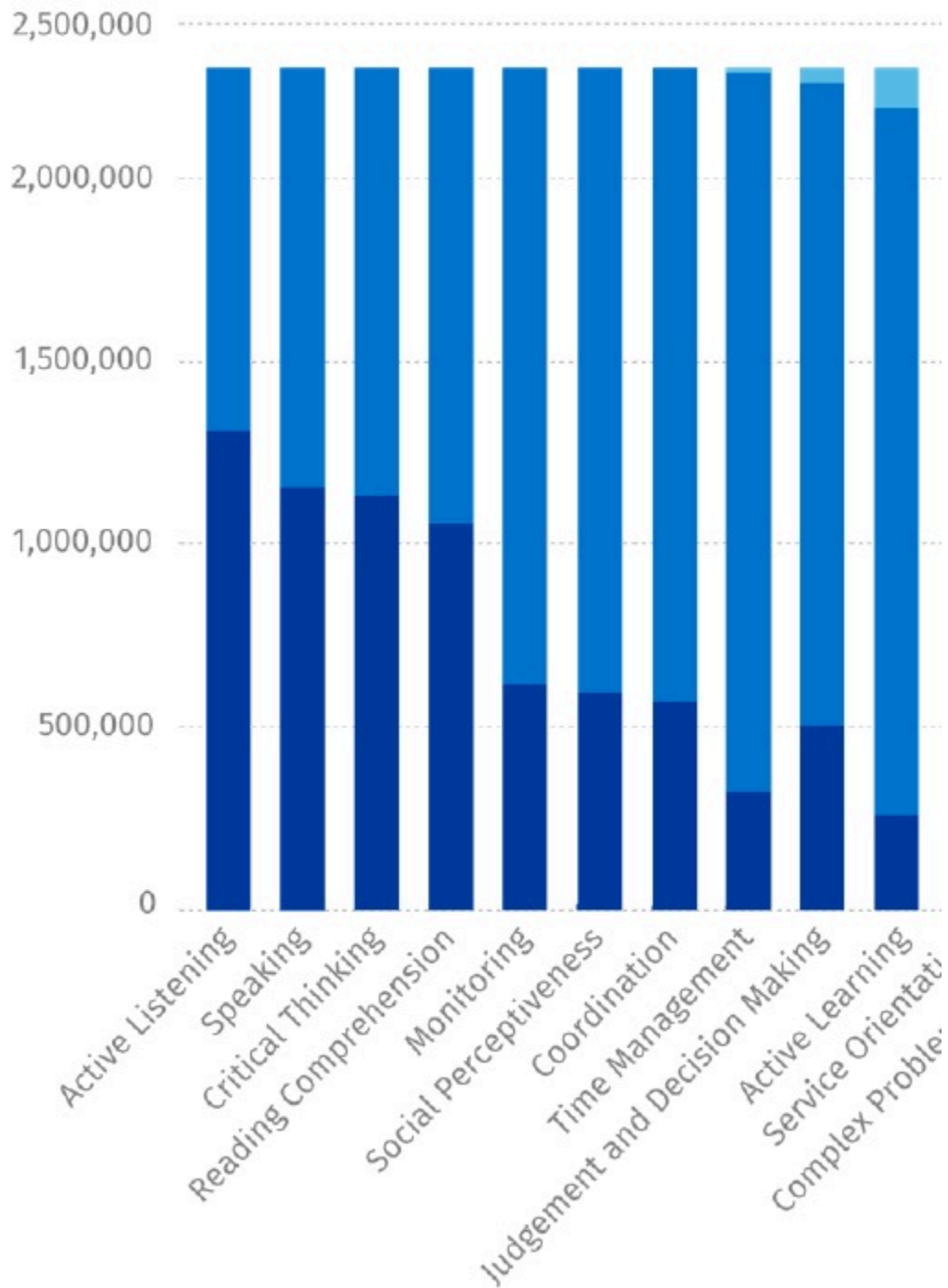


Figure 1.2.2 From 'Humans Wanted', Royal Bank of Canada, 2018

Two of the main conclusions from the Royal Bank report were as follows:

- Canada's education system, training programs and labour market initiatives are inadequately designed to help Canadian youth navigate this new skills economy.
- Canadian employers are generally not prepared, through hiring, training or retraining, to recruit and develop the skills needed to make their organizations more competitive in a digital economy.

1.2.4 Developing skills

What methods of teaching are most likely to develop soft skills? In fact, we can learn a lot from research about skills and skill development (see, for instance, [Fischer, 1980](#), [Fallow and Steven, 2000](#)):

- skills development is relatively context-specific. In other words, skills need to be embedded within a knowledge domain. For example, problem solving in medicine is different from problem-solving in business. First of all, of course, the content base used to solve problems is different. Less well understood though is that somewhat different processes and approaches are used to solve problems in these domains (for instance, decision-making in medicine tends to be more deductive, business more intuitive; medicine is more risk averse, business is more likely to accept a solution that will contain a higher element of risk or uncertainty). Embedding skills within a particular context such as a subject discipline is perhaps the biggest challenge for educational institutions in a digital age. How well does an ability to think critically about English literature transfer to other areas of critical thinking, such as political analysis or assessing the behaviour of a workplace colleague? In many cases, some elements of these soft skills do transfer well but other parts are more context specific. More attention needs to be paid to what is known about the transfer of skills, based on research, and to ensuring this evidence affects the way we teach.
- learners need practice – often a good deal of practice – to reach mastery and consistency in a particular skill;
- skills are often best learned in relatively small steps, with 'jumps' increasing as mastery is approached;
- learners need feedback on a regular basis to learn skills quickly and effectively; immediate feedback is usually better than late feedback;
- although skills can be learned by trial and error without the intervention of a teacher, coach, or technology, skills development can be greatly enhanced or speeded up with appropriate interventions, which means adopting appropriate teaching methods and technologies for skills development;
- we shall see later that although *content* can be transmitted equally effectively through a wide range of media, *skills development* is much more tied to specific teaching approaches and technologies.

What are the implications of this for not only teaching methods, but also curriculum design? It is

worth remembering that unlike competencies, many ‘high-level’ soft skills such as critical thinking are cumulative and do not have a clear end-point. Serena Williams keeps winning not because she continues to get faster and stronger than younger players, but because she continues to hone her skills (including strategy) to a level that compensates for her diminishing strength and speed.

Soft skills need to be developed over a program (indeed a lifetime) rather than in a single course. How do we identify then how to build critical thinking skills for example from first year through to graduation in a particular discipline? How does the development of skills in later stages build on work done earlier in a program?

1.2.5 Measuring skills

Another challenge is measuring skills. I was once questioned by a colleague when I said my students were learning to think critically.

‘How do you know?’ he said.

My answer was: ‘I know it when I see it in their assessments.’

‘But how will your students know what you are looking for if you can’t describe it in advance?’

The Higher Education Quality Council of Ontario (HEQCO) published [a report in 2018](#) that claimed to be ‘one of the first major attempts to measure employment-related skills in university and college students on a large scale.’ The second study used a test designed to evaluate students’ ability to analyse evidence, understand implications and consequences, and develop valid arguments.

The HEQCO study concluded that final-year students had somewhat higher scores in literacy and numeracy than their first-year counterparts, although there was considerable variation among programs, but little difference between the test scores of incoming and graduating students in critical-thinking abilities, although critical thinking ability too showed considerable variation among programs.

There are a number of possible criticisms of this study. One of the challenges that the HEQCO study faced was finding valid and reliable ways to assess soft skills. The first study measured literacy, numeracy and problem-solving abilities of adults using everyday scenarios. Why assess these skills outside the knowledge domains in which they were taught, given the importance of context? Were the measurements sensitive enough to really discriminate differences in skill development over time?

Nevertheless, it is worrying that HEQCO found that after four years of post-secondary study there was no noticeable difference in critical thinking skills. Is this because this is not being well taught, or because the tests used were not valid? Any attempt to identify learning outcomes involving skills requires consideration from the beginning of how these skills can validly be assessed. Instructors should not complain about HEQCO’s assessment methods if they cannot justify their own methods of identifying and assessing skills.

1.2.6 Skills and learning outcomes

The Royal Bank of Canada and the HEQCO studies both highlight that it is becoming increasingly important to define learning outcomes in terms of skills acquisition. Both these are valuable studies that identify some of the issues around developing the knowledge and skills that students will need to succeed, not just in the workforce, but in life generally in the last three quarters of this century. However, the two reports have barely touched the tip of this particular iceberg. Neither for instance attempted to suggest *how* students can develop these skills or what instructors need to do to help students develop such skills.

When developing curricular, in terms of deciding not only what but also how to teach, we need to ask the following questions:

- (a) are programs identifying clearly the learning outcomes expected from a program of study?
- (b) do these learning outcomes sufficiently take into account skills as well as content/topics?
- (c) are these learning outcomes relevant for a digital society?

In other words, we have a major pedagogical challenge in several parts:

- identifying the most important soft skills that students will need (although the RBC report goes a little way in that direction)
- identifying the best way to teach such soft skills
- assessing students' ability in soft skills (although the HEQCO report similarly goes a little way in that direction)
- identifying the extent to which soft skills are generalisable.

The key point here is that content and skills are tightly related and as much attention needs to be given to skills development as to content acquisition to ensure that learners graduate with the necessary knowledge and skills for a digital age.

1.2.7 Rethinking teaching and learning

These are essentially curriculum and pedagogical issues. It means rethinking not only the curriculum and how we teach it, but also the role that technology can play in developing such skills. How can technology increase empathy and understanding (for example, through creating virtual environments or simulations where students play the role of others)? How can technology be used to provide scenarios that enable skills development and testing in a safe environment? How can technology be used to enable students to solve real world problems?

There are a million possible answers to such questions and they need to be answered by instructors and teachers – and by learners – with deep understanding of their subject matter. But subject knowledge alone is not enough if we are to make the last three quarters of the 21st century a time when all people can thrive and feel free.

Chapters 2 and 3 explore different methods of teaching and will look at how well these methods accommodate skills development. But in the next section I discuss the dangers of tying skills development too closely to the immediate needs of the labour market.

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For my comments on why skills development is so important in a digital age, click on the podcast below



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=34>

Activity 1.2 What skills are you developing in your students? Part 1

1. Write down a list of skills you would expect students to develop as a result of studying your courses.
2. Compare these skills to the ones listed above. How well do they match?
3. What do you do as an instructor that enables students to practice or develop the skills you have identified?

There is no feedback provided for this activity, but see podcast above..

1.3 Should education be tied directly to the labour market?



Figure 1.3.1 Knowledge workers

Image: Phil Whitehouse, 2009. Retrieved from <https://www.flickr.com/photos/philliecasablanca/3344142642/>.

However, there is a real danger in tying university, college and schools programs too closely to immediate labour market needs. Labour market demand can shift very rapidly, and in particular, in a knowledge-based society, it is impossible to judge what kinds of work, business or trades will emerge in the future. For instance, who would have predicted 20 years ago that one of the largest companies in the world in terms of stock market valuation would emerge from finding ways to rank the hottest girls on campus (which is how Facebook started)?

The focus on the skills needed in a digital age raises questions about the purpose of universities in particular, but also schools and two year community colleges to some extent. Is their purpose to provide ready-skilled employees for the work-force? *Is it really the job of historians or physicists to teach skills such as attentive listening, time management or social perceptiveness?*

Certainly the rapid expansion in higher education is largely driven by government, employers and parents wanting a workforce that is employable, competitive and if possible affluent. Indeed, preparing professional workers has always been one role for universities, which have a long tradition of training

for the church, law and much later, government administration. The goal here is to ensure that as well as a deep understanding of the content and core values of a subject discipline, students can also develop skills that enable them to apply such knowledge in appropriate contexts.

Secondly, focusing on the skills required for a knowledge-based society (often referred to as 21st century skills) merely reinforces the kind of learning, especially the development of intellectual skills, for which universities have taken great pride in the past. Indeed in this kind of labour market, it is critical to serve the learning needs of the individual rather than specific companies or employment sectors. To survive in the current labour market, learners need to be flexible and adaptable, and should be able to work just as much for themselves as for corporations that increasingly have a very short operational life. The challenge then is not re-purposing education, but making sure it meets that purpose more effectively.

Thirdly, enabling students to live well and to feel some measure of control in a technology-rich society is surely the responsibility of every educator. For instance, all students, whatever their discipline, need to know how to find, evaluate, analyse and apply information within their specific subject discipline. With so much content of varying quality now available at one's fingertips, such skills are essential for a healthy society.

Thus in some cases it is a language issue: instructors may be achieving some of these '21st century skills' such as critical thinking within the requirements of a specific discipline without using this terminology (for example, 'compare and contrast...' is a critical thinking activity). However, the HEQCO study (Weingarten et al., 2018) indicates that high-level soft skills are hard to measure and probably need to be defined and communicated more clearly and purposefully by instructors. In particular, development of such skills need to be considered at a program level so instructors can define what level of skill they expect of students when they arrive, and to what level that skill has been increased or improved by the end of a course or program.

A good example of this is from the Faculty of Computer Science at Dalhousie University. The department developed a map showing the inter-relatedness between specific learning outcomes, course content, and course and learning outcome sequencing, so that each instructor understood what level of skills and outcomes students would have from previous courses, and could identify what levels of skills they were passing on when students left their course. One result of this was to move the theory courses from the fourth year to the first year, as this helped students in the later stages of the program.

These activities do not challenge in any way core disciplinary values, or make universities or colleges merely preparatory schools for business, but they do ensure that students leave with skills that prepare them well for living in a very challenging age.

Reference

Weingarten, H. et al. (2018) *Measuring Essential Skills of Postsecondary Students: Final Report of the Essential Adult Skills Initiative* Toronto ON: HEQCO

The new Ontario provincial government in 2019 announced that it would link funding of its post-secondary institutions to 'performance outcomes'. Institutions would be encouraged to suggest their own performance measures.

Your institution has decided to focus on the development of '21st century skills' as a 'key performance indicator', and is asking all its academic departments to list the 'core' skills that their programs are developing.

If you were asked this, what would you suggest from looking not just at your teaching but the teaching of the department or program as a whole? And what evidence would need to be provided to show such skills are being achieved by your students?

Would having to do this be an infringement of your academic freedom?

No feedback is provided on this activity.

1.4 Change and continuity



Figure 1.4.1 Harvard University

In the age of constant connectedness and social media, it's time for the monolithic, millennium-old, ivy-covered walls to undergo a phase change into something much lighter, more permeable, and fluid.

Anya Kamenetz, 2010

Although this book is aimed at teachers and instructors in schools and colleges as well as universities, I want to look particularly at how the digital age is impacting on universities. There is a widely held belief

– even among those who have benefited from fine degrees at prestigious universities – that universities are out of touch, that academic freedom is really about protecting professors in a comfortable career that doesn't require them to change, and that the entire organization of the academy is better left to its medieval past: in other words, universities are an artifact of the past and something new needs to replace them.

Nevertheless, there are very good reasons why universities have been around for more than 800 years, and are likely to remain relevant well into the future. Universities are deliberately designed to resist external pressure. They have seen kings and popes, governments and business corporations, come and go, without any of these external forces fundamentally changing the nature of the institution. Universities pride themselves on their independence, their freedom, and their contribution to society. So let's start by looking, very briefly, at these core values, because any change that really threatens these core values is likely to be strongly resisted from professors and instructors within the institution.

Universities are fundamentally about the creation, evaluation, maintenance and dissemination of knowledge. This role in society is even more important today than in the past. For universities to perform that role adequately, though, certain conditions are necessary. First they need a good deal of autonomy. The potential value of new knowledge in particular is difficult to predict in advance. Universities provide society with a safe way of gambling on the future, by encouraging innovative research and development that may have no immediate apparent short-term benefits, or may lead to nowhere, without incurring major commercial or social loss. Another critical role is the ability to challenge the assumptions or positions of powerful agencies outside the university, such as government or industry, when these seem to be in conflict with evidence or ethical principles or the general good of society.

Perhaps even more importantly, there are certain principles that distinguish academic knowledge from everyday knowledge, such as rules of logic and reasoning, the ability to move between the abstract and the concrete, ideas supported by empirical evidence or external validation (see for instance, [Laurillard, 2001](#)). We expect our universities to operate at a higher level of thinking than we as individuals or corporations can do in our everyday lives.

One of the core values that has helped to sustain universities is academic freedom. Academics who ask awkward questions, who challenge the status quo, who provide evidence that contradicts statements made by government or corporations, are protected from dismissal or punishment within the institution for expressing such views. Academic freedom is an essential condition within a free society. However, it also means that academics are free to choose what they study, and more importantly for this book, how best to communicate that knowledge. University teaching then is bound up with this notion of academic freedom and autonomy, even though some of the conditions that protect that autonomy, such as tenure or a job for life, are increasingly under pressure.

I make this point for one reason and one reason alone. If universities are to change to meet changing external pressures, this change must come from *within* the organization, and in particular from the professors and instructors themselves. It is the faculty that must see the need for change, and be willing to make those changes themselves. If government or society as a whole tries to enforce changes from outside, especially in a way that challenges the core values of a university such as academic freedom, there is a grave risk that the very thing that makes universities a unique and valuable component of society will be destroyed, thus making them less rather than more valuable to society as a whole. However, this book will provide many reasons why it is also in the best interests of not only learners but instructors themselves to make changes, in terms of managing workload and attracting extra resources to support teaching.

Schools and two-year colleges are in a somewhat different position. It is easier (although not that easy) to impose change from above or through forces from outside the institution, such as government.

However, as the literature on change management clearly indicates (see, for instance, [Weiner, 2009](#)), change occurs more consistently and more deeply when those undergoing change understand the need for it and have a desire to change. Thus in many ways, schools, two year colleges and universities face the same challenge: how to change while preserving the integrity of the institution and what it stands for.

Activity 1.4 Change and continuity

1. Do you think that universities are irrelevant today? If not, what alternatives are there for developing learners with the knowledge and skills needed in a digital age?
2. What are your views on the core values of a university? How do they differ from the ones outlined here?
3. Do you think schools, colleges and/or universities need to change the way they teach? If so, why, and in what way? How could this best be done without interfering with academic freedom or other core values of educational institutions?

There are no right or wrong answers to these questions but you may want to return to your answers after reading the whole chapter.

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1.5 The impact of expansion on teaching methods



Figure 1.5.1 More students means bigger lecture classes

Governments in different provinces, states and countries have varied in their response to the need for more highly educated people. Some (as in Canada) have increased state funding to post-secondary education institutions to an extent that matches or even exceeds the increase in student numbers. Others (particularly in the USA, Australia, and England and Wales) have relied mainly on steep cuts in direct state funding for operating budgets, combined with massive increases in tuition fees.

Whatever the government strategy, in every university and college I visit, I am told instructors have more students to teach, class sizes are getting larger, and as a result, more and more classes are just lectures with little interaction. Indeed, statistics support this argument. According to [Usher \(2013\)](#), the overall full-time faculty:full time student ratio in Canadian universities increased from 1:18 in 1995 to 1:22 by 2011, *despite* a 40 per cent increase in per student funding (after inflation). In fact, a 1:22 ratio means much larger class sizes, because in universities full-time faculty spend only a notional 40 per cent of their time on teaching, and students may take up to 10 different courses a year. The fact is that

especially in first and second year classes, class sizes are extremely high. For instance, one Introductory Psychology class [in a mid-sized Canadian university](#) has one full-time professor responsible for over 3,000 students.

Tuition fees though are very visible, so many institutions or government jurisdictions have tried to control increases in tuition fees, despite cuts in operating grants, resulting in increased full time instructor:student ratios. Also, as a result of higher tuition fees and increased student debt to finance university and college education, students and parents are becoming more demanding, more like customers than scholars in an academic community. Poor teaching in particular is both visible and less and less acceptable to students paying high tuition fees.

The general complaint from faculty is that government or the institutional administration has not increased funding for faculty in proportion to the increase in student numbers. In fact, the situation is much more complicated than that. Most institutions that have expanded in terms of student numbers have handled the expansion through a number of strategies:

- hiring more contract/sessional lecturers at lower salaries than tenured faculty
- greater use of teaching assistants who themselves are students
- increasing class sizes
- increasing faculty workload.

All of these strategies tend to have a negative impact on quality, if the methods of teaching otherwise remain unchanged.

Contract instructors are cheaper to employ than full time professors but they do not usually have the same roles such as choice of curriculum and reading materials as tenured faculty, and although often well qualified academically, the relatively temporary nature of their employment means that their **teaching** experience and **their** knowledge of students are lost when their contracts end. However, of all the strategies, this is likely to have the least negative impact on quality. Unfortunately though it is also the most expensive for institutions.

Teaching assistants may be no more than a couple of years ahead in their studies than the students they are teaching, they are often poorly trained or supervised with regard to teaching, and sometimes, if they are foreign students (as is often the case), their English language skills are poor, making them sometimes difficult to understand. They tend to be used to instruct parallel sections of the same course, so that students studying the same course may have widely different levels of instruction. Employing and paying teaching assistants can be directly linked to the way that post-graduate research is being funded by government agencies.

The increase in class size has tended to result in much more time being devoted to lectures and less time to small group work. Lectures are in fact a very economical way of increasing class size (provided that the lecture halls are large enough to accommodate the extra students). The marginal cost of adding an extra student to a lecture is small, since all students are receiving the same instruction. However, as numbers increase, faculty resort to more quantitative and less flexible forms of assessment, such as multiple-choice questions and automated assessment. Perhaps more importantly, student interaction with faculty decreases rapidly as numbers increase, and the nature of the interaction tends to flow between the instructor and an individual student rather than between students interacting as a group. Research ([Bligh, 2000](#)) has shown that in lectures with 100 or more students, less than ten students will ask questions or provide comments over the course of a semester. The result is that lectures tend to focus more heavily on the transmission of information as class size increases, rather than on exploration,

clarification or discussion (see [Chapter 3, Section 3](#) for a more detailed analysis of the effectiveness of lectures).

Increasing faculty teaching load (more courses to be taught) is the least common of the four strategies, partly because of faculty resistance, sometimes manifesting itself in collective agreement negotiations. Where increased faculty teaching load does occur, quality again is likely to suffer, as faculty put in less preparation time per class and less time for office hours, and resort to quicker and easier methods of assessment. This inevitably results in larger classes if full-time faculty are teaching less but doing more research. However, increased research funding results in more post-graduate students, who can supplement their income as teaching assistants. As a result there has been a major expansion in the use of teaching assistants for delivering lectures. However, in many Canadian universities, full-time faculty teaching load has been going *down* ([Usher, 2013](#)), leading to even larger class sizes *for those that do teach*.

In other employment sectors, increased demand does not necessarily result in increased cost if that sector can be more productive. Thus government is increasingly looking for ways to make higher education institutions more productive: more and better students for the same cost or less (see *for instance* [Kao, 2019](#)). Up to now, this pressure has been met by institutions over a fairly long period of time by gradually increasing class size, and using lower cost labour, such as teaching assistants, but there becomes a point fairly quickly where quality suffers unless changes are made to the underlying processes, by which I mean the way that teaching is designed and delivered.

Another side effect of this gradual increase in class size without changes in teaching methods is that faculty and instructors end up having to work harder. In essence they are processing more students, and without changing the ways they do things, this inevitably results in more work. Faculty usually react negatively to the concept of productivity, seeing it as industrializing the educational process, but before rejecting the concept it is worth considering the idea of getting better results without working as hard but more smartly. Could we change teaching to make it more productive so that both students and instructors benefit?

References

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Usher, A. (2013) Financing Canadian Universities: A Self-Inflicted Wound (Part 5) [Higher Education Strategy Associates](#), September 13

Activity 1.5 How much wriggle room do you have?

1. Are you in general satisfied with your working conditions regarding teaching? If not, what are your main frustrations?
2. What practical solutions (taking into account the financial situation of your institution, student needs, and the time you have available for teaching) could perhaps alleviate some of the frustration?

3. If you could change the way you teach, what would be the main benefits to both yourself and your students? What would need to change for this to happen?

There is no feedback on this activity

1.6 Changing students, changing markets for higher education



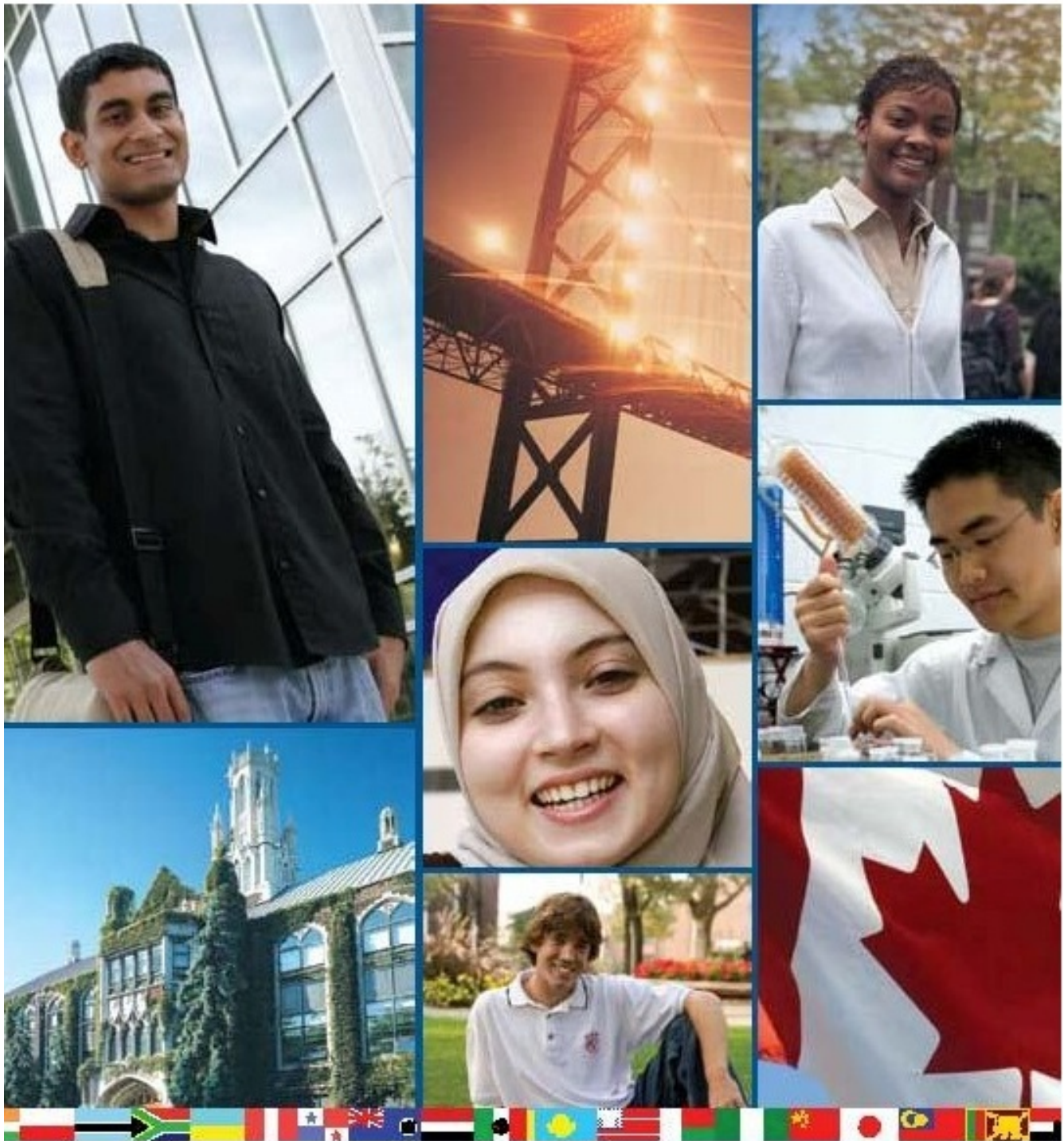


Figure 1.6.1 More diverse students

Image: © [greatinternational students.blogspot.com](http://greatinternationalstudents.blogspot.com), 2013

1.6.1 Greater diversity of students

Probably nothing has changed more in higher education over the last 50 years than the students themselves. In ‘the good old days’, when less than a third of students from high schools went on to

higher education, most came from families who themselves had been to university or college. They usually came from wealthy or at least financially secure backgrounds. Universities in particular could be highly selective, taking students with the best academic records, and thus those most likely to succeed. Class sizes were smaller and faculty had more time to teach and less pressure to do research. Expertise in teaching, while important, was not as essential then as now; good students were in an environment where they were likely to succeed, even if the prof was not the best lecturer in the world. This ‘traditional’ model still holds true for most elite private universities such as Harvard, MIT, Stanford, Oxford and Cambridge, and for a number of smaller liberal arts colleges. But for the majority of publicly funded universities and two year community colleges in most developed countries, this is no longer the case (if it ever was).

The student base has become much more diverse. For instance, in British Columbia, roughly two-thirds of the full Grade 8 school cohort of 2007/2008 (67%) entered B.C. public post-secondary education by Fall 2014 (Heslop, 2016). As state jurisdictions push institutions to participation rates of around 70 per cent going on to some form of post-secondary education (Ontario, 2011), institutions must reach out to previously underserved groups, such as ethnic minorities (particularly Afro-American and Latinos in the USA), new immigrants (in most developed countries), aboriginal students in Canada, and students with English as a second language. Governments are also pushing universities to take more international students, who can be charged full tuition fees or more, which in turn adds to the cultural and language mix. In other words, post-secondary institutions are expected to represent the same kind of socio-economic and cultural diversity as in society at large, rather than being institutions reserved for an elite minority.

We shall also see that in many developed countries, university and college students are older than they used to be and are no longer full-time students dedicated only to lots of study and some fun (or vice versa). The increasing cost of tuition fees and living expenses forces many students now to take part-time work, which inevitably conflicts with regular classroom schedules, even if the students are formally classified as full-time students. As a result students are taking longer to graduate. In the USA, the average completion time for a four year bachelor degree is now 5.1 years (Shapiro, et al., 2016).

1.6.2 The lifelong learning market

The Council of Ontario Universities (2012) noted that students NOT coming direct from high school now constitute 24% of all new admissions, and enrolments from this sector are increasing faster than those from students coming direct from high schools. Perhaps more significantly, many graduates are returning later in their careers to take further courses or programs, in order to keep up in their ever-changing knowledge domain. Many of these students are working full-time, have families and are fitting their studies around their other commitments.





Figure 1.6.2 Lifelong learners are an increasingly important market for higher education

Image: © Evollution.com, 2013

Yet it is economically critical to encourage and support such students, who need to remain competitive in a knowledge-based society. especially as with falling birthrates and longer lives, in some jurisdictions lifelong learners, students who have already graduated but are coming back for more study, will soon exceed the number of students coming directly from high school. Thus at the University of British Columbia in Canada, the mean age of all its graduates students is now 31, and more than one third of all students are over 24 years old. There is also an increase in students transferring from two year colleges to universities – and vice versa. For instance, in Canada, at the British Columbia Institute of Technology **more than 20 per cent** of its new enrolments each year already have a university degree.

1.6.3 Digital natives

Another factor that makes students somewhat different today is their immersion in and facility with digital technology, and in particular social media: instant messaging, Twitter, video games, Facebook, and a whole host of applications (apps) that run on a variety of mobile devices such as iPads and mobile phones. Such students are constantly ‘on’. Most students come to university or college immersed in social media, and much of their life evolves around such media. Some commentators such as [Mark Prensky \(2001\)](#) argue that digital natives think and learn fundamentally differently as a result of their immersion in digital media.

Many instructors too often see such technology as a distraction. Attentive listening is impossible if students are scrolling through videos or Facebook pages. Many instructors would like to ban all mobile phones and tablets from their classes. However, a ban on mobile phones is an attempt to deny the reality of living in a digital age. We should be educating our students in the appropriate use of everyday technology for learning and social purposes, not trying to deny the existence of the technology.

Instead we should be encouraging students to use their technological devices to find, analyse, evaluate and apply their knowledge. This means giving them engaging tasks in class time that require the use of their phones. Yes, they will probably use their device to text other students but then that can be also used for group work and social learning. In particular, mobile phones can be used to support the learning of higher level skills, such as problem solving and critical thinking.

But this means providing criteria and procedures for students that enable their learning – and also learning when they need to put their phones down and switch off. These are skills and knowledge that are essential for life in today's society and it is irresponsible for the education system to ignore such needs. Students expect to use social media in all other aspects of their life. Why should their learning experience be different? We shall explore this further in [Chapter 8, Section 6](#).

1.6.4 From elitism to success

Many older faculty still pine for the good old days when they were students. Even in the 1960s, when the [Robbins' Commission](#) recommended an expansion of universities in Britain, the Vice-Chancellors of the existing universities moaned 'More means worse.' However, for public universities, the Socratic ideal of a professor sharing their knowledge with a small group of devoted students under the linden tree no longer exists, except perhaps at graduate level, and is unlikely ever to return to public post-secondary institutions (except perhaps in Britain, [where the Conservative government seems to be dialling back the clock to the 1950s](#)). The massification of higher education has, to the alarm of traditionalists, opened up the academy to the great unwashed. However, the massification of higher education is needed as much for economic reasons as for social mobility.

The implications of these changes in the student body for university and college teaching are profound. At one time, German math professors used to pride themselves that only five to ten per cent of their students would succeed in their exams. The difficulty level was so high that only the very best passed. A tiny completion rate showed how rigorous their teaching was. It was the students' responsibility, not the professors', to reach the level required. That may still be the goal for top level research students, but we have seen that today universities and colleges have a somewhat different purpose, and that is to ensure, as far as possible, that as many students as possible leave university appropriately qualified for life in a knowledge-based society. We can't afford to throw away the lives of 95 per cent of students, either ethically or economically. In any case, governments are increasingly using completion rates and degrees awarded as key performance indicators that influence funding.

It is a major challenge for institutions and teachers to enable as many students as possible to succeed, given the wide diversity of the student body. More focus on teaching methods that lead to student success, more individualization of learning, and more flexible delivery are all needed to meet the challenge of an increasingly diverse student body. These developments put much more responsibility on the shoulders of teachers and instructors (as well as students), and require a much higher level of skill in teaching.

Fortunately, over the last 100 years there has been a great deal of research into how people learn, and a lot of research into teaching methods that lead to student success. Unfortunately, that research is not known or applied by the vast majority of university and college instructors, who still rely mainly on

teaching methods that were perhaps appropriate when there were small classes and elite students, but are no longer appropriate today (see, for instance, [Christensen Hughes and Mighty, 2010](#)). Thus a different approach to teaching, and a better use of technology to help instructors increase their effectiveness across a diverse student body, are now needed.

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Activity 1.6 Dealing with diversity

1. What changes if any have you noticed in the students you are teaching? How does this differ from my analysis?
2. Whose responsibility is it to ensure students succeed? To what extent does the diversity of students place more responsibility on teachers and instructors?
3. Do you agree that 'More means worse'? If you do, what alternatives would you suggest for higher education? How would this be paid for?
4. Does your country/state have the balance right between academic and vocational education? Do we put too much emphasis on universities and not enough on technical or vocational colleges?

No feedback is provided for this activity.

1.7 From the periphery to the center: how technology is changing the way we teach



Figure 1.7.1 Technology is changing the way we teach – and the way students learn Image: Vidyo.com

We shall see in [Chapter 7, Section 2](#) that technology has played an important role in teaching from time immemorial, but until recently, it has remained more on the periphery of education. Technology has been used mainly to support regular classroom teaching, or operated in the form of distance education, for a minority of students or in specialized departments (often in continuing education or extension).

However, in the last ten to fifteen years, technology has been increasingly influencing the core teaching activities of **universities and colleges**. Some of the ways technology is moving from the periphery to the centre can be seen from the following trends.

1.7.1. Fully online learning

Credit-based online learning **in recent years has become** a major and central activity of most academic departments in universities, colleges and to some extent even in school/k-12 education.

Online learning enrolments increased by between 10-20 per cent per annum between 2002 and 2012 in North American higher education institutions, compared with an increase in campus-based enrolments of around 2-3 per cent per annum (Allen and Seaman, [2014](#)).

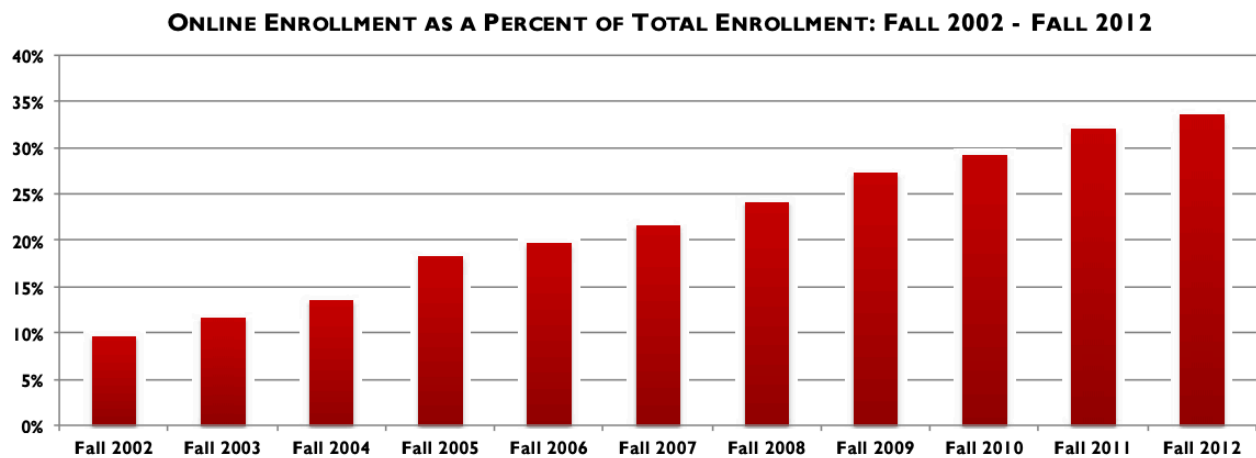


Figure 1.7.2 From Allen and Seaman, 2014

In just the California Community College System alone, there are almost one million online course enrolments (Johnson and Mejia, [2014](#)). There are now at least seven million students in the USA taking at least one fully online course, almost 30 per cent of all post-secondary students in the USA; and 14 per cent of all students are taking *only* distance education courses. The majority of these fully online enrolments (just over two-thirds) are in public institutions in the USA (online enrolments in for-profit institutions plunged after 2012 due to Obama-era regulation). At the same time, the number of students studying on a campus in the USA dropped by almost one million (931,317) between 2012 and 2015 (Digital Learning Compass, [2017](#)).

The situation in Canada is somewhat similar. Most Canadian post-secondary institutions (83 per cent) offered fully online courses for credit in 2017. Roughly 17 per cent of all students were taking at least one online course; online course registrations totalled 1.3 million, accounting for eight per cent of all credit course enrolments. This is equivalent in a system with roughly 70 universities and 150 public colleges to four additional universities of 27,000 students, and five additional colleges of 10,000 students. Online learning was considered by institutional leaders to be very or extremely important for the institution's future in over two-thirds of all institutions (Bates et al, [2018](#)).

Thus fully online learning is now a key component of many school and post-secondary education systems.

1.7.2. Blended and hybrid learning

As more instructors have become involved in online learning, they have realised that much that has traditionally been done in class can be done equally well or better online (a theme that will be explored more in [Chapter 10, Section 2](#)). As a result, instructors have been gradually introducing more online study elements into their classroom teaching. So learning management systems may be used to store lecture notes in the form of slides or PDFs, links to online readings may be provided, or online forums for discussion may be established. Thus online learning is gradually *being* blended with face-to-face

teaching, but without changing the basic classroom teaching model. Here online learning is being used as a supplement to traditional teaching. Although there is no standard or commonly agreed definitions in this area, I will use the term ‘blended learning’ for this use of technology.

More recently, though, lecture capture has resulted in instructors realising that if the lecture is recorded, students could view this in their own time, and then the classroom time could be used for more interactive sessions. This model has become known as the ‘flipped classroom’.

An even more significant move, but still in a minority of classes, is the move to hybrid learning, where some, but not all, of regular classroom time is replaced by online activities. This sometimes leads to a complete re-design of the teaching experience for students.

Some institutions are now developing plans to move a substantial part of their teaching into more blended or flexible modes. Almost two-thirds of the institutions in the 2017 Canadian survey either had a plan for online learning or were developing one, and another 30 per cent reported that they did not have a plan but needed one. For instance in 2013 the University of Ottawa developed a plan to have at least 20 per cent of its courses blended or hybrid within five years ([University of Ottawa, 2013](#)). The University of British Columbia has [a plan to redesign most of its first and second year large lecture classes into hybrid classes](#). Furthermore, some instructors are incorporating emerging technologies such as simulations and educational or serious games, augmented and virtual reality, in ways that fundamentally change the experience of learning. These are all indications of the growing importance of digital learning.

1.7.3. Open learning

Another increasingly important development linked to online learning is the move to ‘open’ education that over the last 10 years has begun to impact directly on conventional institutions. The most immediate is open textbooks – such as what you are reading now. Open textbooks are digital textbooks that can be downloaded in a digital format by students (or instructors) for free, thus saving students considerable money on textbooks. For instance, in Canada, the three provinces of British Columbia, Alberta, and Saskatchewan are collaborating on [the production and distribution of peer-reviewed open textbooks](#) for the 40 high-enrolment subject areas in their university and community college programs. By 2018 nearly all post-secondary institutions in British Columbia (90 per cent) had adopted at least one open textbook (Bates et al, [2018](#)).

Open educational resources (OER) are another recent development in open education. These are digital educational materials freely available over the Internet that can be downloaded by instructors (or students) without charge, and if necessary adapted or amended, under a [Creative Commons license](#) that provides protections for the creators of the material. Probably the best known source of OER is the Massachusetts Institute of Technology [OpenCourseWare project](#). With individual professors’ permission, MIT has made available for free downloading over the Internet video lectures recorded with lecture capture as well as supporting materials such as slides.

The implications of developments in open learning will be discussed further in [Chapter 11](#).

1.7.4. MOOCs

One of the main developments in online learning has been the rapid growth of Massive Open Online Courses (MOOCs). In 2008, the University of Manitoba in Canada offered the first MOOC with just over 2,000 enrolments, which linked webinar presentations and/or blog posts by experts to participants’ blogs and tweets. The courses were open to anyone and had no formal assessment. In 2012, two Stanford

University professors launched a lecture-capture based MOOC on artificial intelligence, attracting more than 100,000 students, and since then MOOCs have expanded rapidly around the world.

Although the format of MOOCs can vary, in general they have the following characteristics:

- open to anyone to enroll and simple enrollment (just an e-mail address)
- very large numbers (from 1,000 to 100,000)
- free access to video-recorded lectures, often from the most elite universities in the USA (Harvard, MIT, Stanford in particular).
- computer-based assessment, usually using multiple-choice questions and immediate feedback, combined sometimes with peer assessment
- a wide range of commitment from learners: up to 50 per cent never do more than register, 25 per cent never take more than the first assignment, less than 10 per cent complete the final assessment.

However, MOOCs are merely the latest example of the rapid evolution of technology, the over-enthusiasm of early adopters, and the need for careful analysis of the strengths and weaknesses of new technologies for teaching. *They are evolving over time, and are beginning to find a more limited but still important niche in the higher education market.* MOOCs will be discussed more fully in [Chapter 5](#).

1.7.5 Managing the changing landscape of education

These rapid developments in educational technologies mean that faculty and instructors need a strong framework for assessing the value of different technologies, new or existing, and for deciding how or when these technologies make sense for them and their students to use. Blended and online learning, social media and open learning are all developments that are critical for effective teaching in a digital age.

However, these emerging technological developments need to be harnessed to the changing needs of learners in a digital society, which means also looking at different ways of teaching and ensuring these teaching methods and choices of technology are fully aligned with the needs of learners in a digital age.

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Activity 1.7 The consequences of change

1. Have you in recent years moved to blended or online learning or used new technology in your teaching? If so, what was your reason?
2. If not, what has stopped you trying a new approach with technology?
3. If you have started to use technology in your teaching, what were the main difficulties you encountered? Did you get sufficient help from colleagues or the institution?
4. Did you change your academic goals or did you try to achieve the same learning outcomes as in fully face-to-face teaching?
5. Were there any unintended or unexpected consequences of moving towards the use of more technology in your teaching?

There is no feedback provided for this activity.

1.8 Navigating new developments in technology and online learning

Instructors in both universities and colleges now face the following challenges:

- to teach in ways that help develop the knowledge and skills needed in today's society;
- to handle increasingly large classes;
- to develop teaching methods that are appropriate for an increasingly diverse student body;
- to deal with a variety of different modes of delivery.

However, in general, teachers and instructors in post-secondary education have little or no training in teaching, pedagogy or the research on learning. Even many school teachers lack adequate training to deal with rapidly changing technologies. We wouldn't expect pilots to fly a modern jet without any training, yet that is exactly what we are expecting of our teachers and instructors.

This book then aims to provide a framework for making decisions about how to teach, and how best to use technology, in ways that are true to the core values of universities, colleges, and schools, while building on the large amount of research into learning and teaching, and into the use of technology for teaching, that has been done over the last 50 years or so.

The next chapter deals with the most important question of all: how do you want to teach in a digital age?

Activity 1.8 Your main conclusions from Chapter 1

Write down at least five conclusions you would draw from this chapter, in addition to the key takeaways below.

Click [here to compare your answers with mine](#).

Key Takeaways

1. Teaching methods need to be used that help to develop and transfer specific skills that serve both the purposes of knowledge development and dissemination, while at the same time preparing graduates for work in a knowledge-based society.
2. As student numbers have increased, teaching has regressed for a variety of reasons to a greater focus on information transmission and less focus on questioning, exploration of ideas, presentation of alternative viewpoints, and the development of critical or original thinking. Yet these are the very skills needed by students in a knowledge-based society.
3. The wide diversity of the student body is a major challenge for institutions. This requires more focus on teaching methods that provide support for learners, more individualization of learning, and more flexible delivery.

4. Online learning is a continuum; every instructor and every institution now needs to decide: where on this continuum of teaching should a particular course or program be?
5. As more academic content becomes openly and freely available, students will look increasingly to their local institutions for support with their learning, rather than for the delivery of content. This puts a greater focus on teaching skills and less on subject expertise.
6. Faculty and instructors need a strong framework for assessing the value of different technologies, new or existing, and for deciding how or when these technologies make sense for them (and/or their students) to use.

Chapter 2: The nature of knowledge and the implications for teaching

Purpose of the chapter

This chapter discusses the relationship between our views on the nature of knowledge and the way we decide to teach.

After reading this chapter you should be able to:

- recognize your own epistemological/philosophical position that determines the way you are currently teaching;
- reflect on the similarities or differences between academic and everyday knowledge;
- decide whether technology changes the nature of knowledge, and consider the implications for teaching;
- describe in broad terms the main theories of learning and discuss their implications for teaching;
- identify different levels and types of learning and decide which is most appropriate for your subject area/students;
- integrate these ideas into a personal strategy or philosophy for the teaching of your subject;
- decide on whether or not to change your overall approach to teaching in the light of the issues raised in this chapter.

What is covered in this chapter

In this chapter, I will be discussing different beliefs about the nature of knowledge, and how that influences teaching and learning. In particular, this chapter covers the following topics:

- [Scenario B: A pre-dinner party discussion](#)
- [2.1: Art, theory, research, and best practices in teaching](#)
- [2.2 Epistemology and theories of learning](#)
- [2.3 Objectivism and behaviourism](#)
- [2.4 Cognitivism](#)
- [2.5 Constructivism](#)
- [2.6 Connectivism](#)
- [2.7 Is the nature of knowledge changing?](#)

- [2.8 Summary](#)

Also in this chapter you will find the following activities:

- [Activity 2.1 What do you think makes a good teacher?](#)
- [Activity 2.2 Epistemologies at a dinner party](#)
- [Activity 2.3 Defining the limits of behaviourism](#)
- [Activity 2.4 Defining the limits of cognitivism](#)
- [Activity 2.5 Defining the limits of constructivism](#)
- [Activity 2.6 Defining the limits of connectivism](#)
- [Activity 2.7 Epistemology and academic knowledge](#)
- [Activity 2.8 Choosing a theory of learning](#)

Key Takeaways

1. Teaching is a highly complex occupation, which needs to adapt to a great deal of variety in context, subject matter and learners. It does not lend itself to broad generalizations. Nevertheless it is possible to provide guidelines or principles based on best practices, theory and research, that must then be adapted or modified to local conditions.

2. Our underlying beliefs and values, usually shared by other experts in a subject domain, shape our approach to teaching. These underlying beliefs and values are often implicit and are often not directly shared with our students, even though they are seen as essential components of becoming an ‘expert’ in a particular subject domain.

3. Different theories of learning reflect different views on the nature of knowledge.

4. Every teacher starts from some epistemological or theoretical position, even if it is not explicit, or even if the teacher is not fully aware of their beliefs.

5. With the possible exception of connectivism, there is some form of empirical evidence to support each of the theories of learning outlined here. The difference then is as much about values and beliefs about knowledge as it is about the effectiveness of each theory.

6. It is argued that academic knowledge is different from other forms of knowledge, and is even more relevant today in a digital age.

7. However, academic knowledge is not the only kind of knowledge that is important in today’s society, and as teachers we have to be aware of other forms of knowledge and their potential importance to our students, and make sure that we are providing the full range of contents and skills needed for students in a digital age.

Scenario B: A pre-dinner party discussion



Figure 2.B The Dinner Party, from NBC's *The Office*

List of characters.

- Peter and Ruth (hosts)
- Stephen (a mechanical engineer and Peter's brother)
- Caroline (a writer and Ruth's friend)

Peter to Stephen. I think Caroline's arrived. Now I know you've not met Caroline before, but for goodness sake, do try to be polite and sociable this time. The last time you were here, you hardly said a word.

Stephen. Well, nobody said anything that interested me. It was all about books and art. You know I'm not interested in that sort of thing.

Peter: Well, just try. Here she is. Caroline – lovely to see you again. Come and sit down. This is Stephen, my brother. I don't think you've met, although I've told you about him – he's a professor of mechanical engineering at the local university. But first, what would you like to drink?

Caroline. Hi, Stephen. No, I don't think we have met. Nice to meet you. Peter, I'll have a glass of white wine, please.

Peter. While you're introducing yourselves, I'll go and get the drinks and give Ruth a hand in the kitchen.

Stephen. Peter says you're a writer. What do you write about?

Caroline (laughing). Well, you do like to get straight to the point, don't you? It's a bit difficult to answer your question. It depends on what I'm interested in at the time.

Stephen. And what are you interested in at the moment?

Caroline. I'm thinking about how someone would react to the loss of someone they love due to the action of someone else they also love deeply. It was prompted by an item on the news of how a father accidentally killed his two year old daughter by running her over when he was backing the car out of the garage. His wife had just let the girl out to play in the front garden and didn't know her husband was getting the car out.

Stephen. God, that's awful. I wonder why the hell he didn't have a rear view video camera installed.

Caroline. Well, the horrible thing about it is that it could happen to anyone. That's why I want to write something around such everyday tragedies.

Stephen. But how can you possibly write about something like that if you haven't experienced that kind of thing yourself? Or have you?

Caroline. No, thank goodness. Well, I guess that's the art of a writer – the ability to embed yourself in other people's worlds, and to anticipate their feelings, emotions and consequent actions.

Stephen. But wouldn't you need a degree in psychology or experience as a grief counsellor to do that in that situation?

Caroline. Well, I might talk to people who've undergone similar kinds of family tragedies, to see what kind of people they are afterwards, but basically it's about understanding how *I* might react in such a situation and projecting that and modifying that according to the kind of characters I'm interested in.

Stephen. But how do you know it would be true, that people really would react the way you think they would?

Caroline. Well, what is 'truth' in a situation like that? Different people are likely to act differently. That's what I want to explore in the novel. The husband reacts one way, the wife another, and then there's the interaction between the two, and all those round them. I'm particularly interested in whether they could actually grow and become better people, or whether they disintegrate and destroy each other.

Stephen. But how can you not know that before you start?

Caroline. Well, that's the point, really. I don't. I want the characters to grow in my imagination, and the outcome will inevitably be determined by that.

Stephen. But if you don't know the truth, how those two people actually responded to that tragedy, how can you help them or others like them?

Caroline. But I'm a novelist, not a therapist. I'm not attempting to help anyone in such an awful situation. I'm trying to understand the *general* human condition, and to do that, I have to start with myself, what I know and feel, and project that into another context.

Stephen. But that's nonsense. How can you possibly understand the human condition just by looking inwards at yourself, and making up a fictional situation, that probably has nothing to do with what actually happened?

Caroline (sighs). Stephen, you're a typical bloody scientist, with no imagination.

Peter (arriving with the drinks). Well, how are you two getting along?

Obviously at this point, not very well. The problem is that they have different world views on truth and how it can be reached. They start from very different views about what constitutes knowledge, how knowledge is acquired, and how it is validated. As always, the ancient Greeks had a word for thinking about the nature of knowledge: epistemology. We shall see that this is an important driver of how we teach.

2.1 Art, theory, research, and best practices in teaching



For my comments on why this chapter is important for the rest of the book, please click on the podcast below



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=57>

All teaching is a mix of art and science. It is an art because any teacher or instructor is faced with numerous and constantly changing variables, which require rapid judgement and decision-making. Good teachers usually have a passion for teaching so the emotional as well as the cognitive side is important. In many cases, it's also about personal relationships, the extent to which an instructor can empathise with students or appreciate their difficulties in learning, and the extent to which the instructor can communicate effectively.

There is also a science of teaching, based on theory and research. We shall see in fact there are many, often conflicting theories, driven primarily by epistemological differences about the nature of knowledge, and by different value systems. Then over the last 100 years there has been a great deal of empirical research into how students learn, and effective teaching methods, which at its best is driven by a strong, explicit theoretical base, and at its worse by mindless data-collection (such as RateMyProfessor).

As well as research-based practices, there are what are known as best practices, based on teachers'

experience of teaching. While in many cases these have been validated by research or are driven by theories of learning, this is not always the case. As a result, what some people see as best practices are not always universally shared by others, even if best practices are seen in general as current accepted wisdom. Teaching math in primary schools is one example. Lectures are another. In [Chapter 3, Section 3](#), strong evidence is provided that lectures have many limitations, yet many instructors still believe that this is the most appropriate way to teach their subject.

However, even the most extensively trained teachers don't always make good teachers if they don't have the talent and emotional connection with learners, and untrained teachers (which covers virtually all university instructors), sometimes succeed, even with little experience, because they have a knack or in-born talent. However, although such instructors are often held up as the triumph of art over science in teaching, they are in practice very rare. Many of these untutored, brilliant instructors have learned rapidly on the job by trial and error, with the inevitable casualties along the way.

For all these reasons, there is no one best way to teach that will fit all circumstances, which is why arguments over 'modern' or 'traditional' approaches to teaching reading or math, for example, are often so sterile. Good teachers usually have an arsenal of tools, methods and approaches that they can draw on, depending on the circumstances. Also teachers and instructors will differ over what constitutes good teaching, depending on their understandings of what knowledge is, what matters most in learning, and their priorities in terms of desirable learning outcomes.

Nevertheless, these apparent contradictions do not mean that we cannot develop guidelines and techniques to improve the quality of teaching, or that we have no principles or evidence on which to base decisions about teaching, even in a rapidly changing digital age. The aim of this book is to provide such guidelines, while recognizing that one size will not fit all, and that every teacher or instructor will need to select and adapt the suggestions in this book to their own unique context.

For this approach to work, though, we need to explore some fundamental issues about teaching and learning, some of which are rarely addressed in everyday discussions about education. The first and probably most important is epistemology.

Activity 2.1: What do you think makes a good teacher?

1. Write down, in order of priority, what you consider to be the three most important characteristics of a good teacher.
2. Explain why your answer differs from mine.

For the reasons given above, I give no feedback (and certainly no 'right or wrong answers') to these questions.

2.2 Epistemology and theories of learning

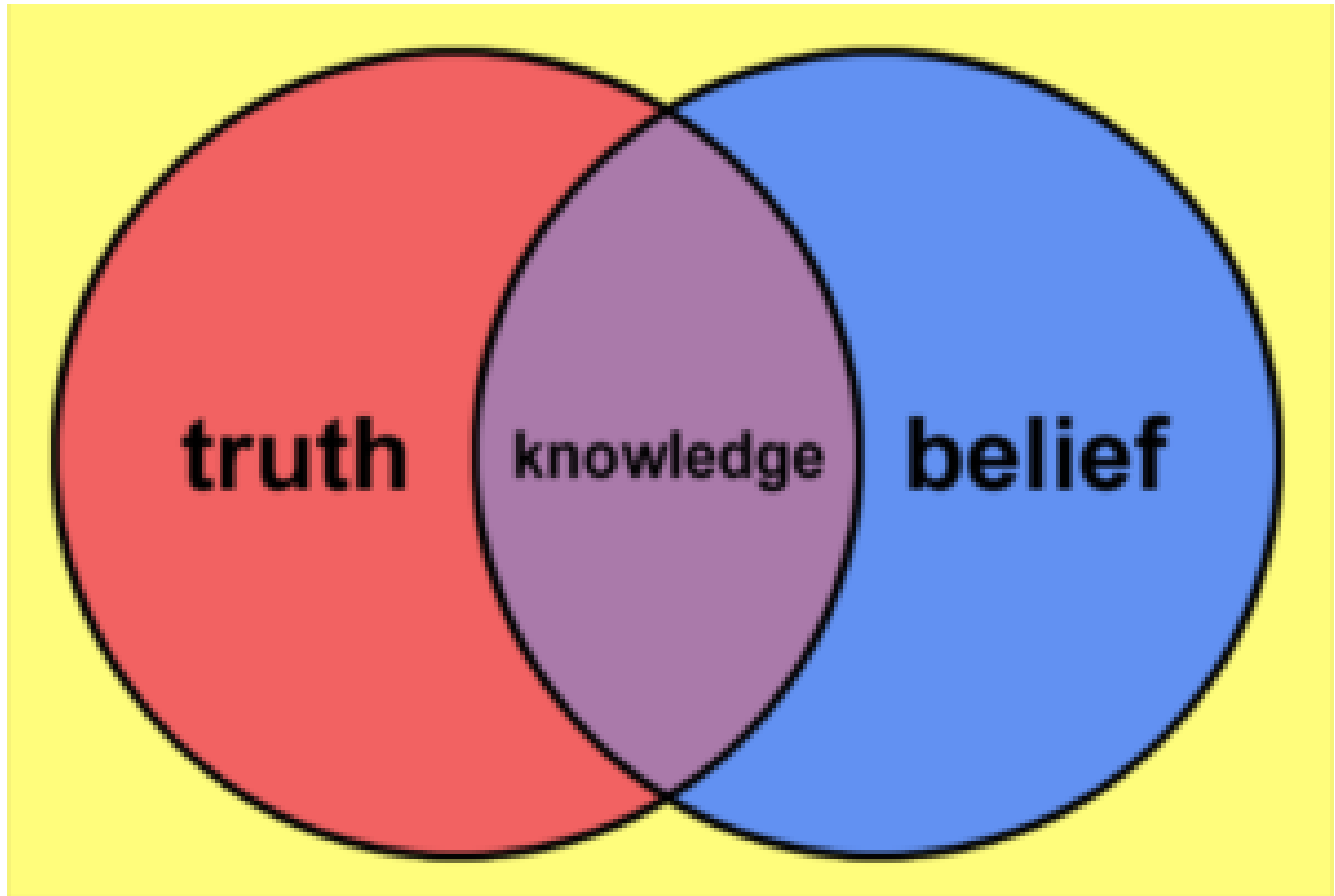


Figure 2.2.1 Image: © Freethought Kampala, 2017, via Libguides, University of Pittsburgh

2.2.1 What is epistemology?

In the dinner party scenario, Stephen and Caroline had quite different beliefs about the nature of knowledge. The issue here is not who was right, but that we all have implicit beliefs about the nature of knowledge, what constitutes truth, how that truth is best validated, and, from a teaching perspective, how best to help people to acquire that knowledge. The basis of that belief will vary, depending on the subject matter, and, in some areas, such as social sciences, even within a common domain of knowledge.

Our choice of teaching approaches and even the use of technology are absolutely dependent on beliefs and assumptions we have about the nature of knowledge, about the requirements of our subject discipline, and about how we think students learn. The way we teach in higher education will be driven

primarily by our beliefs or rather, by the commonly agreed consensus within an academic discipline about what constitutes valid knowledge in the subject area.

The nature of knowledge centres on the question of *how* we know what we know. What makes us believe that something is ‘true’? Questions of this kind are epistemological in nature. Hofer and Pintrich (1997) state:

Epistemology is a branch of philosophy concerned with the nature and justification of knowledge.

The famous argument at the British Association in 1860 between Thomas Huxley and the Bishop of Oxford, Samuel Wilberforce, over the origin of species is a classic example of the clash between beliefs about the foundations of knowledge. Wilberforce argued that Man was created by God; Huxley argued that Man evolved through natural selection. Bishop Wilberforce believed he was right because ‘true’ knowledge was determined through faith and interpretation of holy scripture; Professor Huxley believed he was right because ‘true’ knowledge was derived through empirical science and rational skepticism.

An important part of higher education is aimed at developing students’ understanding, within a particular discipline, of the criteria and values that underpin academic study of that discipline, and these include questions of what constitutes valid knowledge in that subject area. For many experts in a particular field, these assumptions are often so strong and embedded that the experts may not even be openly conscious of them unless challenged. But for novices, such as students, it often takes a great deal of time to understand fully the underlying value systems that drive choice of content and methods of teaching.

Our epistemological position therefore has direct practical consequences for how we teach.

2.2.2 Epistemology and theories of learning

Most teachers in the school/k-12 sector will be familiar with the main theories of learning, but because instructors in post-secondary education are hired primarily for their subject experience, or research or vocational skills, it is essential to introduce and discuss, if only briefly, these main theories. In practice, even without formal training or knowledge of different theories of learning, all teachers and instructors will approach teaching within one of these main theoretical approaches, whether or not they are aware of the educational jargon surrounding these approaches. Also, as new technologies and new modes of teaching such as online learning, technology-based teaching, and informal digital networks of learners have evolved, new theories of learning are beginning to emerge.

With a knowledge of alternative theoretical approaches, teachers and instructors are in a better position to make choices about how to approach their teaching in ways that will best fit the perceived needs of their students, within the very many different learning contexts that teachers and instructors face. This is particularly important when addressing many of the requirements of learners in a digital age that are set out in Chapter 1. Furthermore, the choice of or preference for a particular epistemology or a particular theoretical approach to teaching will have major implications for the way that technology is used to support teaching.

In fact, there is a huge amount of literature on theories of learning, and I am aware that the treatment in this book is cursory, to say the least. Those who would prefer a more detailed introduction to theories of learning should explore Schunk (2016) or Harasim (2017). The aim of my book though is not to be comprehensive in terms of in-depth coverage of all learning theories, but to provide a basis on which to suggest and evaluate different ways of teaching to meet the diverse needs of learners in a digital age.

The important point here is that every theory of teaching or learning is underpinned by a particular

assumption or understanding of what constitutes ‘true’ knowledge: in other words by a particular epistemological position. In the following sections I examine four of the most common theories of learning, and the underlying epistemologies that drive them.

References

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Hofer, B. and Pintrich, P. (1997) ‘[The development of epistemological theories: beliefs about knowledge and knowing and their relation to learning](#)’ *Review of Educational Research* Vol. 67, No. 1, pp. 88-140

Schunk, D. (2016) [*Learning Theories: An Educational Perspective: 7th edition*](#) London: Pearson Education

Activity 2.2 Epistemologies at a dinner party

1. Draw two columns. Under one column, write down a list of the justifications that Caroline used for her book in [Scenario B](#). Similarly, in the other column, write down Stephen’s objections.
2. What are the common themes underlying each person’s justification for their arguments? (Try not to make a value judgement about which were the ‘best’ arguments.)
3. Would it be possible to reconcile both approaches?

Feedback to come

2.3 Objectivism and behaviourism

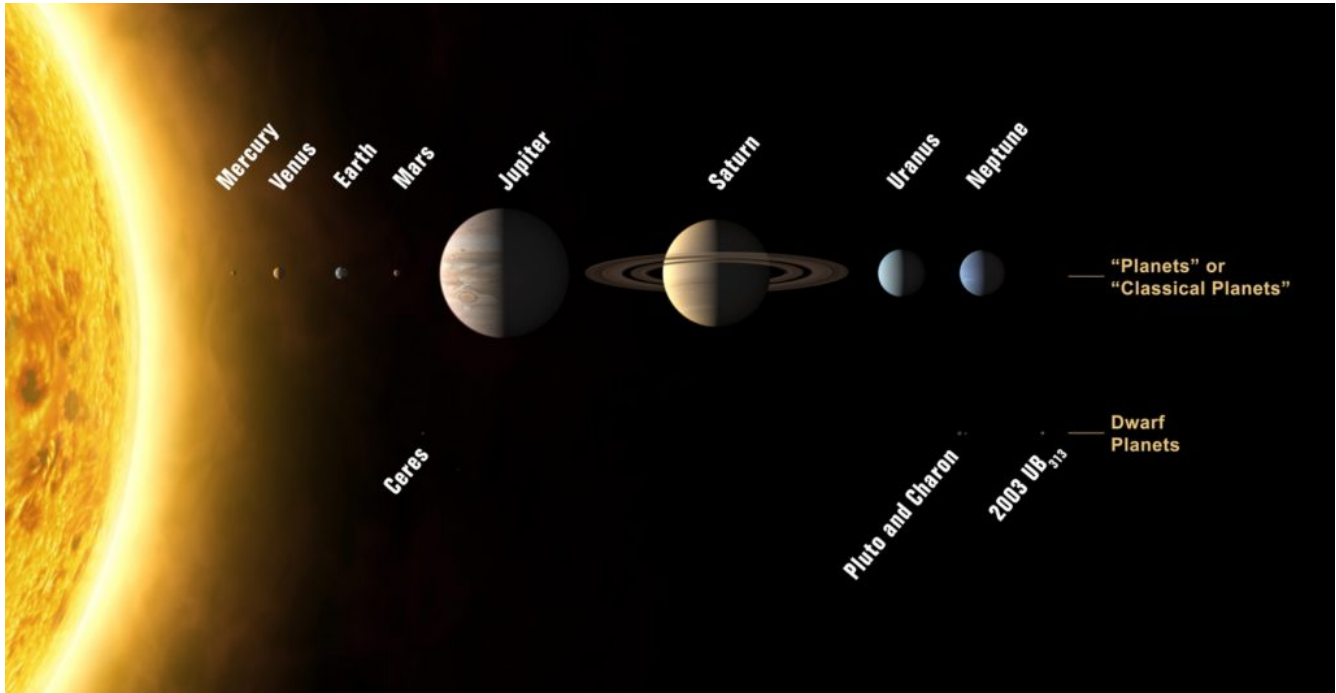


Figure 2.3.1 The solar system: an objective fact?
Image: © International Astronomical Union/Wikipedia

2.3.1 The objectivist epistemology

Objectivists believe that there exists an objective and reliable set of facts, principles and theories that either have been discovered and delineated or will be over the course of time. This position is linked to the belief that truth exists outside the human mind, or independently of what an individual may or may not believe. Thus the laws of physics are constant, although our knowledge of them may evolve as we discover the 'truth' out there.

2.3.2 Objectivist approaches to teaching

A teacher operating from a primarily *objectivist* view is more likely to believe that a course must present

a body of knowledge to be learned. This may consist of facts, formulas, terminology, principles, theories and the like.

The effective transmission of this body of knowledge becomes of central importance. Lectures and textbooks must be authoritative, informative, organized, and clear. The student's responsibility is accurately to comprehend, reproduce and add to the knowledge handed down to him or her, within the guiding epistemological framework of the discipline, based on empirical evidence and the testing of hypotheses. Course assignments and exams would require students to find 'right answers' and justify them. Original or creative thinking must still operate within the standards of an objectivist approach – in other words, new knowledge development must meet the rigorous standards of empirical testing within agreed theoretical frameworks.

An 'objectivist' teacher has to be very much in control of what and how students learn, choosing what is important to learn, the sequence, the learning activities, and how learners are to be assessed.

2.3.3 Behaviourism

Although initially developed in the 1920s, behaviourism still dominates approaches to teaching and learning in many places, particularly in the USA. **Behaviourism is an objectivist learning theory.** Behaviourist psychology is an attempt to model the study of human behaviour on the methods of the physical sciences, and therefore concentrates attention on those aspects of behaviour that are capable of direct observation and measurement. At the heart of behaviourism is the idea that certain behavioural responses become associated in a mechanistic and invariant way with specific stimuli. Thus a certain stimulus will evoke a particular response. At its simplest, it may be a purely physiological reflex action, like the contraction of an iris in the eye when stimulated by bright light.

However, most human behaviour is more complex. Nevertheless behaviourists have demonstrated in labs that it is possible to reinforce through reward or punishment the association between any particular stimulus or event and a particular behavioural response. The bond formed between a stimulus and response will depend on the existence of an appropriate means of reinforcement at the time of association between stimulus and response. This depends on random behaviour (trial and error) being appropriately reinforced as it occurs.

This is essentially the concept of operant conditioning, a principle most clearly developed by Skinner (1968). He showed that pigeons could be trained in quite complex behaviour by rewarding particular, desired responses that might initially occur at random, with appropriate stimuli, such as the provision of food pellets. He also found that a chain of responses could be developed, without the need for intervening stimuli to be present, thus linking an initially remote stimulus with a more complex behaviour. Furthermore, inappropriate or previously learned behaviour could be extinguished by withdrawing reinforcement. Reinforcement in humans can be quite simple, such as immediate feedback for an activity or getting a correct answer to a multiple-choice test.





Figure 2.3.2 YouTube video/film of B.F. Skinner demonstrating his teaching machine, 1954

Click on image to see video

You can see a fascinating five minute film of B.F. Skinner describing his teaching machine in a 1954 film captured on YouTube, either by clicking on the picture above or at: <http://www.youtube.com/watch?v=jTH3ob1IRFo>

Underlying a behaviourist approach to teaching is the belief that learning is governed by invariant principles, and these principles are independent of conscious control on the part of the learner. Behaviourists attempt to maintain a high degree of objectivity in the way they view human activity, and they generally reject reference to unmeasurable states, such as feelings, attitudes, and consciousness. Human behaviour is above all seen as predictable and controllable. Behaviourism thus stems from a strongly objectivist epistemological position.

Skinner's theory of learning provides the underlying theoretical basis for the development of teaching machines, measurable learning objectives, computer-assisted instruction, and multiple choice tests. It often is implicit in the application of artificial intelligence to modifying human behaviour. Behaviourism's influence is still strong in corporate and military training, and in some areas of science, engineering, and medical training. It can be of particular value for rote learning of facts or standard

procedures such as multiplication tables, for dealing with children or adults with limited cognitive ability due to brain disorders, or for compliance with industrial or business standards or processes that are invariant and do not require individual judgement. It is also the underlying methodology of social media such as Facebook for influencing behaviour, through ‘likes’, number of hits and connections, and other ‘status’ rewards.

Behaviourism, with its emphasis on reward and punishment as drivers of learning, and on pre-defined and measurable outcomes, is the basis of populist conceptions of learning among many parents, politicians, and, it should be noted, computer scientists interested in automating learning. It is not surprising then that there has also been a tendency until recently to see technology, and in particular computer-aided instruction, as being closely associated with behaviourist approaches to learning, although we shall see in [Chapter 5, Section 4](#) that computers do not necessarily have to be used in a behaviourist way.

Lastly, although behaviourism is an ‘objectivist’ approach to teaching, it is not the only way of teaching ‘objectively’. For instance, problem-based learning can still take a highly objective approach to knowledge and learning.

References

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Activity 2.3 Defining the limits of behaviourism

1. What areas of knowledge do you think would be best ‘taught’ or learned through a behaviourist approach?
2. What areas of knowledge do you think would NOT be appropriately taught through a behaviourist approach?
3. What are your reasons?

Feedback to come

2.4 Cognitivism



Figure 2.4.1 Benjamin Bloom Image: Wikipedia

2.4.1 What is cognitivism?

An obvious criticism of behaviourism is that it treats humans as a black box, where inputs into the black box, and outputs from the black box, are known and measurable, but what goes on inside the black box is ignored or not considered of interest. However, humans have the ability for conscious thought, decision-making, emotions, and the ability to express ideas through social discourse, all of which are highly significant for learning. Thus we will likely get a better understanding of learning if we try to find out what goes on inside the black box.

Cognitivists therefore have focused on identifying mental processes – internal and conscious representations of the world – that they consider are essential for human learning. Fontana ([1981](#)) summarises the cognitive approach to learning as follows:

‘The cognitive approach ... holds that if we are to understand learning we cannot confine ourselves to observable behaviour, but must also concern ourselves with the learner’s ability mentally to re-organize his psychological field (i.e. his inner world of concepts, memories, etc.) in response to

experience. This latter approach therefore lays stress not only on the environment, but upon the way in which the individual interprets and tries to make sense of the environment. It sees the individual not as the somewhat mechanical product of his environment, but as an active agent in the learning process, deliberately trying to process and categorize the stream of information fed into him by the external world.' (p. 148)

Thus the search for rules, principles or relationships in processing new information, and the search for meaning and consistency in reconciling new information with previous knowledge, are key concepts in cognitive psychology. Cognitive psychology is concerned with identifying and describing mental processes that affect learning, thinking and behaviour, and the conditions that influence those mental processes.

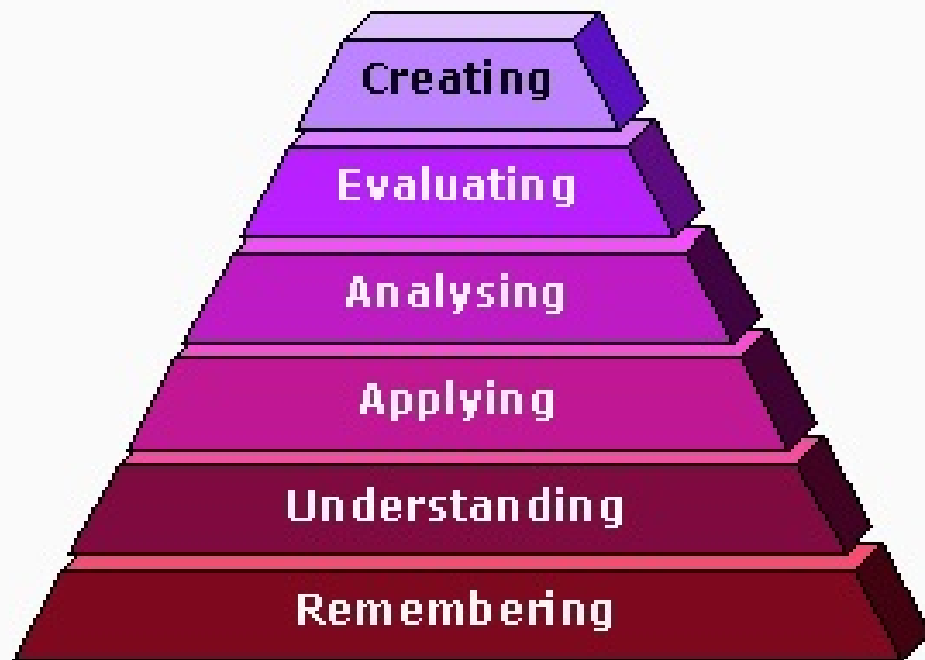
2.4.2 Cognitivist learning theory

The most widely used theories of cognitivism in education are based on Bloom's taxonomies of learning objectives (Bloom et al., [1956](#)), which are related to the development of different kinds of learning skills, or ways of learning. Bloom and his colleagues claimed that there are three important domains of learning:

- cognitive (thinking)
- affective (feeling)
- psycho-motor (doing).

Cognitivism focuses on the 'thinking' domain. In more recent years, Anderson and Krathwohl (2000) have slightly modified Bloom et al.'s original taxonomy, adding 'creating' new knowledge:





*Revised taxonomy of the cognitive domain
following Anderson and Krathwohl (2001)*

Figure 2.4.2 Cognitive domain

Image: © Atherton J S (2013) CC-NC-ND

Bloom et al. also argued that there is a hierarchy of learning, meaning that learners need to progress through each of the levels, from remembering through to evaluating/creating. As psychologists delve deeper into each of these cognitive activities to understand the underlying mental processes, it becomes an increasingly reductionist exercise (see Figure 2.4.3 below).

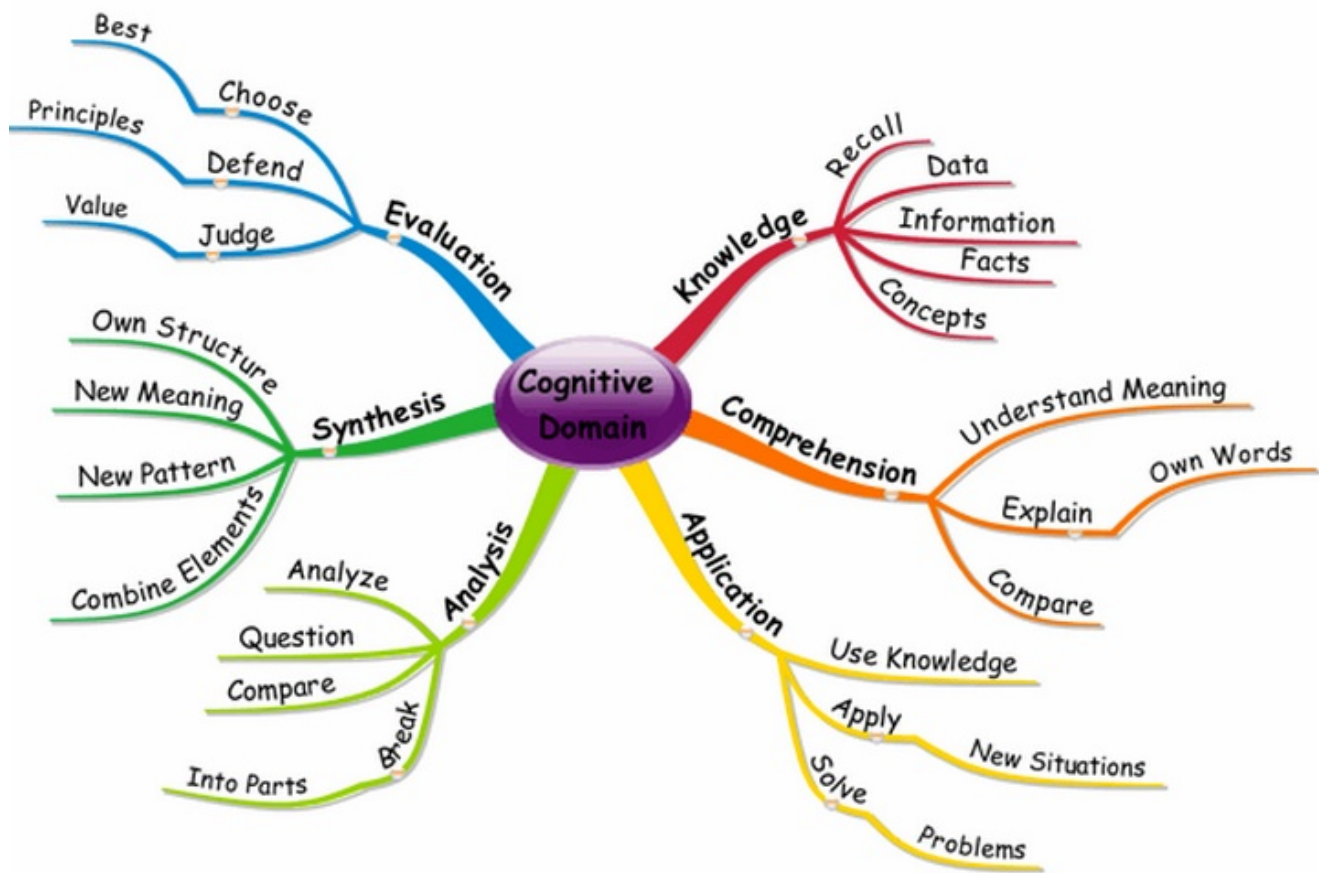


Figure 2.4.3 © Faizel Mohidin, [UsingMindMaps](#), 2011.

2.4.3 Applications of cognitivist learning theory

Cognitive approaches to learning, with a focus on comprehension, abstraction, analysis, synthesis, generalization, evaluation, decision-making, problem-solving and creative thinking, seem to fit much better with higher education than behaviourism, but even in school/k-12 education, a cognitivist approach would mean for instance focusing on teaching learners *how* to learn, on developing stronger or new mental processes for future learning, and on developing deeper and constantly changing understanding of concepts and ideas.

Cognitive approaches to learning cover a very wide range. At the objectivist end, cognitivists consider basic mental processes to be genetic or hard-wired, but can be programmed or modified by external factors, such as new experiences. Early cognitivists in particular were interested in the concept of mind as computer, and more recently brain research has led to a search for linking cognition to the development and reinforcement of neural networks in the brain.

In terms of practice, this concept of mind as computer has led to several technology-based developments in teaching, including:

- *intelligent tutoring systems*, a more refined version of teaching machines, based on breaking down learning into a series of manageable steps, and analysing learners' responses to direct

them to the most appropriate next step. Adaptive learning is the latest extension of such developments;

- *artificial intelligence*, which seeks to represent in computer software the mental processes used in human learning (which of course if successful would result in computers replacing many human activities – such as teaching, if learning is considered in an objectivist framework);
- *pre-determined learning outcomes*, based on an analysis and development of different kinds of cognitive activities, such as comprehension, analysis, synthesis, and evaluation;
- *problem-based learning*, based on an analysis of the thinking processes successful problem-solvers use to solve problems;
- *instructional design* approaches that attempt to manage the design of teaching to ensure successful achievement of pre-determined learning outcomes or objectives.

Cognitivists have increased our understanding of how humans process and make sense of new information, how we access, interpret, integrate, process, organize and manage knowledge, and have given us a better understanding of the conditions that affect learners' mental states.

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Activity 2.4 Defining the limits of cognitivism

1. What areas of knowledge do you think would be best 'taught' or learned through a cognitivist approach?
2. What areas of knowledge do you think would NOT be appropriately taught through a cognitivist approach?
3. What are your reasons?

Feedback to come

2.5 Constructivism



Figure 2.5.1 Project work is one form of constructivist learning
Image: © Jim Olive, Environmental Protection Agency/Wikipedia, 1972

2.5.1 What is constructivism?

Both behaviourist and some elements of cognitive theories of learning are *deterministic*, in the sense that behaviour and learning are believed to be rule-based and operate under predictable and constant conditions over which the individual learner has no or little control. However, constructivists emphasise the importance of consciousness, free will and social influences on learning. Carl Rogers (1969) stated that:

every individual exists in a continually changing world of experience in which he is the center.

The external world is interpreted within the context of that private world. The belief that humans are essentially active, free and strive for meaning in personal terms has been around for a long time, and is an essential component of constructivism.

Constructivists believe that knowledge is essentially subjective in nature, constructed from our perceptions and mutually agreed upon conventions. According to this view, we construct new knowledge rather than simply acquire it via memorization or through transmission from those who know to those who don't know. Constructivists believe that meaning or understanding is achieved by assimilating information, relating it to our existing knowledge, and cognitively processing it (in other words, thinking or reflecting on new information). *Social* constructivists believe that this process works best through discussion and social interaction, allowing us to test and challenge our own understandings with those of others. For a constructivist, even physical laws exist because they have been constructed by people from evidence, observation, and deductive or intuitive thinking, and, most importantly, because certain communities of people (in this example, scientists) have mutually agreed what constitutes valid knowledge.

Constructivists argue that individuals consciously strive for meaning to make sense of their environment in terms of past experience and their present state. It is an attempt to create order in their minds out of disorder, to resolve incongruities, and to reconcile external realities with prior experience. The means by which this is done are complex and multi-faceted, from personal reflection, seeking new information, to testing ideas through social contact with others. Problems are resolved, and incongruities sorted out, through strategies such as seeking relationships between what was known and what is new, identifying similarities and differences, and testing hypotheses or assumptions. Reality is always tentative and dynamic.

One consequence of constructivist theory is that each individual is unique, because the interaction of their different experiences, and their search for personal meaning, results in each person being different from anyone else. Thus behaviour is not predictable or deterministic, at least not at the individual level (which is a key distinguishing feature from cognitivism, which seeks general rules of thinking that apply to all humans). The key point here is that for constructivists, learning is seen as essentially a *social* process, requiring communication between learner, teacher and others. This social process cannot effectively be replaced by technology, although technology may facilitate it.

2.5.2 Constructivist approaches to teaching

For many educators, the social context of learning is critical. Ideas are tested not just on the teacher, but with fellow students, friends and colleagues. Furthermore, knowledge is mainly acquired through social processes or institutions that are socially constructed: schools, universities, and increasingly these days, online communities. Thus what is taken to be 'valued' knowledge is also socially constructed.

Constructivists believe that learning is a constantly dynamic process. Understanding of concepts or principles develops and becomes deeper over time. For instance, as a very young child, we understand the concept of heat through touch. As we get older we realise that it can be quantified, such as minus 20 centigrade being very cold (unless you live in Manitoba, where -20C would be considered normal). As we study science, we begin to understand heat differently, for instance, as a form of energy transfer, then as a form of energy associated with the motion of atoms or molecules. Each 'new' component needs to be integrated with prior understandings and also integrated with other related concepts, including other components of molecular physics and chemistry.

Thus 'constructivist' teachers place a strong emphasis on learners developing personal meaning

through reflection, analysis and the gradual building of layers or depths of knowledge through conscious and ongoing mental processing. Reflection, seminars, discussion forums, small group work, and projects are key methods used to support constructivist learning in campus-based teaching (discussed in more detail in [Chapter 3](#)), and online collaborative learning, and communities of practice are important constructivist methods in online learning ([Chapter 4](#)).

Although problem-solving can be approached in an objectivist way, by pre-determining a set of steps or processes to go through pre-determined by ‘experts’, it can also be approached in a constructivist manner. The level of teacher guidance can vary in a constructivist approach to problem-solving, from none at all, to providing some guidelines on how to solve the problem, to directing students to possible sources of information that may be relevant to solving that problem, to getting students to brainstorm particular solutions. Students will probably work in groups, help each other and compare solutions to the problem. There may not be considered one ‘correct’ solution to the problem, but the group may consider some solutions better than others, depending on the agreed criteria of success for solving the problem.

It can be seen that there can be ‘degrees’ of constructivism, since in practice the teacher may well act as first among equals, and help direct the process so that ‘suitable’ outcomes are achieved. The fundamental difference is that students have to work towards constructing their own meaning, testing it against ‘reality’, and further constructing meaning as a result.

Constructivists also approach technology for teaching differently from behaviourists. From a constructivist perspective, brains have more plasticity, adaptability and complexity than current computer software programs. Other uniquely human factors, such as emotion, motivation, free will, values, and a wider range of senses, make human learning very different from the way computers operate. Following this reasoning, education would be much better served if computer scientists tried to make software to support learning more reflective of the way human learning operates, rather than trying to fit human learning into the current restrictions of behaviourist computer programming. This will be discussed in more detail in [Chapter 4, Section 4](#).

Although constructivist approaches can be and have been applied to all fields of knowledge, they are more commonly found in approaches to teaching in the humanities, social sciences, education, and other less quantitative subject areas.

References

Rogers, C. (1969) [*Freedom to Learn*](#) Columbus, OH: Charles E. Merrill Publishing Co.

There are many books on constructivism but some of the best are the original works of some of the early educators and researchers, in particular:

Piaget, J. and Inhelder, B., (1958) [*The Growth of Logical Thinking from Childhood to Adolescence*](#) New York: Basic Books, 1958

Searle, J. (1996) *The construction of social reality* New York: Simon & Shuster

Vygotsky, L. (1978) [*Mind in Society: Development of Higher Psychological Processes*](#) Cambridge MA: Harvard University Press

Activity 2.5 Defining the limits of constructivism

1. What areas of knowledge do you think would be best 'taught' or learned through a constructivist approach?
2. What areas of knowledge do you think would NOT be appropriately taught through a constructivist approach?
3. What are your reasons?

Feedback to come

2.6 Connectivism



*Figure 2.6.1 Stephen Downes Image:
Wikipedia*



*Figure 2.6.2 George Siemens Image:
Wikipedia*

2.6.1 What is connectivism?

Another epistemological position, connectivism, has emerged in recent years that is particularly relevant to a digital society. Connectivism is still being refined and developed, and it is currently highly controversial, with many critics.

In connectivism it is the collective connections between all the ‘nodes’ in a network that result in new forms of knowledge. According to Siemens ([2005](#)), knowledge is created beyond the level of individual human participants, and is constantly shifting and changing. Knowledge in networks is not controlled or created by any formal organization, although organizations can and should ‘plug in’ to this world of

constant information flow, and draw meaning from it. Knowledge in connectivism is a chaotic, shifting phenomenon as nodes come and go and as information flows across networks that themselves are interconnected with myriad other networks.

The significance of connectivism is that its proponents argue that the Internet changes the essential nature of knowledge. ‘*The pipe is more important than the content within the pipe,*’ to quote Siemens again. [Downes \(2007\)](#) makes a clear distinction between constructivism and connectivism:

In connectivism, a phrase like “constructing meaning” makes no sense. Connections form naturally, through a process of association, and are not “constructed” through some sort of intentional action. ...Hence, in connectivism, there is no real concept of transferring knowledge, making knowledge, or building knowledge. Rather, the activities we undertake when we conduct practices in order to learn are more like growing or developing ourselves and our society in certain (connected) ways.

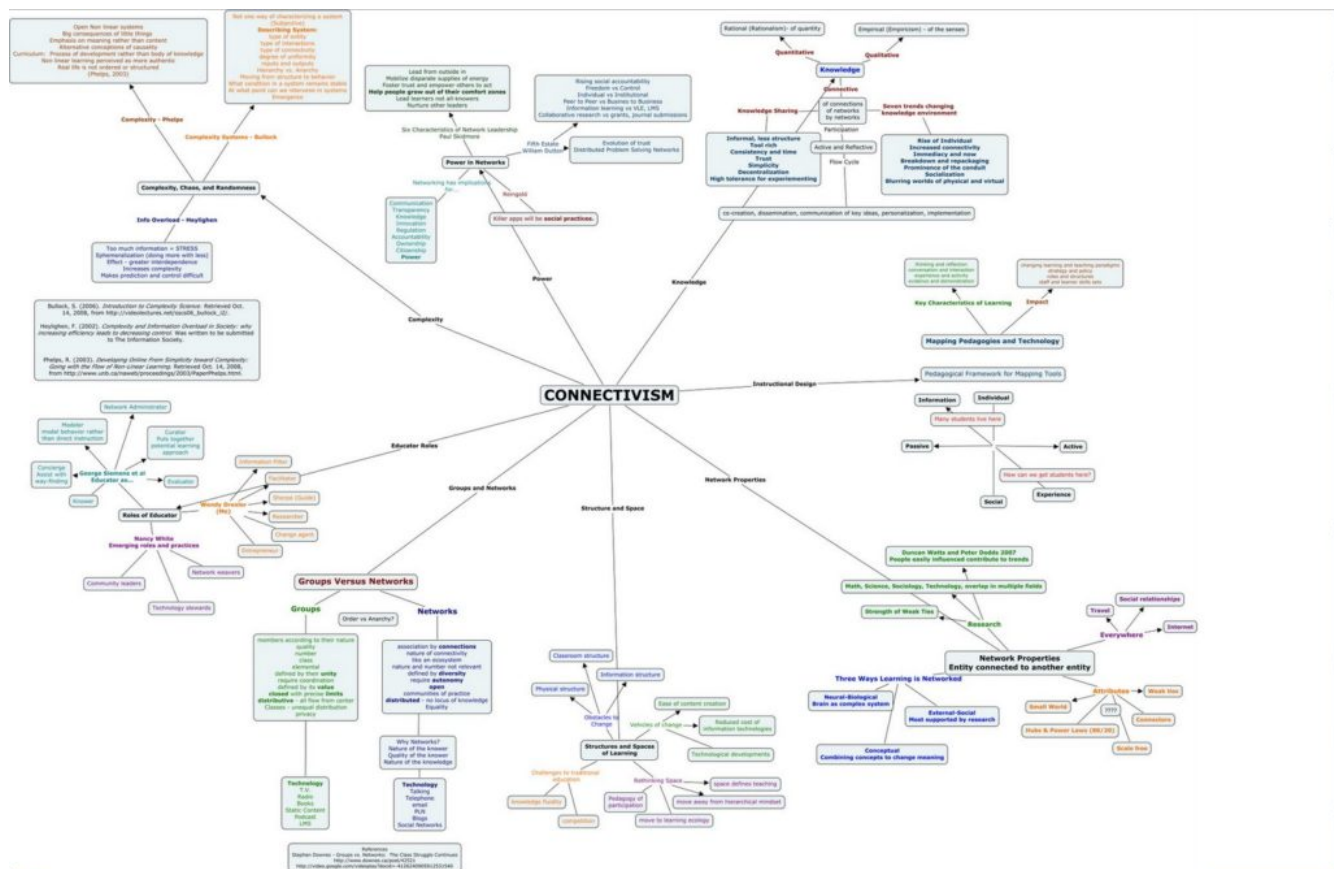


Figure 2.6.3: A map of connectivism Image: © pkab.wordpress.com. Click and drag for a larger image.

2.6.2 Connectivism and learning

For Siemens (2005), it is the connections and the way information flows that result in knowledge existing beyond the individual. Learning becomes the ability to tap into significant flows of information, and to follow those flows that are significant. He argues that:

Connectivism presents a model of learning that acknowledges the tectonic shifts in society where learning is no longer an internal, individualistic activity....Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database).

[Siemens \(2005\)](#) identifies the principles of connectivism as follows:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

[Downes \(2007\)](#) states that:

at its heart, connectivism is the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks....[Connectivism] implies a pedagogy that:

(a) seeks to describe 'successful' networks (as identified by their properties, which I have characterized as diversity, autonomy, openness, and connectivity) and

(b) seeks to describe the practices that lead to such networks, both in the individual and in society – which I have characterized as modelling and demonstration (on the part of a teacher) – and practice and reflection (on the part of a learner).

2.6.3 Applications of connectivism to teaching and learning

Siemens, Downes and Cormier constructed the first massive open online course (MOOC), [Connectivism and Connective Knowledge 2011](#), partly to explain and partly to model a connectivist approach to learning.

Connectivists such as Siemens and Downes tend to be somewhat vague about the role of teachers or instructors, as the focus of connectivism is more on individual participants, networks and the flow of information and the new forms of knowledge that result. The main purpose of a teacher appears to be to provide the initial learning environment and context that brings learners together, and to help learners construct their own personal learning environments that enable them to connect to ‘successful’ networks, with the assumption that learning will automatically occur as a result, through exposure to the flow of information and the individual’s autonomous reflection on its meaning. There is no need for formal institutions to support this kind of learning, especially since such learning often depends heavily on social media readily available to all participants.

There are numerous criticisms of the connectivist approach to teaching and learning (see [Chapter 5, Section 4](#)). Some of these criticisms may be overcome as practice improves, as new tools for assessment, and for organizing co-operative and collaborative work with massive numbers, are developed, and as more experience is gained. More importantly, connectivism is really the first theoretical attempt to radically re-examine the implications for learning of the Internet and the explosion of new communications technologies.

References and further reading

- AlDahdouh, A., et al. (2015) [Understanding knowledge network, learning and connectivism](#), *International Journal of Instructional Technology and Distance Learning*, Vol. 12, No.10
- Downes, S. (2007) [What connectivism is](#) Half An Hour, February 3
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- Siemens, G. (2005) [Connectivism: a theory for the digital age](#) *International Journal of Instructional Technology and Distance Learning*, Vol. 2, No. 1.

Activity 2.6 Defining the limits of connectivism

1. What areas of knowledge do you think would be best ‘taught’ or learned through a connectivist approach?
2. What areas of knowledge do you think would NOT be appropriately taught through a connectivist approach?
3. What are your reasons?

You might like to come back to your answer after you have read [Chapter 6](#) on MOOCs. **Otherwise no feedback is provided for this activity.**

2.7 Is the nature of knowledge changing?

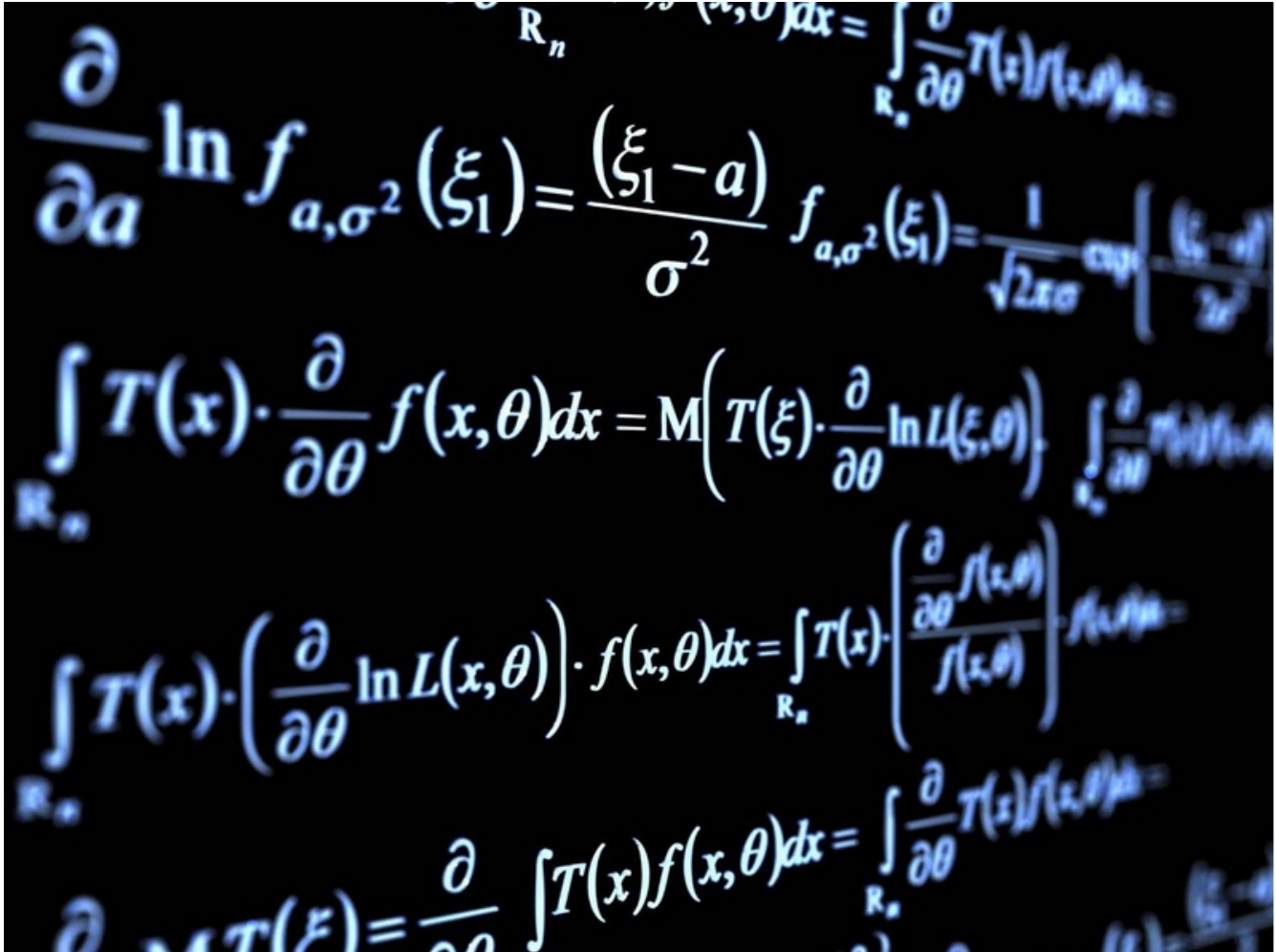

$$\frac{\partial}{\partial a} \ln f_{a, \sigma^2}(\xi_1) = \frac{(\xi_1 - a)}{\sigma^2} f_{a, \sigma^2}(\xi_1) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left[-\frac{(\xi_1 - a)^2}{2\sigma^2}\right]$$
$$\int_{\mathbb{R}_n} T(x) \cdot \frac{\partial}{\partial \theta} f(x, \theta) dx = M\left(T(\xi) \cdot \frac{\partial}{\partial \theta} \ln L(\xi, \theta)\right)$$
$$\int_{\mathbb{R}_n} T(x) \cdot \left(\frac{\partial}{\partial \theta} \ln L(x, \theta)\right) \cdot f(x, \theta) dx = \int_{\mathbb{R}_n} T(x) \cdot \left(\frac{\frac{\partial}{\partial \theta} f(x, \theta)}{f(x, \theta)}\right) \cdot f(x, \theta) dx$$
$$\frac{\partial}{\partial \theta} \int_{\mathbb{R}_n} T(x) f(x, \theta) dx = \int_{\mathbb{R}_n} \frac{\partial}{\partial \theta} T(x) f(x, \theta) dx$$

Figure 2.7 Academic knowledge is a second-order form of knowledge that seeks abstractions and generalizations based on reasoning and evidence Image: © Wallpaper/Wikipedia

2.7.1 Knowledge and technology

Before moving on to the more pragmatic elements of teaching in a digital age, it is necessary to address the question of whether the development of digital technologies has actually changed the nature of knowledge, because if that is the case, then this will influence strongly what needs to be taught as well as how it will be taught.

Connectivists such as Siemens and Downes argue that the Internet *has* changed the nature of knowledge. They argue that ‘important’ or ‘valid’ knowledge now is different from prior forms of knowledge, particularly academic knowledge. [Downes \(2007\)](#) has argued that new technologies allow for the de-institutionalisation of learning. Chris Anderson, the editor of Wired Magazine and now [Curator](#) of Ted Talks, has argued ([2008](#)) that massive meta-data correlations can replace ‘traditional’ scientific approaches to creating new knowledge:

Google’s founding philosophy is that we don’t know why this page is better than that one: If the statistics of incoming links say it is, that’s good enough. No semantic or causal analysis is required. ...This is a world where massive amounts of data and applied mathematics replace every other tool that might be brought to bear. Out with every theory of human behavior, from linguistics to sociology. Forget taxonomy, ontology, and psychology. Who knows why people do what they do? The point is they do it, and we can track and measure it with unprecedented fidelity. With enough data, the numbers speak for themselves.

The big target here isn’t advertising, though. It’s science. The scientific method is built around testable hypotheses. These models, for the most part, are systems visualized in the minds of scientists. The models are then tested, and experiments confirm or falsify theoretical models of how the world works. This is the way science has worked for hundreds of years. Scientists are trained to recognize that correlation is not causation, that no conclusions should be drawn simply on the basis of correlation between X and Y (it could just be a coincidence). Instead, you must understand the underlying mechanisms that connect the two. Once you have a model, you can connect the data sets with confidence. Data without a model is just noise. But faced with massive data, this approach to science — hypothesize, model, test — is becoming obsolete.’

(It should be noted this was written before derivative-based investments caused financial markets to collapse, mainly because those using them didn’t understand the underlying logic that created the data.)

Jane Gilbert’s book, ‘Catching the Knowledge Wave’ (2005), directly addresses the assumption that the nature of knowledge is changing. Drawing on publications by [Manuel Castells \(2009\)](#) and [Jean-François Lyotard \(1984\)](#), she writes (p. 35):

‘Castells says that...knowledge is not an object but a series of networks and flows...the new knowledge is a process not a product...it is produced not in the minds of individuals but in the interactions between people.....

According to Lyotard, the traditional idea that acquiring knowledge trains the mind would become obsolete, as would the idea of knowledge as a set of universal truths. Instead, there will be many truths, many knowledges and many forms of reason. As a result... the boundaries between traditional disciplines are dissolving, traditional methods of representing knowledge (books, academic papers, and so on) are becoming less important, and the role of traditional academics or experts are undergoing major change.’

Back in the 1960s [Marshall McLuhan \(1964\)](#) argued that the medium is the message; the way information is represented and transmitted is changed and so is our focus and understanding as information moves between and within different media. If information and knowledge are now represented and more significantly now flow differently, how does that affect educational processes such as teaching and learning?

One way knowledge is certainly changing is in the way it is represented. It should be remembered that Socrates ([according to Plato](#)) criticised writing because it could not lead to ‘true’ knowledge which came only from verbal dialogue and oratory. Writing however is important because it provides a permanent record of knowledge. The printing press was important because it enabled the written word to spread to many more people. As a consequence, scholars could challenge and better interpret, through reflection, what others had written, and more accurately and carefully argue their own positions. Many scholars believe that one consequence of the development of mass printing was the Renaissance and the age of enlightenment, and modern academia consequently came to depend very heavily on the print medium.

Now we have other ways to record and transmit knowledge that can be studied and reflected upon, such as video, audio, animations, and graphics, and the Internet does expand enormously the speed and range by which these representations of knowledge can be transmitted. We shall also see in Chapter 8 and Chapter 9 that that media are not neutral, but represent meaning in different ways.

2.7.2 Knowledge as a commodity

All the above authors agree that the ‘new’ knowledge in the knowledge society is about the commercialisation or commodification of knowledge: ‘it is defined not through what it is, but through what it can do.’ (Gilbert, p.35). ‘The capacity to own, buy and sell knowledge has contributed, in major ways, to the development of the new, knowledge-based societies.’ (p.39)

In a knowledge-based society, particular emphasis is placed on the utility of knowledge for commercial purposes. As a result there is more emphasis on certain types of immediately practical knowledge over longer term research, for instance, but because of the strong relationship between pure and applied knowledge, this is probably a mistake, even in terms of economic development.

The issue is not so much the nature of knowledge, but how students or learners come to acquire that knowledge and learn how it can be used. As I argued in Chapter 1, this requires more emphasis on developing and learning skills of how best to apply knowledge, rather than a focus on merely teaching content. Also it will be argued later in the book that students have many more sources of information besides the teacher or instructor and that a key educational issue is the management of vast amounts of knowledge. Since knowledge is dynamic, expanding and constantly changing, learners need to develop the skills and learn to use the tools that will enable them to continue to learn.

But does this mean that knowledge itself is now different? I will argue that in a digital age, some aspects of knowledge do change considerably, but others do not, at least in essence. In particular, I argue that academic knowledge, in terms of its values and goals, does not and should not change a great deal, but the way it is represented and applied will and should change.

2.7.3 The nature of academic knowledge

Academic knowledge is a specific form of knowledge that has characteristics that differentiate it from other kinds of knowledge, and particularly from knowledge or beliefs based solely on direct personal experience. In summary, academic knowledge is a second-order form of knowledge that seeks abstractions and generalizations based on reasoning and evidence.

Fundamental components of academic knowledge are

- transparency,
- codification,
- reproduction, and
- communicability.

Transparency means that the source of the knowledge can be traced and verified. Codification means that the knowledge can be consistently represented in some form (words, symbols, video) that enables interpretation by someone other than the originator. Knowledge can be reproduced or have multiple copies. Lastly, knowledge must be in a form such that it can be communicated and challenged by others.

[Laurillard \(2001\)](#) recognises the importance of relating the student’s direct experience of the world to

an understanding of academic concepts and processes, but she argues that teaching at a university level must go beyond direct experience to reflection, analysis and explanations of those direct experiences. Because every academic discipline has a specific set of conventions and assumptions about the nature of knowledge within its discipline, students in higher education need to change the perspectives of their everyday experience to match those of the subject domain.

As a result, Laurillard argues that university teaching is ‘essentially a rhetorical activity, persuading students to change the way they experience the world’ (p.28). Laurillard then goes on to make the point that because academic knowledge has this second-order character, it relies heavily on symbolic representation, such as language, mathematical symbols, ‘or any symbol system that can represent a description of the world, and requires interpretation’ (p.27) to enable this mediation to take place.

If academic knowledge requires mediation, then this has major significance for the use of technology. Language (i.e. reading and speaking) is only one channel for mediating knowledge. Media such as video, audio, and computing can also provide teachers with alternative channels of mediation.

Laurillard’s reflections on the nature of academic knowledge are a counter-balance to the view that students can automatically construct knowledge through argument and discussion with their peers, or self-directed study, or the wisdom of the crowd. For academic knowledge, the role of the teacher is to help students understand not just the facts or concepts in a subject discipline, but the rules and conventions for acquiring and validating knowledge within that subject discipline. Academic knowledge shares common values or criteria, making academic knowledge itself a particular epistemological approach.

2.7.4 Academic versus applied knowledge

In a knowledge-based society, knowledge that leads to innovation and commercial activity is now recognised as critical to economic development. Again, there is a tendency to argue that this kind of knowledge – ‘commercial’ knowledge – is different from academic knowledge. I would argue that sometimes it is and sometimes it isn’t.

I have no argument with the point of view that knowledge is the driver of most modern economies, and that this represents a major shift from the ‘old’ industrial economy, where natural resources (coal, oil, iron), machinery and cheap manual labour were the predominant drivers. I do though challenge the idea that the *nature* of knowledge has undergone radical changes.

The difficulty I have with the broad generalisations about the changing nature of knowledge is that there have *always* been different kinds of knowledge. One of my first jobs was in a brewery in the East End of London in 1959. I was one of several students hired during our summer vacation. One of my fellow student workers was a brilliant mathematician. Every lunch hour the regular brewery workers played cards (three card brag) for what seemed to us large sums of money, but they would never let us play with them. My student friend was desperate to get a game, and eventually, on our last week, they let him in. They promptly won all his wages. He knew the numbers and the odds, but there was still a lot of non-academic knowledge he didn’t know about playing cards for money, especially against a group of friends playing together rather than against each other. Gilbert’s point is that academic knowledge has always been more highly valued in education than ‘everyday’ knowledge. However, in the ‘real’ world, all kinds of knowledge are valued, depending on the context. Thus while beliefs about what constitutes ‘important’ knowledge may be changing, this does not mean that the nature of academic knowledge is changing.

Gilbert argues that in a knowledge society, there has been a shift in valuing applied knowledge over academic knowledge in the broader society, but this has not been recognised or accepted in education

(and particularly the school system). She sees academic knowledge as associated with narrow disciplines such as mathematics and philosophy, whereas applied knowledge is knowing how to do things, and hence by definition tends to be multi-disciplinary. Gilbert argues (p. 159-160) that academic knowledge is:

‘authoritative, objective, and universal knowledge. It is abstract, rigorous, timeless – and difficult. It is knowledge that goes beyond the here and now knowledge of everyday experience to a higher plane of understanding.....In contrast, applied knowledge is practical knowledge that is produced by putting academic knowledge into practice. It is gained through experience, by trying things out until they work in real-world situations.’

Other kinds of knowledge that don’t fit the definition of academic knowledge are those kinds built on experience, traditional crafts, **trial**-and-error, and quality improvement through continuous minor change built on front-line worker experience – not to mention how to win at three card brag.

I agree that academic knowledge is different from everyday knowledge, but I challenge the view that academic knowledge is ‘pure’, not applied. It is too narrow a definition, because it thus excludes all the professional schools and disciplines, such as engineering, medicine, law, business, education that ‘apply’ academic knowledge. These are just as accepted and ‘valued’ parts of universities and colleges as the ‘pure’ disciplines of humanities and science, and their activities meet all the criteria for academic knowledge set out by Gilbert.

Making a distinction between academic and applied knowledge misses the real point about the kind of education needed in a knowledge society and a digital age. It is not just knowledge – both pure and applied – that is important, but also digital literacy, skills associated with lifelong learning, and attitudes/ethics and social behaviour.

Knowledge is not just ‘stuff’, or fixed content, but it is dynamic. Knowledge is also not just ‘flow’. Content or ‘stuff’ does matter as well as the discussions or interpretations we have about content. Where does the ‘stuff’ come from that ebbs and flows over the discussions on the internet? It may not originate or end in the heads of individuals, but it certainly flows **through** them, where it is interpreted and transformed. Knowledge may be dynamic and changing, but at some point each person does settle, if only for a brief time, on what they think knowledge to be, even if over time that knowledge changes, develops or becomes more deeply understood. Thus ‘stuff’ or content does matter, though knowing (a) how to acquire content and (b) what to do with content we have acquired, is even more important.

Thus it is not sufficient just to teach academic content (applied or not). It is equally important also to enable students to develop the ability to know how to find, analyse, organise and apply information/content within their professional and personal activities, to take responsibility for their own learning, and to be flexible and adaptable in developing new knowledge and skills. All this is needed because of the explosion in the quantity of knowledge in any professional field that makes it impossible to memorise or even be aware of all the developments that are happening in the field, and the need to keep up-to-date within the field after graduating.

To do this learners must have access to appropriate and relevant content, know how to find it, and must have opportunities to apply and practice what they have learned. Thus learning has to be a combination of content, skills and attitudes, and increasingly this needs to apply to all areas of study. This does not mean that there is no room to search for universal truths, or fundamental laws or principles, but this needs to be embedded within a broader learning environment. This should include the ability to use digital technologies as an integral part of learning, but tied to appropriate content and skills within their area of study.

Also, the importance of non-academic knowledge in the growth of knowledge-based industries

should not be ignored. These other forms of knowledge have proved just as valuable. For instance it is important within a company to manage the every-day knowledge of employees through better internal communication, encouraging external networking, and rewards for collaboration and participation in improving products and services.

2.7.5 The relevance of academic knowledge in the knowledge society

An over-emphasis on the functionality of knowledge will result in ‘academic knowledge’ being implicitly seen as irrelevant to the knowledge society. However, it has been the explosion in academic knowledge that has formed the basis of the knowledge society. It was academic development in sciences, medicine and engineering that led to the development of the Internet, biotechnology, digital financial services, computer software and telecommunications, *for example*. Indeed, it is no coincidence that those countries most advanced in knowledge-based industries were those that have the highest participation rates in university education.

Thus while academic knowledge is not ‘pure’ or timeless or objectively ‘true’, it is the principles or values that drive academic knowledge that are important. Although it often falls short, the goal of academic studies is to reach for deep understanding, general principles, empirically-based theories, timelessness, etc., even if knowledge is dynamic, changing and constantly evolving. Academic knowledge is not perfect, but does have value because of the standards it requires. Nor have academic knowledge or methods run out of steam. There is evidence all around us: academic knowledge is generating new drug treatments, new understandings of climate change, better technology, and certainly new knowledge generation.

Indeed, more than ever, we need to sustain the elements of academic knowledge, such as rigour, abstraction, evidence-based generalisation, empirical evidence, rationalism and academic independence. It is these elements of education that have enabled the rapid economic growth both in the industrial and the knowledge societies. The difference now is that these elements alone are not enough; they need to be combined with new approaches to teaching and learning.

2.7.6 Academic knowledge and other forms of knowledge

As mentioned earlier, there are many other forms of knowledge that are useful or valued besides academic knowledge. There is increasing emphasis from government and business on the development of vocational or trades skills. Teachers or instructors are responsible for developing these areas of knowledge as well. In particular, skills that require manual dexterity, performance skills in music or drama, production skills in entertainment, skills in sport or sports management, are all examples of forms of knowledge that have not traditionally been considered ‘academic’.

However, one feature of a digital society is that increasingly these vocational skills are now requiring a much higher proportion of academic knowledge or intellectual and conceptual knowledge as well as performance skills. For example higher levels of ability in math and/or science are now demanded of many trades and professions such as network engineers, power engineers, auto mechanics, nurses and other health professionals. The ‘knowledge’ component of their work has increased over recent years.

The nature of the job is also changing. For instance, auto mechanics are now increasingly focused on diagnosis and problem-solving as the value component of vehicles becomes increasingly digitally based and components are replaced rather than repaired. Nurse practitioners now are undertaking areas of work previously done by doctors or medical specialists. Many workers now also need strong inter-personal skills, especially if they are in front-line contact with the public. At the same time, as we saw in Chapter

1, more traditionally academic areas are needing to focus more on skills development, so the somewhat artificial boundaries between pure and applied knowledge are beginning to break down.

In summary, a majority of jobs now require both academic and skills-based knowledge. Academic and skills-based knowledge also need to be integrated and contextualised. As a result, the demands on those responsible for teaching and instruction have increased, but above all, these new demands of teachers in a digital age mean that their own skills level needs to be increased to cope with these demands.

Activity 2.7 Epistemology and academic knowledge

1. Can you state the epistemological position that drives your teaching? Does it fit with any of the epistemological positions described in this chapter? How does that work out in practice in terms of what you do?

2. Can you justify the role of 'teacher' in a digital society where individuals can find all they need on the Internet and from friends or even strangers? How do you think that the role of the teacher might, could or should change as a result of the development of a digital society? Or are there 'constants' that will remain?

3. Briefly define the subject area or speciality in which you are teaching. Do you agree that academic knowledge is different from everyday knowledge? If so, to what extent is academic knowledge important for your learners? Is its importance growing or diminishing? Why? If it is diminishing, what is it being replaced with – or what should replace it?

Feedback to come

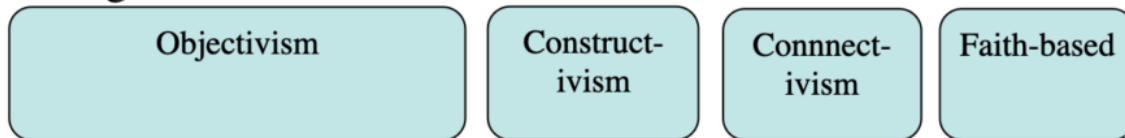
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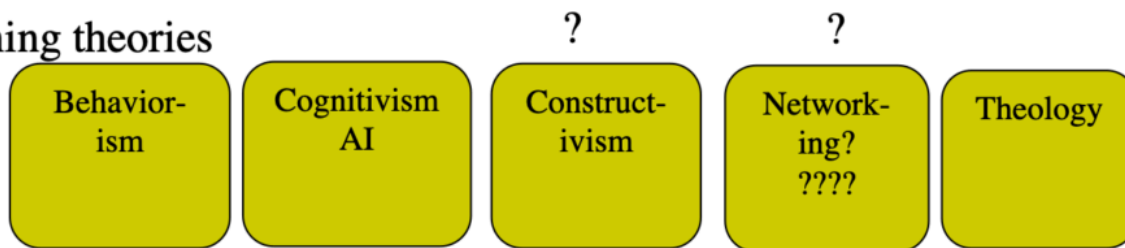
2.8 Summary

Thinking about theory

Epistemologies



Learning theories



Teaching methods/approaches



lectures	apprenticeship	nurturing	computer-based (CBL)	xMOOCs
social reform	experiential	problem-based (PBL)	competency-based	cMOOCs
seminars	online collaborative	ADDIE	online LMS	communities of practice

Figure 2.8.1 The green boxes are left open until we cover teaching methods (the bottom line) in Chapters 3 and 4

I have chosen just a few epistemological approaches that influence teaching and learning, but I could have chosen many others. Theologies reflect another epistemological approach, based on faith. Elements of [scholasticism](#) can still be found in elite universities such as Oxford and Cambridge, particularly in their tutorial system.

It can be seen then that there are different epistemologies that influence teaching today. Furthermore, much to the consternation and confusion of many students, teachers themselves will have different epistemological positions, not just across different disciplines, but sometimes within the same discipline. For instance, subject areas such as psychology and economics may contain different epistemological

foundations in different parts of the curriculum: statistics is validated differently from Freudian analysis or behavioural factors that influence investor behaviour.

Epistemological positions are rarely explicitly discussed with students, are not always consistent even within a subject discipline, and are not mutually exclusive. For instance a teacher may deliberately choose to use a more objectivist approach with novice students, then move to a more constructivist approach when the students have learned the basic facts and concepts within a topic through an objectivist approach. Even within the same lesson, the teacher may shift epistemological positions, often causing confusion for students.

At this point, I'm not taking sides (although I do favour in general a more constructivist philosophy). Arguments can be made for or against any of these epistemological positions. However, we need to be aware that knowledge and consequently teaching is not a pure, objective concept, but driven by different values and beliefs about the nature of knowledge.

Arguments are also being made today that academic knowledge is now redundant and is being or will be replaced by networked learning or more applied learning. I have made the case though that there are strong reasons to sustain and further develop academic knowledge, but with a focus as much on the development of skills as on learning content.

Different theories of learning reflect different positions on the nature of knowledge. With the possible exception of connectivism, there is some form of empirical evidence to support each of the theories of learning outlined in this chapter. However, while the theories suggest different ways in which all people learn, they do not automatically tell teachers or instructors how to teach. Indeed, theories of behaviourism, cognitivism and constructivism were all developed outside of education, in experimental labs, psychology, neuroscience, and psychotherapy. Educators have had to work out how to move from the theoretical position to the practical one of applying these theories within an educational experience. In other words, they have had to develop teaching methods that build on such learning theories.



For my personal comments on the relationship between epistemologies, theories of learning and teaching methods, please click on the podcast below



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=78>

The next chapter examines a range of teaching methods that have been developed, their epistemological roots, and their implications for teaching in a digital age.

Reference

Entwistle, N. (2010) 'Taking Stock: An Overview of Research Findings' in Christensen Hughes, J. and Mighty, J. (eds.) [*Taking Stock: Research on Teaching and Learning in Higher Education*](#) Montreal and Kingston: McGill-Queen's University Press

For more on the relationship between epistemologies, learning theories and methods of teaching, see:

Bates, T. (2015) Thinking about theory and practice, [Open Learning and Distance Education Resources](#), July 29

Activity 2.8 Choosing a theory of learning

Entwistle (2010) states:

'There are some important questions to ask when considering how much weight to place on evidence or how valuable a theory will be for pedagogy. For example:

- *Is the theory derived from data or observations in an educational context?*
- *Is the theory presented in language that is readily intelligible to teachers?*
- *Can the aspects identified as affecting learning be readily changed [by the teacher]?*
- *Does the theory have direct implications for teaching and learning [in the particular context in which you are working]?*
- *How realistic and practical are the suggestions?*
- *Will the theory spark off new ideas about teaching?*

It is not sufficient for a pedagogical theory simply to explain how people learn; it also has to provide clear implications about how to improve the quality and efficiency of learning.'

Using Entwistle's criteria and your own knowledge and experience of teaching, answer the questions below.

1. Which theory of learning do you like best, and why? State what main subject you are teaching.
2. Does your preferred way of teaching match any of these theoretical approaches? Write down some of the activities you do when teaching that 'fit' with this theory. Can you think of other possible activities you now could use within this theoretical framework for teaching?
3. Does your teaching generally combine different theories – sometimes behaviourist, sometimes cognitive, etc.? If so, what are the reasons or contexts for taking one specific approach rather than another?

4. How useful are these theories in terms of teaching practice? In your view, are they just jargon or useless theorising, or ‘labelling’ of commonly understood practice, or do they provide strong guidelines for how you should teach?

5. How do you think new digital technologies, such as social media, affect these theories? Do new technologies make these theories redundant? Does connectivism replace other theories or merely add another way of looking at teaching and learning?

Feedback to come.

Key Takeaways

1. Teaching is a highly complex occupation, which needs to adapt to a great deal of variety in context, subject matter and learners. It does not lend itself to broad generalizations. Nevertheless it is possible to provide guidelines or principles based on best practices, theory and research, that must then be adapted or modified to local conditions.

2. Our underlying beliefs and values, usually shared by other experts in a subject domain, shape our approach to teaching. These underlying beliefs and values are often implicit and are often not directly shared with our students, even though they are seen as essential components of becoming an ‘expert’ in a particular subject domain.

3. It is argued that academic knowledge is different from other forms of knowledge, and is even more relevant today in a digital age.

4. However, academic knowledge is not the only kind of knowledge that is important in today’s society, and as teachers we have to be aware of other forms of knowledge and their potential importance to our students, and make sure that we are providing the full range of contents and skills needed for students in a digital age.

Chapter 3: Methods of teaching: campus-focused

Purpose of the chapter

This chapter discusses a **selection** of teaching methods that are **often used in** a campus-based learning environment.

When you have read this chapter you should be able to:

- describe several different methods of teaching used in campus-based teaching;
- discuss the general strengths and weaknesses of each approach;
- identify the extent to which each approach meets the needs of learners in a digital age;
- choose an appropriate teaching method (or mix of methods) for your teaching context.

What is covered in this chapter

Five perspectives on teaching are examined and related to epistemologies and theories of learning, with a particular emphasis on their relevance to a digital age. In particular this chapter covers the following topics:

- [Scenario C: A stats lecturer fights the system](#)
- [3.1 Five perspectives on teaching](#)
- [3.2 The origins of the classroom design model](#)
- [3.3 Transmissive lectures: learning by listening](#)
- [3.4 Interactive lectures, seminars, and tutorials: learning by talking](#)
- [3.5 Learning by doing: Experiential learning](#)
- [3.6 Learning by doing: Apprenticeship](#)
- [3.7 Learning by being: The nurturing and social reform models of teaching](#)
- [3.8 Main conclusions](#)

Also in this chapter you will find the following activities:

- [Activity 3.1 There is no activity for this section](#)
- [Activity 3.2 Thinking outside the \[classroom\] box](#)
- [Activity 3.3 The future of lectures](#)

- [Activity 3.4 Developing conceptual learning](#)
- [Activity 3.5 Assessing experiential design models](#)
- [Activity 3.6 Applying apprenticeship to university teaching](#)
- [Activity 3.7 Nurturing, social reform and connectivism](#)
- [Activity 3.8 'Labelling' your own teaching](#)

Key Takeaways

Most instructors will mix and match different methods, depending on the needs of both the subject matter and the needs of their students at a particular time. There are though some core conclusions to be drawn from this comparative review of different approaches to teaching.

1. No single method is likely to meet all the requirements teachers face in a digital age.
2. Nevertheless, some forms of teaching fit better with the development of the skills needed in a digital age. In particular, methods that focus on conceptual development, such as dialogue and discussion, knowledge management, and experiential learning in real-world contexts are more likely to develop the high level conceptual skills required in a digital age, rather than information transmission.
3. It is not just conceptual skills though that are needed. It is the combination of conceptual, practical, personal and social skills in highly complex situations that are needed. This again means combining a variety of teaching methods.
4. Nearly all of these teaching methods are media or technology independent. In other words, they can be used in classrooms or online. What matters from a learning perspective is not so much the choice of technology as the efficacy and expertise in appropriately choosing and using the teaching method.
5. Nevertheless, we shall see in the next chapter that new technologies offer new possibilities for teaching, including offering more practice or time on task, reaching out to new target groups, and increasing the productivity of both teachers and the system as a whole.

Scenario C: A stats lecturer fights the system



Figure 3 C Image: Verywellmind.com

Clive (looking carefully at his partner, Jean): So what went wrong at work today?

Jean: So you noticed – nice.

Clive: Now don't take it out on me. How could I have avoided the slamming of the door, the shouting at the cat, and the almost instant demand for a large glass of wine – which incidentally is sitting on your desk?

Jean (grabbing the wine). Well, today was the last straw. I got the results of the student end-of-term evaluation of my new class I've been teaching.

Clive: Bad, eh?

Jean: Well, first the rankings are odd: about 30 per cent As, about 5 per cent Bs, 15 per cent Cs, 15 per cent D's and 35 per cent E's – NOT a normal curve of distribution! They either loved me or hated me, but the average – which is all Harvey, the stupid head of department, looks at – came out as a D, which

means any chance of a promotion next year just went straight out the window. I'm now going to have to explain myself to that old buffoon who last taught a class when slate tablets were the latest technology.

Clive: I'm not going to say I told you so, but.....

Jean: DON'T go there. I know I'm bloody mad to have stopped lecturing and tried to engage the students more. I could kill that faculty development guy who persuaded me to change how I teach. I didn't mind all the extra work, not even the continual fighting with the guy from Facilities who kept telling me to put all the tables and chairs back properly – he was just a jerk – and I loved the actual teaching, which was stimulating and deeply satisfying, but what really finished me was when the department wouldn't change the exam. I've been trying to get the kids to question what is meant by a sample, discuss alternative ways of looking at significance, solve problems, and then they go and give the poor kids multiple-choice questions that just assessed their memory of statistical techniques and formulae. No wonder most of the students were mad at me.

Clive: But you've always claimed that the students enjoyed your new way of teaching.

Jean: Well, I was fooled by them. From the student comments on the evaluation, it seemed that about a third of them really *did* like the lessons and some even said it opened up their eyes to what statistics is all about, but apparently what the rest wanted was just a crib sheet they could use to answer the exam questions.

Clive: So what are you going to do now?

Jean: I honestly don't know. I know what I'm doing is right, now I've been through all the changes. Those kids *won't* have crib sheets when they start work, they *will* have to interpret data, and when they get into advanced level science and engineering courses they won't be able to use statistics properly if I just teach to the exam. They will know a bit about statistics but not how to do it properly.

Clive: So you'll have to get the department to agree to changing the exam.

Jean: Yeah, good luck with that, because everyone else will have to change how they teach if we do that.

Clive: But I thought the whole reason for you changing your teaching was that the university was worried it wasn't producing graduates with the right kind of skills and knowledge needed today.

Jean: You're right, but the problem is Harvey won't support me – he's old school down to his socks and underpants and thinks that what I am doing is just trendy – and without his support there's no way the rest of the department is going to change.

Clive: OK, so just relax for now and have a glass of wine and we'll go out somewhere nice for dinner. That will help clear my mind of the thought of Harvey in his socks and underpants. Then you can hear about *my* day.

3.1 Five perspectives on teaching



For my personal comments on why I wrote this chapter on campus-based teaching methods, please click on the podcast below



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<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=83>

The first thing to be said about teaching methods is that there is no law or rule that says teaching methods are driven by theories of learning. Especially in post-secondary education, most instructors would be surprised if their teaching was labelled as behaviourist or constructivist. On the other hand, it would be less than accurate to call such teaching ‘theory-free’. We have seen how views about the nature of knowledge are likely to impact on preferred teaching methods. But it would be unwise to press this too hard. A great deal of teaching, at least at a post-secondary level, is based on an apprenticeship model of copying the same methods used by one’s own teachers, then gradually refining them from experience, without a great deal of attention being paid to theories of how students actually learn.

Dan Pratt (1998) studied 253 teachers of adults, across five different countries, and identified ‘five qualitatively different perspectives on teaching,... presenting each perspective as a legitimate view of teaching’:

- **transmission:** effective delivery of content (an objectivist approach)
- **apprenticeship:** modelling ways of being (learning by doing under supervision)

- **developmental:** cultivating ways of thinking (constructivist/cognitivist)
- **nurturing:** facilitating self-efficacy (a fundamental tenet of connectivist MOOCs)
- **social reform:** seeking a better society.

It can be seen that each of these perspectives relates to theories of learning to some extent, and they help to drive methods of teaching. So in practical terms, I will start by looking at some common methods of teaching, and assessing their appropriateness for developing the knowledge and skills outlined in Chapter 1.

I will organise these various methods of teaching into two chapters. The first chapter will discuss design models that derive from more traditional school or campus-based teaching, and the second chapter will be focused on design models that make more use of Internet technologies, although we will see in Chapter 10 that these distinctions are already beginning to break down.

References

Pratt, D. and Associates (1998) [*Five Perspectives on Teaching in Adult and Higher Education*](#) Malabar FL: Krieger Publishing Company

3.2 The origins of the classroom design model



*Figure 3.2.1 Miss Bowls's class in an unidentified girls' school, England Date: circa 1905
Image: Southall Board, Flickr*

Our institutions are a reflection of the times in which they were created. Francis Fukuyama, in his monumental writing on political development and political decay ([2011](#), [2014](#)), points out that institutions that provide essential functions within a state often become so fixed over time in their original structures that they fail to adapt and adjust to changes in the external environment. We need therefore to examine in particular the roots of our modern educational systems, because teaching and learning in the present day is still strongly influenced by institutional structures developed many years ago. Thus, we need to examine the extent to which our traditional campus-based models of teaching remain fit for a digital age.

The large urban school, college or university, organized by age stratification, learners meeting in groups, and regulated units of time, was an excellent fit for an industrial society. **In many ways it**

matched the way work was organised in factories. In effect, we still have a predominantly industrial model of educational design, which in large part remains our default design model even today.

Some design models are so embedded in tradition and convention that we are often like fish in water – we just accept that this is the environment in which we have to live and breath. The classroom model is a very good example of this. In a classroom based model, learners are organised in classes that meet on a regular basis at the same place at certain times of the day for a given length of time over a given period (a term or semester).

This is a design decision that was taken more than 150 years ago. It was embedded in the social, economic and political context of the 19th century. This context included:

- the industrialization of society which provided ‘models’ for organizing both work and labour, such as factories and mass production;
- the movement of people from rural to urban occupations and communities, with increased density resulting in larger institutions;
- the move to mass education to meet the needs of industrial employers and an increasingly large and complex range of state-managed activities, such as government, health and education;
- voter enfranchisement and hence the need for a better educated voting public;
- over time, demand for more equality, resulting in universal access to education.

However, over the span of 150 years, our society has slowly changed. Many of these factors or conditions no longer exist, while others persist, but often in a less dominant way than in the past. Thus we still have factories and large industries, but we also have many more small companies, greater social and geographical mobility, and above all a massive development of new technologies that allow both work and education to be organized in different ways.

This is not to say that the classroom design model is inflexible. Teachers for many years have used a wide variety of teaching approaches within this overall institutional framework. But in particular, the way in which our institutions are structured strongly affects the way we teach. We need to examine which of the methods built around a classroom model are still appropriate in today’s society, and, more of a challenge, whether we could build new or modified institutional structures that would better meet the needs of today.

References

Fukuyama, F. (2011) [*The Origins of Political Order: From Prehuman Times to the French Revolution*](#) New York: Farrar Strauss and Giroux

Fukuyama, F. (2014) [*Political Order and Political Decay: From the Industrial Revolution to the Globalisation of Democracy*](#) New York: Farrar Strauss and Giroux

If classrooms, schools and university campuses are the physical products of an industrial age, what type of learning environment would be a product of a digital age? In other words, if we were starting from scratch today, how would you design an environment for teaching and learning that would reflect the age in which we live?

Obviously there is no right or wrong answer to this, but later you may want to look at [Chapter 6 on learning environments](#) to see if your ‘digital’ learning environment contains all the necessary components.

You may also want to consider the social, economic and political context of the 21st century in terms of identifying an appropriate learning environment. How much would the campus experience still be necessary? (For instance, how would the environment deal with the effects of too much screen time on children’s development?)

Listen to the podcast below for my response to this:



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3.3 Transmissive lectures: learning by listening



Figure 3.3.1 The lecture is one of the most traditional forms of classroom teaching. Image: Lecture Hall, Baruch College, New York City – Wikipedia

3.3.1 Definition

[Lectures] are more or less continuous expositions by a speaker who wants the audience to learn something.'

Bligh, 2000

This specific definition is important as it excludes contexts where a lecture is deliberately designed to be interrupted by questions or discussion between instructors and students. This form of more interactive lecturing will be discussed in the next section ([Chapter 3, Section 4](#)).

3.3.2 The origins of the lecture

Transmissive lectures can be traced back as far as ancient Greek and Roman times, and certainly from at least the start of the European university, in the 13th century. The term ‘lecture’ comes from the Latin, meaning a reading. In the 13th century, most books were extremely rare. They were painstakingly handcrafted and illustrated by monks, often from fragments or collections of earlier and exceedingly rare and valuable scrolls from ancient Greek or Roman times, or were translated from Arabic sources, since much documentation was destroyed in Europe during the Dark Ages following the fall of the Roman empire. As a result, a university would often have only one copy of a book, and it may have been the only copy available in the world. The library and its collection therefore became critical to the reputation of a university, and professors had to borrow the only text from the library and literally read from it to the students, who dutifully wrote down their own version of the lecture.

Lectures themselves belong to an even longer oral tradition of learning, where knowledge is passed on by word of mouth from one generation to the next. In such contexts, accuracy and authority (or power in controlling access to knowledge) are critical for ‘accepted’ knowledge to be successfully transmitted. Thus accurate memory, repetition and a reference to authoritative sources become exceedingly important in terms of validating the information transmitted. The great sagas of the ancient Greeks and, much later, of the Vikings, are examples of the power of oral transmission of knowledge, continued even today through the myths and legends of many indigenous communities.





Figure 3.3.2 A medieval lecture

Artist: Laurentius de Voltolina;

Liber ethicorum des Henricus de Alemannia; Kupferstichkabinett SMPK, Berlin/Staatliche Museen Preussischer Kulturbesitz, Min. 1233

This illustration from a thirteenth-century manuscript shows Henry of Germany delivering a lecture to university students in Bologna, Italy, in 1233. What is striking is how similar the whole context is to lectures today, with students taking notes, some talking at the back, and one clearly asleep. Certainly, if Rip Van Winkle awoke in a modern lecture theatre after 800 years of sleeping, he would know exactly where he was and what was happening.

Nevertheless, the lecture format has been questioned for many years. Samuel Johnson (1709-1784) over 200 years ago said of lectures:

‘People have nowadays...got a strange opinion that everything should be taught by lectures. Now, I cannot see that lectures can do as much good as reading the books from which the lectures are taken...Lectures were once useful, but now, when all can read, and books are so numerous, lectures are unnecessary.’

Boswell, 1791

What is remarkable is that even after the invention of the printing press, radio, television, and the Internet, the transmissive lecture, characterised by the authoritative instructor talking to a group of students, still remains the dominant methodology for teaching in many institutions, even in a digital age, where information is available at a click of a mouse. It could be argued that anything that has lasted this long must have something going for it. On the other hand, we need to question whether the transmissive lecture is still the most appropriate means of teaching, given all the changes that have taken place in recent years, and in particular given the kinds of knowledge and skills needed in a digital age.

3.3.3 What does research tell us about the effectiveness of lectures?

Whatever you may think of Samuel Johnson's opinion, there has indeed been a great deal of research into the effectiveness of lectures, going back to the 1960s, and continued through until today. The most authoritative analysis of the research on the effectiveness of lectures remains Bligh's (2000). He summarized a wide range of meta-analyses and studies of the effectiveness of lectures compared with other teaching methods and found consistent results:

- the lecture is as effective as other methods for transmitting information (the corollary of course is that other methods – such as video, reading, independent study, or Wikipedia – are just as effective as lecturing for transmitting information);
- most lectures are not as effective as discussion for promoting thought;
- lectures are generally ineffective for changing attitudes or values or for inspiring interest in a subject;
- lectures are relatively ineffective for teaching behavioural skills.

Bligh also examined research on student attention, on memorizing, and on motivation, and concluded (p.56):

'We see evidence... once again to suppose that lectures should not be longer than twenty to thirty minutes – at least without techniques to vary stimulation.'

These research studies have shown that in order to understand, analyze, apply, and commit information to long-term memory, the learner must actively engage with the material. In order for a lecture to be effective, it must include activities that compel the student to mentally manipulate the information. Many lecturers of course do this, by stopping and asking for comments or questions throughout the lecture – but many do not.

Again, although these findings have been available for a long time, and You Tube videos now last approximately eight minutes and TED talks 20 minutes at a maximum, teaching in many educational institutions is still organized around a standard 50 minute lecture session or longer, with, if students are lucky, a few minutes at the end for questions or discussion. There are two important conclusions from the research:

- even for the sole purpose for which lectures may be effective – the transmission of information – the 50 minute lecture needs to be well organized, with frequent opportunities for student questions and discussion (Bligh provides excellent suggestions on how to do this

in his book);

- for all other important learning activities, such as developing critical thinking, deep understanding, and application of knowledge – the kind of skills needed in a digital age – lectures are ineffective. Other forms of teaching and learning – such as opportunities for discussion and student activities – are necessary.

3.3.4 Does new technology make lectures more relevant?

Over the years, institutions have made massive investments in adding technologies to support lecturing. Powerpoint presentations, multiple projectors and screens, clickers for recording student responses, even ‘back-chat’ channels on Twitter, enabling students to comment on a lecture – or more often, the lecturer – in real time (surely the **worst** form of torture for a speaker), have all been tried. Students have been asked to bring tablets or lap-tops to class, and universities in particular have invested millions of dollars in state of the art lecture theatres. Nevertheless, all this is just lipstick on a pig. The essence of a lecture remains the transmission of information, all of which is now readily and, in most cases, freely available in other media and in more learner-friendly formats.

I worked in a college where in one program all students had to bring laptops to class. At least in these classes, there were some activities to do related to the lecture that required the students to use the laptops during class time. However, in most classes this took less than 25 per cent of the lesson time. Most of the other time, students were talked at, and as a result used their laptops for other, mainly non-academic activities, especially playing online poker.

Faculty often complain about students use of technology such as mobile phones or tablets, for ‘non-relevant’ multitasking in class, but this misses the point. If most students have mobile phones or laptops, why are they still having to come to a lecture hall **in person**? Why can’t they get a podcast or a video of the lecture? Second, if they are coming, why are the lecturers not requiring them to use their mobile phones, tablets, or laptops for study purposes, such as finding sources? Why not break the students into small groups and get them to do some online research then come back with group answers to share with the rest of the class? If lectures are to be offered, the aim should be to make the lecture engaging in its own right, so the students are not distracted by their **non-academic** online activity.

3.3.5 Is there then no role for lectures in a digital age?

Lectures though still have their uses. One example is an inaugural lecture I attended for a newly appointed research professor. In this lecture, the professor summarised all the research he and his team had done, resulting in treatments for several cancers and other diseases. This was a public lecture, so he had to satisfy not only other leading researchers in the area, but also a lay public with often no science background. He did this by using excellent visuals and analogies. The lecture was followed by a small wine and cheese reception for the audience. The lecture worked for several reasons:

- first of all, it was a celebratory occasion bring together family, colleagues and friends;
- second, it was an opportunity to pull together nearly 20 years of research into a single, coherent narrative or story;
- third, the lecture was well supported by an appropriate use of graphics and video;
- lastly, he put a great deal of work into preparing this lecture and thinking about who would be

in the audience – much more preparation than would have been the case if this was just one of many lectures in a course.

McKeachie and Svinicki ([2006](#), p. 58) believe that lecturing is best used for:

- providing up-to-date material that can't be found in one source;
- summarizing material found in a variety of sources;
- adapting material to the interests of a particular group;
- initially helping students discover key concepts, principles or ideas;
- modelling expert thinking.

The last point is important. Faculty often argue that the real value of a lecture is to provide a model for students of how the faculty member, as an expert, approaches a topic or problem. Thus the important point of the lecture is not the transmission of content (facts, principles, ideas), which the students could get from just reading, but an expert way of thinking about the topic. The trouble with this argument for lectures is three-fold:

- students are rarely aware that this is the purpose of the lecture, and therefore focus on memorizing the content, rather than the 'modelling' of expert thinking;
- faculty themselves are not explicit about how they are doing the modelling (or fail to offer other ways in which modelling could be used, so students can compare and contrast);
- students get no practice themselves in modelling this skill, even if they are aware of the modelling.

Perhaps more importantly, looking at McKeachie and Svinicki's suggestions, would it not be better for the students, rather than the lecturer, to be doing these activities in a digital age?

So, yes, there are a few occasions when lectures work very well. But in a digital age they should not be the default model for regular teaching. There are much better ways to teach that will result in better learning over the length of a course or program.

3.3.6 Why are lectures still the main form of educational delivery?

Given all of the above, some explanation needs to be offered for the persistence of the lecture into the 21st century. Here are some suggestions:

- in fact, in many areas of education, the lecture *has* been replaced, particularly in many elementary or primary schools;
- architectural inertia: a huge investment has been made by institutions in facilities that support the lecture model. What is to happen to all that real estate if it is not used? (As Winston Churchill said, '*We shape our buildings and our buildings shape us*');)
- in North America, the Carnegie unit of teaching, which is based on a notion of one hour per week of classroom time per credit over a 13 week period. It is easy then to divide a three credit course into 39 one hour lectures over which the curriculum for the course must be covered. It is on this basis that teaching load and resources are decided;

- faculty in post-secondary education have no other model for teaching. This is the model they are used to, and because appointment is based on training in research or work experience, and not on qualifications in teaching, they have no knowledge of how students learn or confidence or experience in other methods of teaching;
- many experts prefer the oral tradition of teaching and learning, because it enhances their status as an expert and source of knowledge; being allowed an hour of other people's time to hear your ideas without major interruption is very satisfying on a personal level (at least for me when I'm lecturing);
- see [Scenario C](#) at the start of this chapter.

3.3.7 Is there a future for lectures in a digital age?

That depends on how far into the future one wants to look. Given the inertia in the system, lectures are likely still to predominate for another ten years, but after that, in most institutions, courses based on three lectures a week over 13 weeks will have disappeared. There are several reasons for this:

- all content can be easily digitalized and made available on demand at very low cost (see [Chapter 11](#));
- institutions will be making greater use of dynamic video (not talking heads) for demonstration, simulations, animations, etc. Thus most content modules will be multi-media;
- third, open textbooks incorporating multi-media components and student activities will provide the content, organization and interpretation that are the rationale for most lectures;
- lastly, and most significantly, the priority for teaching will have changed from information transmission and organization to knowledge management, where students have the responsibility for finding, analyzing, evaluating, sharing and applying knowledge, under the direction of a skilled subject expert. Project-based learning, collaborative learning and situated or experiential learning will become much more widely prevalent. Also many instructors will prefer to use the time they would have spent on a series of lectures in providing more direct, individual and group learner support, thus bringing them into closer contact with learners.

This does not mean that lectures will disappear altogether, but they will be special events, and probably multi-media, synchronously and asynchronously delivered. Special events might include:

- a professor's summary of her latest research,
- the introduction to a course,
- a point mid-way through a course for taking stock and dealing with common difficulties, or
- the wrap-up to a course.

Lectures will provide a chance for instructors to make themselves known, to impart their interests and enthusiasm, and to motivate learners, but this will be just one, relatively small, but important component of a much broader learning experience for students.

For a different and informed perspective on the role and future of lectures, see [Christine Gross-Loh, 2016](#).

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Activity 3.3 The future of lectures

1. Do you agree that lectures are dead – or soon will be?
2. Look at the skills needed in a digital age described in Chapter 1. Which of these skills could lectures help develop? Would they need to be redesigned or modified to do this and if so, how?

For feedback on the second question click on the podcast below:



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=89>

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3.4 Interactive lectures, seminars, and tutorials: learning by talking



Figure 3.4.1 A tutorial at Oriel College, Oxford University: Image: University of Oxford

3.4.1 The theoretical and research basis for dialogue and discussion

Researchers have identified a distinction, often intuitively recognised by instructors, between meaningful and rote learning (Asubel et al., [1978](#)). Meaningful learning involves the learner going beyond memorization and surface comprehension of facts, ideas or principles, to a deeper understanding of what those facts, ideas or principles mean to them. Marton and Saljö, who have conducted a number of studies that examined how university students actually go about their learning, make the distinction between deep and surface approaches to learning (see, for instance, Marton and Saljö, [1997](#)). Students who adopt a deep approach to learning tend to have a prior intrinsic interest in the subject. Their motivation is to learn because they want to know more about a topic. Students with a surface approach

to learning are more instrumental. Their interest is primarily driven by the need to get a pass grade or qualification.

Subsequent research (e.g. Entwistle and Peterson, [2004](#)) showed that as well as students' initial motivation for study, a variety of other factors also influence students' approaches to learning. In particular, *surface* approaches to learning are more commonly found when there is a focus on:

- information transmission,
- tests that rely mainly on memory,
- a lack of interaction and discussion.

On the other hand, *deeper* approaches to learning are found when there is a focus on:

- analytical or critical thinking or problem-solving,
- in-class discussion,
- assessment based on analysis, synthesis, comparison and evaluation.

Constructivists believe that knowledge is mainly acquired through social processes which are necessary to move students beyond surface learning to deeper levels of understanding. *Connectivist* approaches to learning also place heavy emphasis on networking learners, with all participants learning through interaction and discussion between each other, driven both by their individual interests and the extent to which these interests connect to the interests of other participants. The very large numbers participating in connectivist MOOCs (see [Chapter 5](#)) means that there is a high probability of converging interests for all participants, although those interests may vary considerably over the whole group.

Laurillard ([2001](#)), and Harasim ([2017](#)), have emphasised that academic knowledge requires students to move constantly from the concrete to the abstract and back again, and to build or construct knowledge based on academic criteria such as logic, evidence and argument. This in turn requires a strong teacher presence within a dialectical environment, in which argument and discussion within the rules and criteria of the subject discipline are encouraged and developed by the instructor or teacher. Laurillard calls this a rhetorical exercise, an attempt to get learners to think about the world differently. Conversation and discussion are critical if this is to be achieved.

The combination of theory and research here suggests the need for frequent interaction between students, and between teacher and students, for the kinds of learning needed in a digital age. This interaction usually takes the form of semi-structured discussion. I will now examine how this kind of learning has traditionally been facilitated by educators.

3.4.2 Seminars and tutorials

3.4.2.1 Definitions

*A **seminar** is a group meeting (either face-to-face or online) where a number of students participate at least as actively as the teacher, although the teacher may be responsible for the design of the group experience, such as choosing topics and assigning tasks to individual students.*

*A **tutorial** is either a one-on-one session between a teacher and a student, or a very small group*

(three or four) of students and an instructor, where the learners are at least as active in discussion and presentation of ideas as the teacher.

3.4.2.2 Seminars

Seminars can range from six or more students, up to 30 students in the same group. Because the general perception is that seminars work best when numbers are relatively small, they tend to be found more at graduate level or the last year of undergraduate programs.



Figure 3.4.1 Socrates and his students: Painter: Johann Friedrich Greuter, 1590: (San Francisco, Achenbach Foundation for Graphic Arts)

Seminars and tutorials again have a very long history, going back at least to the time of Socrates and Aristotle. Both were tutors to the aristocracy of ancient Athens. Aristotle was the private tutor to Alexander the Great when Alexander was young. Socrates was the tutor of Plato, the philosopher, although Socrates denied he was a teacher, rebelling against the idea common at that time in ancient Greece that ‘a teacher was a vessel that poured its contents into the cup of the student’. Instead,

according to Plato, Socrates used dialogue and questioning ‘to help others recognize on their own what is real, true, and good.’ ([Stanford Encyclopedia of Philosophy](#).) Thus it can be seen that seminars and tutorials reflect a strongly constructivist approach to learning and teaching.

The format can vary a great deal. One common format, especially at graduate level, although similar practices can be found at the school/k-12 level, is for the teacher to set advance work for a selected number of students, and then have the selected students present their work to the whole group, for discussion, criticism and suggestions for improvement. Although there may be time for only two or three student presentations in each seminar, over a whole semester every student gets their turn. Another format is to ask all the students in a group to do some specified advanced reading or study, then for the teacher to introduce questions for general discussion within the seminar that requires students to draw on their earlier work.

3.4.2.3 Tutorials

Tutorials are a particular kind of seminar that are identified with Ivy League universities, and in particular Oxford or Cambridge. There may be as few as two students and a professor in a tutorial and the meeting often follows closely the Socratic method of the student presenting his or her findings and the professor rigorously questioning every assumption made by the student – and also drawing in the other student to the discussion.

Both these forms of dialogical learning can be found not only in classroom contexts, but also online. Online discussion will be discussed in more detail in [Chapter 4, Section 4](#). However, in general, the pedagogical similarities between online and face-to-face discussions are much greater than the differences.

3.4.3 Are seminars a practical method in a massive education system?

For many faculty, the ideal teaching environment is Socrates sitting under the linden tree, with three or four dedicated and interested students. Unfortunately, the reality of mass higher education makes this impossible for all but the most elite and expensive institutions.

However, seminars for 25-30 students are not unrealistic, even in public undergraduate education. More importantly, they enable the kind of teaching and learning that are most likely to facilitate the types of skills needed from our students in a digital age. Seminars are flexible enough to be offered in class or online, depending on the needs of the students. They are probably best used when students have done individual work before the seminar. Of utmost importance, though, is the ability of teachers to teach successfully in this manner, which requires different skills from transmissive lecturing.

Although expansion of student numbers in higher education is part of the problem, it's not the whole problem. Other factors, such as senior professors teaching less, and focusing mainly on graduate students, lead to larger classes at undergraduate level that use transmissive lecturing. And if more senior or experienced instructors switched from transmissive lectures, and instead required students to find and analyse content for themselves, this would free up more time for them to spend on seminar-type teaching.

So it is as much an organizational issue, a matter of choice and priorities, as an economic issue. The more we can move towards a seminar approach to teaching and learning and away from large, transmissive lectures, the better, if we are to develop students with the skills needed in a digital age.

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Activity 3.4 Developing conceptual learning

1. What kind of teacher interventions in group discussions can you suggest that could help learners develop deep, conceptual learning?
2. How could you reorganise a lecture class of 200 or more students to develop group work and the development of conceptual learning?

Click on the podcast below for my suggestions:



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=92>

3.5 Learning by doing: Experiential learning



Figure 3.5.1 Ryerson University's Law Practice program is a good example of a blended learning approach to experiential learning. For more details, click [here](#)

Learning by doing is one of [Pratt's five teaching approaches](#). There are a number of different approaches or terms within the broad heading of experiential learning, such as [cooperative learning](#), [adventure learning](#) and [apprenticeship](#). I will use the term '[experiential learning](#)' as a broad umbrella term to cover this wide variety of approaches to learning by doing. I will deal with apprenticeship as a separate section ([Chapter 3.6](#)) because of its traditional (if tacit) role in preparing university and college instructors, although it can be seen as just one of several methods of experiential learning.

3.5.1. What is experiential learning?

Simon Fraser University ([2010](#)) has defined experiential learning as:

the strategic, active engagement of students in opportunities to learn through doing, and reflection on those activities, which empowers them to apply their theoretical knowledge to practical endeavours in a multitude of settings inside and outside of the classroom.

There are many different theorists in this area, such as John Dewey ([1938](#)) and more recently David Kolb ([1984](#)). There is a wide range of design models that aim to embed learning within real world contexts, including:

- laboratory, workshop or studio work;
- apprenticeship;
- problem-based learning;
- case-based learning;
- project-based learning;
- inquiry-based learning;
- cooperative (work- or community-based) learning.

The focus here is on some of the main ways in which experiential learning can be designed and delivered, with particular respect to the use of technology, and in ways that help develop the knowledge and skills needed in a digital age. (For a more detailed analysis of experiential learning, see Moon, [2004](#)).

3.5.2 Core design principles

Experiential learning focuses on learners reflecting on their experience of doing something, so as to gain conceptual insight as well as practical expertise. Kolb's experiential learning model suggest four stages in this process:

- active experimentation;
- concrete experience;
- reflective observation;
- abstract conceptualization.

Experiential learning is a major form of teaching at the University of Waterloo. Its [web site](#) lists the conditions needed to ensure that experiential learning is effective, as identified by the [Association for Experiential Education](#).

The next section examines different ways in which these principles have been applied.

3.5.3 Experiential design models

There are many different design models for experiential learning, but they also have many features in common.

3.5.3.1 Laboratory, workshop or studio work



Figure 3.5.2 Concordia University wood shop

Today, we take almost for granted that laboratory classes are an essential part of teaching science and engineering. Workshops and studios are considered critical for many forms of trades training or the development of creative arts. Labs, workshops and studios serve a number of important functions or goals, which include:

- to give students hands-on experience in choosing and using common scientific, engineering or trades equipment appropriately;
- to develop motor skills in using scientific, engineering or industrial tools or creative media;
- to give students an understanding of the advantages and limitations of laboratory experiments;
- to enable students to see science, engineering or trade work ‘in action’;
- to enable students to test hypotheses or to see how well concepts, theories, procedures actually work when tested under laboratory conditions;

- to teach students how to design and/or conduct experiments;
- to enable students to design and create objects or equipment in different physical media.

An important pedagogical value of laboratory classes is that they enable students to move from the concrete (observing phenomena) to the abstract (understanding the principles or theories that are derived from the observation of phenomena). Another is that the laboratory introduces students to a critical cultural aspect of science and engineering, that all ideas need to be tested in a rigorous and particular manner for them to be considered ‘true’.

One major criticism of traditional educational labs or workshops is that they are limited in the kinds of equipment and experiences that scientists, engineers and trades people need today. As scientific, engineering and trades equipment becomes more sophisticated and expensive, it becomes increasingly difficult to provide students in schools especially but increasingly now in colleges and universities direct access to such equipment. Furthermore traditional teaching labs or workshops are capital and labour intensive and hence do not scale easily, a critical disadvantage in rapidly expanding educational opportunities.

Because laboratory work is such an accepted part of science teaching, it is worth remembering that teaching science through laboratory work is in historical terms a fairly recent development. In the 1860s neither Oxford nor Cambridge University were willing to teach empirical science. Thomas Huxley therefore developed a program at the Royal School of Mines (a constituent college of what is now Imperial College, of the University of London) to teach school-teachers how to teach science, including how to design laboratories for teaching experimental science to school children, a method that is still the most commonly used today, both in schools and universities.

At the same time, scientific and engineering progress since the nineteenth century has resulted in other forms of scientific testing and validation that take place outside at least the kind of ‘wet labs’ so common in schools and universities. Examples are nuclear accelerators, nanotechnology, quantum mechanics and space exploration. Often the only way to observe or record phenomena in such contexts is remotely or digitally. It is also important to be clear about the objectives of lab, workshop and studio work. There may now be other, more practical, more economic, or more powerful ways of achieving these objectives through the use of new technology, such as remote labs, simulations, and experiential learning. These will be examined in more detail later in this book.

3.5.3.2 Problem-based learning

The earliest form of systematised problem-based learning (PBL) was developed in 1969 by Howard Barrows and colleagues in the School of Medicine at McMaster University in Canada, from where it has spread to many other universities, colleges and schools. This approach is increasingly used in subject domains where the knowledge base is rapidly expanding and where it is impossible for students to master all the knowledge in the domain within a limited period of study. Working in groups, students identify what they already know, what they need to know, and how and where to access new information that may lead to resolution of the problem. The role of the instructor (usually called a tutor in classic PBL) is critical in facilitating and guiding the learning process.

Usually PBL follows a strongly systematised approach to solving problems, although the detailed steps and sequence tend to vary to some extent, depending on the subject domain. The following is a typical example:



The Maastricht Seven-Jump Method for PBL tutorials

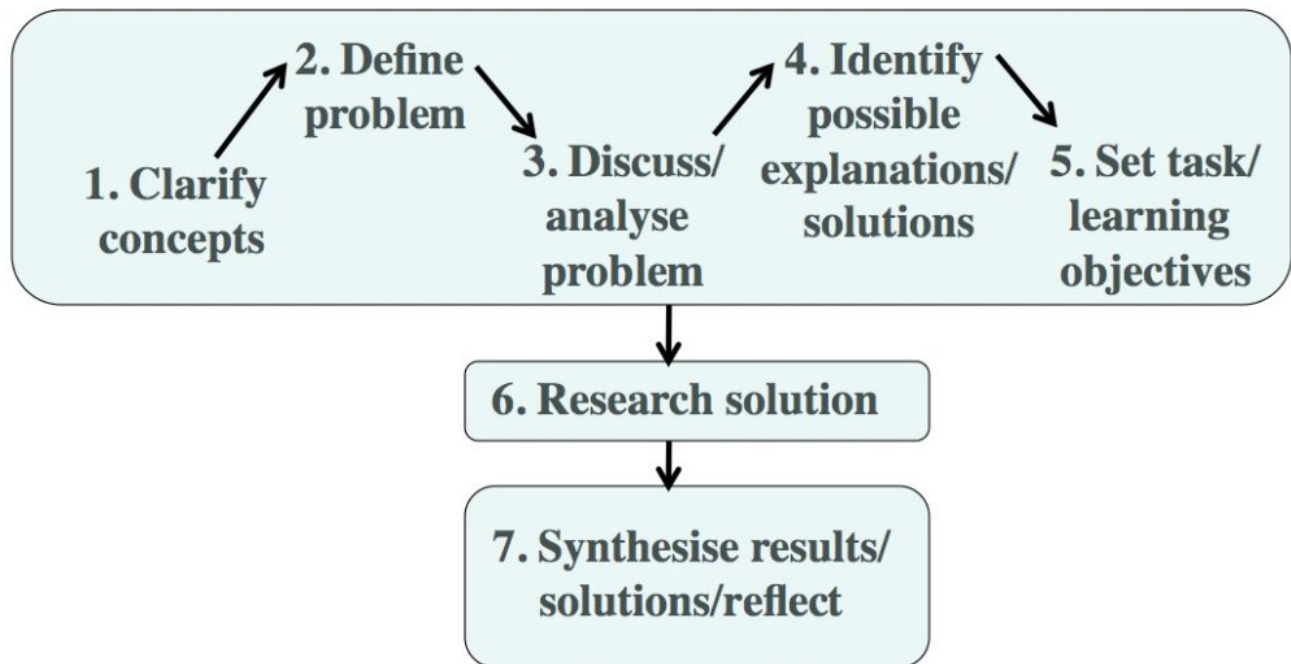


Figure 3.5.3 (derived from Gijeselaers, [1995](#))

Traditionally, the first five steps would be done in a small face-to-face class tutorial of 20-25 students, with the sixth step requiring either individual or small group (four or five students) private study, with the seventh step being accomplished in a full group meeting with the tutor. However, this approach also lends itself to blended learning in particular, where the research solution (step 6) is done mainly online, although some instructors have managed the whole process online, using a combination of synchronous web conferencing and asynchronous online discussion.

Developing a complete problem-based learning curriculum is challenging, as problems must be carefully chosen, increasing in complexity and difficulty over the course of study, and problems must be chosen so as to cover all the required components of the curriculum. Students often find the problem-based learning approach challenging, particularly in the early stages, where their foundational knowledge base may not be sufficient to solve some of the problems. (The term ‘cognitive overload’ has been used to describe this situation.) Others argue that lectures provide a quicker and more condensed way to cover the same topics. Assessment also has to be carefully designed, especially if a final exam carries heavy weight in grading, to ensure that problem-solving skills as well as content coverage are measured.

However, research (see for instance, [Strobel and van Barneveld, 2009](#)) has found that problem-based learning is better for long-term retention of material and developing ‘replicable’ skills, as well as for improving students’ attitudes towards learning. There are now many variations on the ‘pure’ PBL

approach, with problems being set after initial content has been covered in more traditional ways, such as lectures or prior reading, for instance.

The methodology of problem-based learning however is one essential tool for developing the knowledge and skills needed in a digital society.

3.5.3.3 Case-based learning

With case-based teaching, students develop skills in analytical thinking and reflective judgment by reading and discussing complex, real-life scenarios.

[University of Michigan Centre for Research on Teaching and Learning](#)

Case-based learning is sometimes considered a variation of PBL, while others see it as a design model in its own right. As with PBL, case-based learning uses a guided inquiry method, but usually requires the students to have a degree of prior knowledge that can assist in analysing the case. There is usually more flexibility in the approach to case-based learning compared to PBL. Case-based learning is particularly popular in business education, law schools and clinical practice in medicine, but can be used in many other subject domains.

Herreid ([2004](#)) provides eleven basic rules for case-based learning.

1. Tells a story.
2. Focuses on an interest-arousing issue.
3. Set in the past five years
4. Creates empathy with the central characters.
5. Includes direct quotations from the characters.
6. Relevant to the reader.
7. Must have pedagogic utility.
8. Conflict provoking.
9. Decision forcing.
10. Has generality.
11. Is short.

Using examples from clinical practice in medicine, Irby ([1994](#)) recommends five steps in case-based learning:

- anchor teaching in a (carefully chosen) case;
- actively involve learners in discussing, analysing and making recommendations regarding the case;
- model professional thinking and action as an instructor when discussing the case with learners;
- provide direction and feedback to learners in their discussions;
- create a collaborative learning environment where all views are respected.

Case-based learning can be particularly valuable for dealing with complex, interdisciplinary topics or issues which have no obvious ‘right or wrong’ solutions, or where learners need to evaluate and decide on competing, alternative explanations. Case-based learning can also work well in both blended and fully online environments. Marcus, Taylor and Ellis ([2004](#)) used the following design model for a case-based blended learning project in veterinary science:

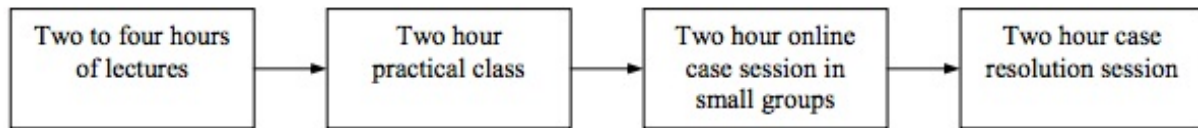


Figure 3.5.4 Blended learning sequence involving online learning resources, Marcus, Taylor and Ellis, 2004

Other configurations are of course also possible, depending on the requirements of the subject.

3.5.3.4 Project-based learning

Project-based learning is similar to case-based learning, but tends to be longer and broader in scope, and with even more student autonomy/responsibility in the sense of choosing sub-topics, organising their work, and deciding on what methods to use to conduct the project. Projects are usually based around real world problems, which give students a sense of responsibility and ownership in their learning activities.

Once again, there are several best practices or guidelines for successful project work. For instance, Larmer and Mergendoller ([2010](#)) argue that every good project should meet two criteria:

- students must perceive the work as personally meaningful, as a task that matters and that they want to do well;
- a meaningful project fulfills an educational purpose.

The main danger with project-based learning is that the project can take on a life of its own, with not only students but the instructor losing focus on the key, essential learning objectives, or important content areas may not get covered. Thus project-based learning needs careful design and monitoring by the instructor.

3.5.3.5 Inquiry-based learning

Inquiry-based learning (IBL) is similar to project-based learning, but the role of the teacher/instructor is somewhat different. In project-based learning, the instructor decides the ‘driving question’ and plays a more active role in guiding the students through the process. In inquiry-based learning, the learner explores a theme and chooses a topic for research, develops a plan of research and comes to conclusions, although an instructor is usually available to provide help and guidance when needed.

Banchi and Bell ([2008](#)) suggest that there are different levels of inquiry, and students need to begin at the first level and work through the other levels to get to ‘true’ or ‘open’ inquiry as follows:

Levels of inquiry-based learning

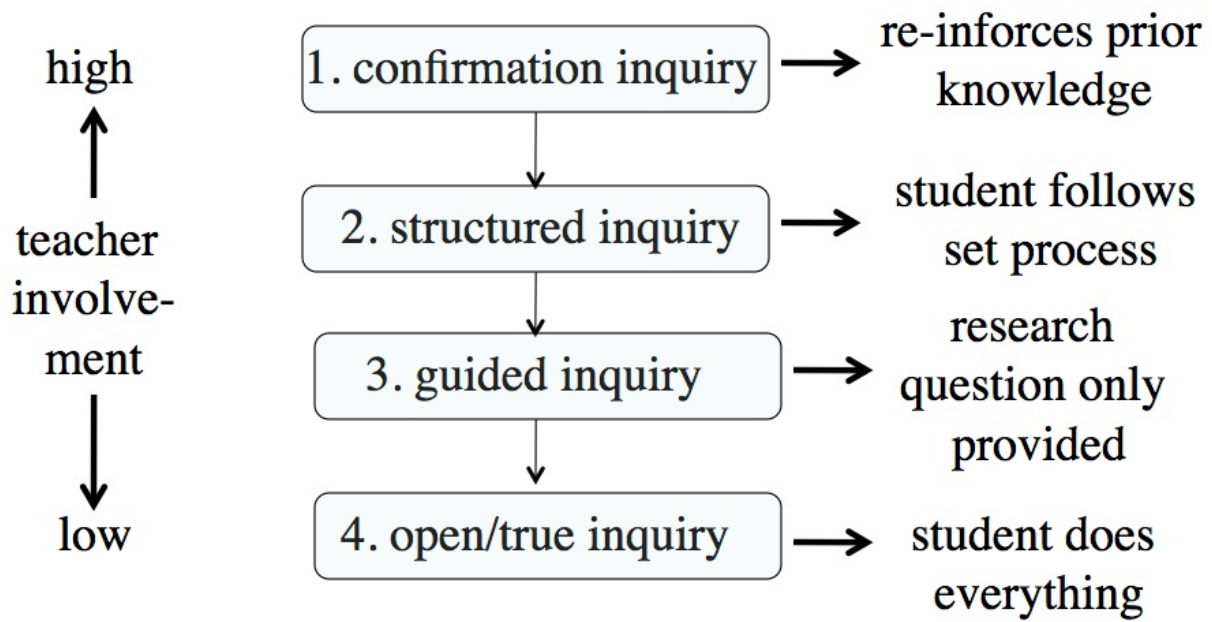


Figure 3.5.5 Levels of inquiry-based learning, from Banchi and Bell (2008)

It can be seen that the fourth level of inquiry describes the graduate thesis process, although proponents of inquiry-based learning have advocated its value at all levels of education.

3.5.4 Experiential learning in online learning environments

Some advocates of experiential learning are highly critical of online learning, because, they argue, it is impossible to embed learning in real world examples. However, this is an oversimplification, and there are contexts in which online learning can be used very effectively to support or develop experiential learning, in all its variations:

- *blended or flipped learning*: although group sessions often start off the process, and/or bring a problem or project to a conclusion, they are usually done in a classroom or lab setting. However students can increasingly conduct the research and information gathering by accessing resources online, by using online multimedia resources to create reports or presentations, and by collaborating online through group project work or through critique and evaluation of each other's work;

- *fully online*: increasingly, instructors are finding that experiential learning can be applied fully online, through a combination of synchronous tools such as web conferencing, asynchronous tools such as discussion forums and/or social media for group work, e-portfolios and multimedia for reporting, and remote labs for experimental work.

Indeed, there are circumstances where it is impractical, too dangerous, or too expensive to use real world experiential learning. Online learning can be used to simulate real conditions and to reduce the time to master a skill. Flight simulators have long been used to train commercial pilots, enabling trainee pilots to spend less time mastering fundamentals on real aircraft. Commercial flight simulators are still extremely expensive to build and operate, but in recent years the costs of creating realistic simulations has dropped dramatically.



Figure 3.5.6 Virtual world border crossing, Loyalist College, Ontario

Instructors at Loyalist College have created a ‘virtual’ fully functioning border crossing and a virtual

car in Second Life to train Canadian Border Services Agents. Each student takes on the role of an agent, with his/her avatar interviewing the avatars of the travellers wishing to enter Canada. Other students play the travellers. All communication is done by voice communications in Second Life, with the people playing the travellers in a separate room from the students. Each student interviews three or four travellers and the entire class observes the interactions and discusses the situations and the responses. A secondary site for auto searches features a virtual car that can be completely dismantled so students learn all possible places where contraband may be concealed. This learning is then reinforced with a visit to the auto shop at Loyalist College and the search of an actual car. The students in the customs and immigration track are assessed on their interviewing techniques as part of their final grades. Students participating in the first year of the Second Life border simulation achieved a grade standing that was 28 per cent higher than the previous class who did not utilize a virtual world. The next class, using Second Life, scored a further 9 per cent higher. More details can be found [here](#).

Staff in the Emergency Management Division at the Justice Institute of British Columbia have developed [a simulation tool called Praxis](#) that helps to bring critical incidents to life by introducing real-world simulations into training and exercise programs. Because participants can access Praxis via the web, it provides the flexibility to deliver immersive, interactive and scenario-based training exercises anytime, anywhere. A typical emergency might be a major fire in a warehouse containing dangerous chemicals. ‘Trainee’ first responders, who will include fire, police and paramedical personnel, as well as city engineers and local government officials, are ‘alerted’ on their mobile phones or tablets, and have to respond in real time to a fast developing scenario, ‘managed’ by a skilled facilitator, following procedures previously taught and also available on their mobile equipment. The whole process is recorded and followed later by a face-to-face debriefing session.

Once again, design models are not in most cases dependent on any particular medium. The pedagogy transfers easily across different delivery methods. Learning by doing is an important method for developing many of the skills needed in a digital age.

3.5.5 Strengths and weaknesses of experiential learning models

How one evaluates experiential learning designs depends partly on one’s epistemological position. Constructivists strongly support experiential learning models, whereas those with a strong objectivist position are usually highly skeptical of the effectiveness of this approach. Nevertheless, problem-based learning in particular has proved to be very popular in many institutions teaching science or medicine, and project-based learning is used across many subject domains and levels of education. There is evidence that experiential learning, when properly designed, is highly engaging for students and leads to better long-term memory. Proponents also claim that it leads to deeper understanding, and develops skills for a digital age such as problem-solving, critical thinking, improved communications skills, and knowledge management. In particular, it enables learners to manage better highly complex situations that cross disciplinary boundaries, and subject domains where the boundaries of knowledge are difficult to manage.

Critics though such as Kirschner, Sweller and Clark (2006) argue that instruction in experiential learning is often ‘unguided’, and pointed to several ‘meta-analyses’ of the effectiveness of problem-based learning that indicated no difference in problem-solving abilities, lower basic science exam scores, longer study hours for PBL students, and that PBL is more costly. They conclude:

In so far as there is any evidence from controlled studies, it almost uniformly supports direct, strong instructional guidance rather than constructivist-based minimal guidance during the instruction

of novice to intermediate learners. Even with students with considerable prior knowledge, strong guidance when learning is most often found to be equally effective as unguided approaches.

Certainly, experiential learning approaches require considerable re-structuring of teaching and a great deal of detailed planning if the curriculum is to be fully covered. It usually means extensive re-training of faculty, and careful orientation and preparation of students. I would also agree with Kirschner et al. that just giving students tasks to do in real world situations without guidance and support is likely to be ineffective.

However, many forms of experiential learning can and do have strong guidance from instructors, and one has to be very careful when comparing matched groups that the tests of knowledge include measurement of the skills that are claimed to be developed by experiential learning, and are not just based on the same assessments as for traditional methods, which often have a heavy bias towards memorisation and comprehension.

On balance then, I would support the use of experiential learning for developing the knowledge and skills needed in a digital age, but as always, it needs to be done well, following best practices associated with the **different** design models.

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Activity 3.5 Assessing experiential design models

1. If you have experiences with experiential learning, what worked well and what didn't?
2. Are the differences between problem-based learning, case-based learning, project-based learning and inquiry-based learning significant, or are they really just minor variations on the same design model?
3. Do you have a preference for any one of the models? If so, why?
4. Do you agree that experiential learning can be done just as well online as in classrooms or in the field? If not, what is the 'uniqueness' of doing it face-to-face that cannot be replicated online? Can you give an example?
5. Kirschner, Sweller and Clark's paper is a powerful condemnation of PBL. Read it in full, then decide whether or not you share their conclusion, and if not, why not.

Click on the podcast below for my feedback on these questions.



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=103>

3.6 Learning by doing: Apprenticeship



Figure 3.6.1 BMW Group UK Apprentice Recruitment, 2013

Image: © Motoring Insight, 2013

3.6.1 The importance of apprenticeship as a teaching method

Apprenticeship is one of the most common and well established forms of experiential learning. Bloom and his colleagues designated psycho-motor skills as [the third domain of learning](#) back in 1956. Learning by doing is particularly common in teaching motor skills, such as learning to ride a bicycle or play a sport, but examples can also be found in higher education, such as teaching practice, medical internships, and laboratory studies.

Apprenticeship is a particular way of enabling students to learn by doing. It is often associated with vocational training where a more experienced tradesman or journeyman models behaviour, the apprentice attempts to follow the the model, and the journeyman provides feedback. However, apprenticeship is the most common method used to train post-secondary education instructors

in teaching (at least implicitly), so there is a wide range of applications for an apprenticeship approach to teaching.

Because a form of apprenticeship is the often implicit, default model also for university teaching, and in particular for pre-service training of university instructors, apprenticeship will be discussed separately from other forms of experiential learning, although it is really just one, very commonly used, version.

3.6.2 Key features of apprenticeship



Figure 3.6.2 An apprentice being supervised
Image: © BBC, 2014

‘It is useful to remember that apprenticeship is not an invisible phenomenon. It has key elements: a particular way of viewing learning, specific roles and strategies for teachers and learners, and clear stages of development, whether for traditional or cognitive apprenticeship. But mostly it’s important to remember that in this perspective, one cannot learn from afar. Instead, one learns amid the engagement of participating in the authentic, dynamic and unique swirl of genuine practice.’

Pratt and Johnson, 1998

Schön (1983) argues that apprenticeship operates in ‘*situations of practice that...are frequently ill-defined and problematic, and characterized by vagueness, uncertainty and disorder*’. Learning in apprenticeship is not just about learning to do (active learning), but also requires an understanding of the contexts in which the learning will be applied. In addition there is a social and cultural element to the learning, understanding and embedding the accepted practices, customs and values of experts in the field. Pratt and Johnson (1998) identify the characteristics of a master practitioner, whom they define as:

a person who has acquired a thorough knowledge of and/or is especially skilled in a particular area of practice. Master practitioners:

1. *possess great amounts of knowledge in their area of expertise, and are able to apply that knowledge in difficult practice settings;*
2. *have well-organized, readily accessible schemas (cognitive maps) which facilitate the acquisition of new information;*
3. *have well-developed repertoires of strategies for acquiring new knowledge, integrating and organizing their schemas, and applying their knowledge and skills in a variety of contexts....;*
4. *...are motivated to learn as part of the process of developing their identities in their communities of practice. They are not motivated to learn simply to reach some external performance goal or reward;*
5. *frequently display tacit knowledge in the form of:*
 - *spontaneous action and judgements;*
 - *being unaware of having learned to do these things;*
 - *being unable or having difficulty in describing the knowing which their actions reveal.*

Pratt and Johnson further distinguish two different but related forms of apprenticeship: traditional and cognitive. A *traditional* apprenticeship experience, based on developing a motor or manual skill, involves learning a procedure and gradually developing mastery, during which the master and learner go through several stages.

3.6.3 University apprenticeship

An *intellectual or cognitive* apprenticeship model is somewhat different because this form of learning is less easily observable than learning motor or manual skills. Pratt and Johnson argue that in this context, master and learner must say what they are thinking during applications of knowledge and skills, and must make explicit the context in which the knowledge is being developed, because context is so critical to the way knowledge is developed and applied. Pratt and Johnson suggest five stages for cognitive and intellectual modelling (p. 99):

1. modelling by the master and development of a mental model/schema by the learner;
2. learner approximates replication of the model with master providing support and feedback (scaffolding/coaching);

3. learner widens the range of application of the model, with less support from master;
4. self-directed learning within the specified limits acceptable to the profession;
5. generalizing: learner and master discuss how well the model might work or would have to be adapted in a range of other possible contexts.

Pratt and Johnson provide a concrete example of how this apprenticeship model might work for a novice university professor (pp. 100-101). They argue that for cognitive apprenticeship it is important to create a forum or set of opportunities for:

articulate discussion and authentic participation in the realities of practice from within the practice, not from just one single point of view. Only from such active involvement, and layered and cumulative experience does the novice move towards mastery.

The main challenge of the apprenticeship model in a university setting is that it is not usually applied in a systematic matter. The hope that young or new university teachers will have automatically learned how to teach just by observing their own professors teach leaves far too much to chance.

[Removed from Version 1: 3.5.4 Apprenticeship in online environments]

3.6.4 Strengths and weaknesses

The main advantages of an apprenticeship model of teaching can be summarised as follows:

- teaching and learning are deeply embedded within complex and highly variable contexts, allowing rapid adaptation to real-world conditions;
- it makes efficient use of the time of experts, who can integrate teaching within their regular work routine;
- it provides learners with clear models or goals to aspire to;
- it acculturates learners to the values and norms of the trade or profession.

On the other hand, there are some serious limitations with an apprenticeship approach, particularly in preparing for university teaching:

- much of a master's knowledge is tacit, partly because their expertise is built slowly through a very wide range of activities;
- experts often have difficulty in expressing consciously or verbally the schema and 'deep' knowledge that they have built up and taken almost for granted, leaving the learner often to have to guess or approximate what is required of them to become experts themselves;
- experts often rely solely on modelling with the hope that learners will pick up the knowledge and skills from just watching the expert in action, and don't follow through on the other stages that make an apprenticeship model more likely to succeed;
- there is clearly a limited number of learners that one expert can manage, given that the experts themselves are fully engaged in applying their expertise in often demanding work conditions which may leave little time for paying attention to the needs of novice learners in

the trade or profession;

- traditional vocational apprenticeship programs have a very high attrition rate: for instance, in British Columbia, more than 60 per cent of those that enter a formal campus-based vocational apprenticeship program withdraw before successful completion of the program. As a result, there are large numbers of experienced tradespeople in the workforce without full accreditation, limiting their career development and slowing down economic development where there are shortages of fully qualified skilled workers;
- in trades or occupations undergoing rapid change in the workplace, the apprenticeship model can slow adaptation or change in working methods, because of the prevalence of traditional values and norms being passed down by the ‘master’ that may no longer be as relevant in the new conditions facing workers. This limitation of the apprenticeship model can be clearly seen in the post-secondary education sector, where traditional values and norms around teaching are increasingly in conflict with external forces such as new technology and the massification of higher education.

Nevertheless, the apprenticeship model, when applied thoroughly and systematically, is a very useful model for teaching in highly complex, real-world contexts.

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Activity 3.6 Applying apprenticeship to university teaching

1. Do you agree that learning to teach in a university depends heavily on an apprenticeship model? In what ways does it resemble apprenticeship and in what ways does it differ? In what ways could it be improved?
2. What are the key features required for an apprenticeship model to work?

Click on the podcast below for my response to this activity



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=96>

3.7 Learning by being: The nurturing and social reform models of teaching:



Figure 3.7.1 Image: Michigan State University, 2019

In this section I will briefly discuss the last two of Pratt's five teaching perspectives, nurturing and social reform.

3.7.1 The nurturing perspective

A nurturing perspective on teaching can best be understood in terms of the role of a parent. Pratt ([1998](#)) states:

We expect 'successful' parents to understand and empathize with their child; and that they will provide kind, compassionate, and loving guidance through content areas of utmost difficulty....The nurturing educator works with other issues...in different contexts and different age groups, but

the underlying attributes and concerns remain the same. Learners' efficacy and self-esteem issues become the ultimate criteria against which learning success is measured, rather than performance-related mastery of a content body.

There is a strong emphasis on the teacher focusing on the interests of the learner, on empathizing with how the learner approaches learning, of listening carefully to what the learner is saying and thinking when learning, and providing appropriate, supportive responses in the form of ‘*consensual validation of experience*’. This perspective is driven partly by the observation that people learn autonomously from a very early age, so the trick is to create an environment for the learner that encourages rather than inhibits their ‘natural’ tendency to learn, and directs it into appropriate learning tasks, decided by an analysis of the learner’s needs. This is further elaborated in Chapter 6, on [Building an Effective Learning Environment](#).

3.7.2 The social reform perspective

Pratt ([1998](#), p. 173) states:

Teachers holding a social reform perspective are most interested in creating a better society and view their teaching as contributing to that end. Their perspective is unique in that it is based upon an explicitly stated ideal or set of principles linked to a vision of a better social order. Social reformers do not teach in one single way, nor do they hold distinctive views about knowledge in general...these factors all depend on the particular ideal that inspires their actions.

This then in some ways is less a theory of teaching as an epistemological position, that society needs change, and the social reformer knows how to bring about this change **through teaching and education**. Indeed, as Figure 3.7.2 below illustrates, the social reform model of learning can be driven as much by the passions and concerns of learners as by those of their instructors.





Figure 3.7.2

3.7.3 Past and future: the relevance of the nurturing and social reform methods for connectivism

These two perspectives on teaching again have a long history, with echoes of:

- Jean-Jacques Rousseau (1762): *‘education should be carried out, so far as possible, in harmony with the development of the child’s natural capacities by a process of apparently autonomous discovery’* ([Stanford Encyclopedia of Philosophy](#))
- Malcolm Knowles (1984): *‘As a person matures his self concept moves from one of being a dependent personality toward one of being a self-directed human being.’*
- Paulo Freire (2004): *‘education makes sense because women and men learn that through learning they can make and remake themselves, because women and men are able to take responsibility for themselves as beings capable of knowing—of knowing that they know and knowing that they don’t.’*
- Ivan Illich (1971) (in his criticism of the institutionalization of education): *‘The current search for new educational funnels must be reversed into the search for their institutional inverse: educational webs which heighten the opportunity for each one to transform each*

moment of his living into one of learning, sharing, and caring.'

The reason why the nurturing and social reform perspectives on teaching are important is because they reflect many of the assumptions or beliefs around connectivism ([Chapter 2.6](#)). Indeed, as early as 1971, Illich made this remarkable statement for the use of advanced technology to support “learning webs”:

The operation of a peer-matching network would be simple. The user would identify himself by name and address and describe the activity for which he sought a peer. A computer would send him back the names and addresses of all those who had inserted the same description. It is amazing that such a simple utility has never been used on a broad scale for publicly valued activity.

Well, those conditions certainly exist today. Learners do not necessarily need to go through institutional gateways to access information or knowledge, which is increasing available and accessible through the Internet. As we shall see in [Chapter 5](#), MOOCs help to identify those common interests and connectivist MOOCs in particular aim to provide the networks of common interests and the environment for self-directed learning. The digital age provides the technology infrastructure and support needed for this kind of learning.

3.7.4 The roles of learners and teachers

Of all the perspectives on teaching these two are the most learner-centred. They are based on a **profoundly** optimistic view of human nature, that people will seek out and learn what they need, and will find the necessary support from caring, dedicated educators and/or from others with similar interests and concerns, and that individuals have the capacity and ability to identify and follow through with their own educational needs. It is also a more radical view of education, because it seeks to escape the political and controlling aspects of state or private **institutions**.

Within each of these two perspectives, there are differences of view about the centrality of teachers for successful learning. For Pratt, the teacher plays a central role in nurturing learning; for others such as Illich or Freire, professionally trained teachers are more likely to be the servant of the state than of the individual learner. For those supporting these perspectives on teaching, volunteer mentors or social groups organised around certain ideals or social goals provide the necessary support for learners.

3.7.5 Strengths and weaknesses of these two approaches

There are, as always, a number of drawbacks to these two perspectives on teaching:

- The teacher in a nurturing approach needs to adopt a highly dedicated and unselfish approach, putting the demands and needs of the learner first. This often means for teachers who are experts in their subject holding back the transmission and sharing of their knowledge until the learner is ‘ready’, thus denying to many subject experts their own identity and needs to a large extent;
- Pratt argues that ‘*although content is apparently neglected, children taught by nurturing educators do continue to master it at much the same rate as children taught by curriculum-driven teaching methodologies*’, but no empirical evidence is offered to support this statement, although it does derive in Pratt’s case from strong personal experience of teaching in this way;

- like all the other teaching approaches the nurturing perspective is driven by a very strong belief system, which will not necessarily be shared by other educators (or parents – or even learners, for that matter);
- a nurturing perspective necessitates probably the most labour-intensive of all the teaching models *other than apprenticeship*, requiring a deep understanding on the part of the teacher of each learner and that learner's needs; every individual learner is different and needs to be treated differently, and teachers need to spend a great deal of time identifying learners' needs, their readiness to learn, and building or creating supportive environments or contexts for that learning;
- there may well be a conflict between what the learner identifies as their personal learning needs, and the demands of society in a digital age. Dedicated teachers may be able to help a learner negotiate that divide, but in situations where learners are left without professional guidance, learners may end up just talking to other individuals with similar views that do not progress their learning (remembering that academic teaching is a rhetorical exercise, challenging learners to view the world differently);
- social reform depends to a large extent on learners and teachers embracing similar belief systems, and can easily descend into dogmatism without challenges from outside the 'in-community' established by self-referential groups.

Nevertheless, there are aspects of both perspectives that have significance for a digital age:

- both nurturing and social reform perspectives seems to work well for many adults in particular, and the nurturing approach also works well for younger children;
- nurturing is an approach that has been adopted as much in advanced corporate training in companies such as Google as in informal adult education (see for instance, Tan, [2012](#));
- we shall see in [Chapter 5](#) that connectivist MOOCs strongly reflect both the nurturing approach and the ability to create webs of connections that enable the development of self-efficacy and attempts at social reform;
- both perspectives seem to be effective when learners are already fairly well educated and already have good prior knowledge and conceptual development;
- perspectives that focus on the needs of individuals rather than institutions or state bureaucracies can liberate thinking and learning and thus make the difference between 'good' and 'excellent' in creative thinking, problem-solving, and application of knowledge in complex and variable contexts.

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Activity 3.7 Nurturing, social reform and connectivism

1. Do you have experience of teaching in one or both of these ways? If so, do you agree with the analysis of the strengths and weaknesses of each component?
2. Do you think that connectivism is a modern reflection of either of these models of teaching – or is connectivism a distinct and unique method of teaching in itself? If so, what distinguishes it as a teaching method from all the other methods I have covered?

There is no immediate feedback for these questions, although the issues will be raised again in Chapter 5.

3.8 Main conclusions



Figure 3.8 A workshop on blended learning, where instructors apply principles from a lecture on blended learning to designing a unit of teaching (a mix of transmissive and experiential learning methods reflecting a constructivist epistemology). Image: Tony Bates, 2017

3.8.1 Relating epistemology, learning theories and teaching methods

3.8.1.1 Pragmatism trumps ideology in teaching

Although there is often a direct relationship between a method of teaching, a learning theory and an epistemological position, this is by no means always the case. It is tempting to try to put together a table and neatly fit each teaching method into a particular learning theory, and each theory into a particular epistemology, but unfortunately education is not as tidy as computer science, so it would be misleading to try to do a direct ontological classification. For instance a transmissive lecture might be structured so as to further a cognitivist rather than a behaviourist approach to learning, or a lecture session may combine several elements, such as transmission of information, learning by doing, and discussion.

Purists may argue that it is logically inconsistent for a teacher to use methods that cross epistemological boundaries (and it may certainly be confusing for students) but teaching is essentially a pragmatic profession and teachers will do what it takes to get the job done. If students need to learn facts, principles, standard procedures or ways of doing things, before they can start an informed discussion about their meaning, or before they can start solving problems, then a teacher may well consider behaviourist methods to lay this foundation before moving to more constructivist approaches later in a course or program.

3.8.1.2 Teaching methods are not determined by technology

Secondly technology applications such as MOOCs or video recorded lectures may replicate exactly a particular teaching method or approach to learning used in the classroom. In many ways methods of teaching, theories of learning and epistemologies are independent of a particular technology or medium of delivery, although we shall see in Chapters 7, 8, 9 and 10 that technologies can be used to transform teaching, and a particular technology will in some cases further one method of teaching more easily than other methods, depending on the characteristics or ‘affordances’ of that technology.

Thus, teachers who are aware of not only a wide array of teaching methods, but also of learning theories and their epistemological foundation will be in a far better position to make appropriate decisions about how to teach in a particular context. Also, as we shall see, having this kind of understanding will also facilitate an appropriate choice of technology for a particular learning task or context.

3.8.2 Relating teaching methods to the knowledge and skills needed in a digital age

The main purpose of this chapter has been to enable you as a teacher to identify the classroom teaching methods that are most likely to support the development of the knowledge and skills that students or learners will need in a digital age. We still have a way to go before we have all the information and tools needed to make this decision, but we can at least have a stab at it from here, while recognising that such decisions will depend on a wide variety of factors, such as the nature of the learners and their prior knowledge and experience, the demands of particular subject areas, the institutional context in which teachers and learners find themselves, and the likely employment context for learners.

First, we can identify a number of different types of skills needed:

- conceptual skills, such as knowledge management, critical thinking, analysis, synthesis, problem-solving, creativity/innovation, experimental design;
- developmental or personal skills, such as independent learning, communications skills, ethics, networking, responsibility and teamwork;
- digital skills, embedded within and related to a particular subject or professional domain;
- manual and practical skills, such as machine or equipment operation, safety procedures, observation and recognition of data, patterns, and spatial factors.

We can also identify that in terms of content, we need teaching methods that enable students to manage information or knowledge, rather than methods that merely transmit information to students.

There are several key points for a teacher or instructor to note:

- the teacher needs to be able to identify/recognise the skills they are hoping to develop in their students;
- these skills are often not easily separated but tend to be contextually based and often integrated;
- teachers need to identify appropriate methods and contexts that will enable students to develop these skills;
- students will need practice to develop such skills;
- students will need feedback and intervention from the teacher and other students to ensure a high level of competence or mastery in the skill;
- an assessment strategy needs to be developed that recognises and rewards students' competency and mastery of such skills.

In a digital age, just choosing a particular teaching method such as seminars or apprenticeship is not going to be sufficient. It is unlikely that one method, such as transmissive lectures, or seminars, will provide a rich enough learning environment for a full range of skills to be developed within the subject area. It is necessary to provide a rich learning environment for students to develop such skills that includes contextual relevance, and opportunities for practice, discussion and feedback. As a result, we are likely to combine different methods of teaching.

Secondly, this chapter has focused mainly on classroom or campus-based approaches to teaching. In the next chapter a range of teaching methods that incorporate online/digital technologies will be examined. So it would be foolish at this stage to say that any single method, such as seminars, or apprenticeship, or nurturing, is the best method for developing the knowledge and skills needed in a digital age. At the same time, the limitations of transmissive lectures, especially if they are used as the main method for teaching, are becoming more apparent.

1. Think of what you consider in the past to have been your most successful unit of teaching (a class or a whole course). Can you identify the underlying epistemology? What theory or theories of learning would best describe how students learned in that context? What was the main teaching method(s) you used?
2. Look at one of the courses you are likely to be teaching next year. How would you change your teaching methods on that course, now you have read Chapters 1, 2 and 3?

There is no direct feedback from me on this activity as it is a reflective exercise.

Key Takeaways

This list of classroom or campus-based teaching methods is not meant to be exhaustive or comprehensive. The aim is to show that there many different ways to teach, and all are in some ways legitimate in certain circumstances. Most instructors will mix and match different methods, depending on the needs of both the subject matter and the needs of their students at a particular time. There are though some core conclusions to be drawn from this comparative review of different approaches to teaching.

1. No single method is likely to meet all the requirements teachers face in a digital age.
2. Nevertheless, some forms of teaching fit better with the development of the skills needed in a digital age. In particular, methods that focus on conceptual development, such as dialogue and discussion, knowledge management (rather than information transmission), and experiential learning in real-world contexts, are all methods more likely to develop the high level conceptual skills required in a digital age.
3. It is not just conceptual skills though that are needed. It is the combination of conceptual, practical, personal and social skills in highly complex situations that are needed. This again means combining a variety of teaching methods.
4. Nearly all of these teaching methods are media or technology independent. In other words, they can be used in classrooms or online. What matters from a learning perspective is not so much the choice of technology as the efficacy and expertise in appropriately choosing and using the teaching method.
5. Nevertheless, we shall see in the next chapter that new technologies offer new possibilities for teaching, including offering more practice or time on task, reaching out to new target groups, and increasing the productivity of both teachers and the system as a whole.

Chapter 4: Methods of teaching with an online focus

Purpose of the chapter

At the end of this chapter you should be able to:

1. Describe key approaches to the design of online teaching and learning.
2. Analyse each model in terms of its value for teaching in a digital age.
3. Decide which model or combination of models will fit best with your own teaching.
4. Use the model as a basis for designing your own teaching.

What is covered in this chapter

- [Scenario D: Developing historical thinking](#)
- [4.1 Online learning and teaching methods](#)
- [4.2 Old wine in new bottles: classroom-type online learning](#)
- [4.3 The ADDIE model](#)
- [4.4 Online collaborative learning](#)
- [4.5 Competency-based learning](#)
- [4.6 Communities of practice](#)
- [Scenario E: ETEC 522: Ventures in e-Learning](#)
- [4.7 'Agile' Design: flexible designs for learning](#)
- [4.8 Making decisions about teaching methods](#)

Also in this chapter you will find the following activities:

- [Activity 4.1 There is no activity for this section](#)
- [Activity 4.2 Moving the classroom model online](#)
- [Activity 4.3 Using the ADDIE model](#)
- [Activity 4.4 Evaluating online collaborative learning models](#)
- [Activity 4.5 Thinking about competency-based education](#)
- [Activity 4.6 Making communities of practice work](#)
- [Activity 4.7 Taking risks with 'agile' design](#)

- [Activity 4.8 Making choices](#)

Key Takeaways

1. Traditional classroom teaching, and especially transmissive lectures, were designed for another age. Although lectures have served us well, we are now in a different age that requires different methods.
2. The key shift is towards greater emphasis on skills, particularly knowledge management, and less on memorising content. We need design models for teaching and learning that lead to the development of the skills needed in a digital age.
3. There is no one 'best' design model for all circumstances. The choice of design model needs to take account of the context in which it will be applied, but nevertheless, some design models are better than others for developing the knowledge and skills needed in a digital age. For the contexts with which I'm most associated, online collaborative learning, experiential learning and agile design best meet my criteria.
4. Design models in general are not dependent on a particular mode of delivery; they can operate in most cases as well online as in class.
5. In an increasingly volatile, uncertain, complex and ambiguous world, we need design models for teaching that are light and nimble.

Scenario D: Developing historical thinking



Signing: "Banned: Finger-guessing games, shouting games, music playing, dancing"
The lifting of the bans led to other behaviors such as drinking games that had to be banned again.
(1982 Summer Palace restaurant, Beijing)

Figure 4 D An artifact used by students in their history of Beijing, 1964-2014

Image: © zonaeuropa.com

Ralph Goodyear is a professor of history in a public research university in the central United States. He has a class of 72 undergraduate students taking HIST 305, 'Historiography'. For the first three weeks of the course, Goodyear had recorded a series of short 15 minute video lectures that covered the following topics/content:

- the various sources used by historians (e.g. earlier writings, empirical records including registries of birth, marriage and death, eye witness accounts, artifacts such as paintings, photographs, and physical evidence such as ruins);
- the themes around which historical analysis tend to be written;
- some of the techniques used by historians, such as narrative, analysis and interpretation;
- three different positions or theories about history (objectivist, marxist, post modernist).

Students downloaded the videos according to a schedule suggested by Goodyear. Students attended two one hour classes a week, where specific topics covered in the videos were discussed. Students also had an online discussion forum in the course space on the university's learning management system, where Goodyear had posted similar topics for discussion. Students were expected to make at least one substantive contribution to each online topic for which they received a mark that went towards their final grade. Students also had to read a major textbook on historiography over this three week period.

In the fourth week, he divided the class into twelve groups of six, and asked each group to research the history of any city outside the United States over the last 50 years or so. They could use whatever sources they could find, including online sources such as newspaper reports, images, research publications, and so on, as well as the university's own library collection. In writing their report, they had to do the following:

- pick a particular theme that covered the 50 years and write a narrative based around the theme;
- identify the sources they finally used in their report, and discuss why they selected some sources and dismissed others;
- compare their approach to the three positions covered in the lectures;
- post their report in the form of an online e-portfolio in the course space on the university's learning management system.

They had five weeks to do this.

The last three weeks of the course were devoted to presentations by each of the groups, with comments, discussion and questions, both in class and online (the in class presentations were recorded and made available online). At the end of the course, students assigned grades to each of the other groups' work. Goodyear took these student gradings into consideration, but reserved the right to adjust the grades, with an explanation of why he did the adjustment. Goodyear also gave each student an individual grade, based on both their group's grade, and their personal contribution to the online and class discussions.

Goodyear commented that he was surprised and delighted at the quality of the students' work. He said: 'What I liked was that the students weren't learning *about* history; they were *doing* it.'

Based on an actual case, but with some embellishments

4.1 Online learning and teaching methods



For my personal comments on some of the issues raised in this chapter, please click on the podcast below, which discusses the relationship between quality, modes of delivery, teaching methods and design.



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=114>

Online learning is increasingly influencing both classroom/campus-based teaching but more importantly it is leading to new models or designs for teaching and learning.

When commercial movies were first produced, they were basically a transfer of previous music hall and vaudeville acts to the movie screen. Then along came D.W. Griffith's 'Birth of a Nation', which transformed the design of movies, by introducing techniques that were unique to cinema at the time, such as panoramic long shots, panning shots, realistic battle scenes, and what are now known as special effects.

A similar development has taken place with online learning. Initially, there were two separate influences: designs from classroom teaching; and designs inherited from print-based or multimedia distance education. Over time, though, new designs that fully exploit the unique characteristics of online learning are beginning to emerge.

What we do when we move teaching online is to change the learning environment. Thus, I am

beginning to move from talking about teaching methods (which can be the same both in class and online) to design models, where the teaching method is deliberately adapted to the learning environment.

4.2 Old wine in new bottles: classroom-type online learning



Figure 4.2.1 Live video streaming of lecture Image: Planet eStream, 2019

We start with classroom teaching methods that have been moved into a technological format with little change to the overall design principles. I will argue that these are essentially old designs in new bottles.

4.2.1 Live, streamed video

This is basically a classroom lecture delivered at the time of delivery to remote students (although there may also be live students in the lecture theatre as well). The remote students may be watching on their own at home, work or in transit, or (more often) in small groups at another campus or local learning centre. There is no change in the design, although the instructor may need to make sure that the remote students are not ignored if there are questions or discussion. For an example, see [here](#).

This is often the first step instructors take into online learning, because they do not have to do anything new other than learn how to set up and switch on the equipment. As the technology became cheaper and

easier to use, the use of live streamed lectures doubled between 2016 and 2017 in Canada ([Bates et al., 2018](#)).

Some instructors require all students to be present during the live lecture in order to ensure discussion, but this can be counter-productive if the aim of going online is to increase flexibility for students. This can be countered by using an online asynchronous discussion forum in a learning management system (for more on this, see [Chapter 4.4](#)). In most cases, though, lecturers prefer also to record the live transmission so all students can access the lecture at any time (see the next section below).

4.2.2 Classes using lecture capture

This technology, which automatically records a classroom lecture, was originally designed to enhance the classroom model by making lectures available for repeat viewings online at any time for students regularly attending classes – in other words, a form of homework or revision.



Figure 4.2.2 An MIT classroom lecture recorded and made available through MIT's [OpenCourseWare](#). Click on image to see the lecture.

Flipped classrooms, which pre-record a lecture for students to watch on their own, followed by discussion in class, are an attempt to exploit more fully this potential. The main advantage of lecture

capture is increased access, especially if students have long commutes or harsh weather to navigate. In some cases, it can reduce student drop-out dramatically. For an example of this see [here](#).

One of the biggest impacts of lecture capture has been for ‘instructionist’ massive open online courses (xMOOCs), such as those offered by Coursera, Udacity and edX. However, even this type of MOOC is really a basic classroom design model (MOOCs are discussed in more detail in [Chapter 5](#)). The main difference with a MOOC is that in a MOOC the classroom is open to anyone – but then in principle so are many university lectures – but MOOCs are available to unlimited numbers at a distance. Thus, if an institution decided to put all its recorded lectures up on an openly accessible server or on YouTube, they would become MOOCs. Nevertheless, whether lecture captures are available only to students registered in a course or as a MOOC, the design of the teaching has not changed markedly, although increasingly lectures are recorded in smaller chunks, partly as a result of research on MOOCs (for more on this research see [Chapter 8.4](#)).

4.2.2 Courses using learning management systems

Learning management systems (LMSs) are software that enable instructors and students to log in and work within a password protected online learning environment. Most learning management systems, such as Blackboard, Desire2Learn and Moodle, are in fact used to replicate a classroom design model. They have weekly units or modules, the instructor selects and presents the material to all students in the class at the same time, a large class enrolment can be organized into smaller sections with their own instructors, there are opportunities for (online) discussion, students work through the materials at roughly the same pace, and assessment is by end-of-course tests or essays.



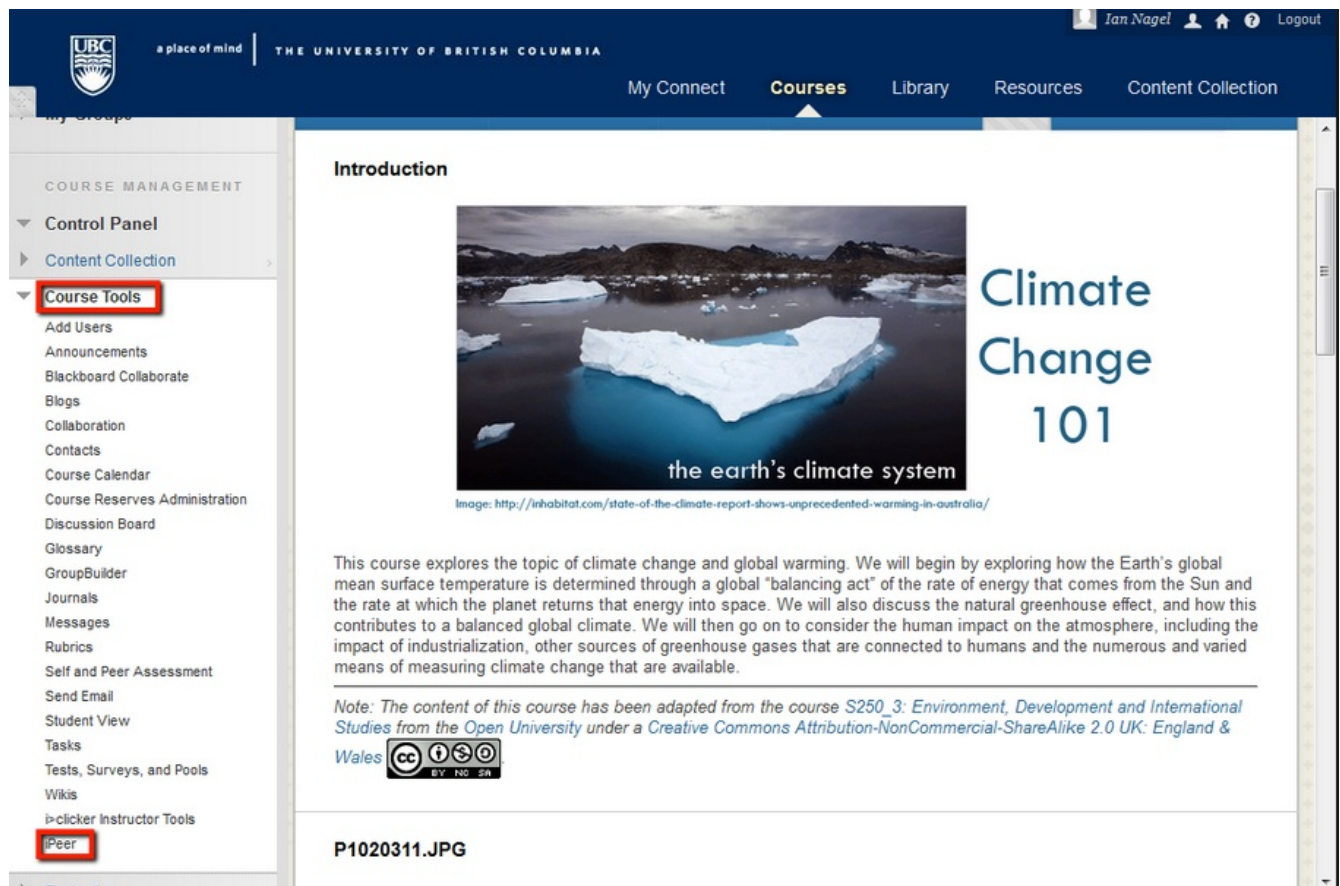


Figure 4.2.3 A screenshot of the University of British Columbia's LMS, Blackboard Connect

The main design differences are that the content is primarily text based rather than oral (although increasingly video and audio are now integrated into LMSs), the online discussion is mainly asynchronous rather than synchronous, and the course content is available at any time from anywhere with an Internet connection. These are important differences from a physical classroom, and skilled teachers and instructors can modify or adapt LMSs to meet different teaching or learning requirements (as they can in physical classrooms), but the basic organizing framework of the LMS remains the same as for a physical classroom.

Nevertheless, the LMS is still an advance over online designs that merely put lectures on the Internet as pre-recorded videos, or load up pdf copies of Powerpoint lecture notes, as is still the case unfortunately in many online programs. There is also enough flexibility in the design of learning management systems for them to be used in ways that break away from the traditional classroom model, which is important, as good online design should take account of the special requirements of online learners, so the design needs to be different from that of a classroom model.

4.2.3 The limitations of the classroom design model for online learning

Old wine can still be good wine, whether the bottle is new or not. What matters is whether classroom

design meets the changing needs of a digital age. However, just adding technology to the mix, or delivering the same design online, does not automatically result in meeting changing needs.

It is important then to look at the design that makes the most of the educational affordances of new technologies, because unless the design changes significantly to take full advantage of the potential of the technology, the outcome is likely to be inferior to that of the physical classroom model which it is attempting to imitate. Thus even if the new technology, such as lecture capture and computer-based multiple-choice questions organised in a MOOC, result in helping more students memorise better or learn more content, for example, this may not be sufficient to meet the higher level skills needed in a digital age.

The second danger of just adding new technology to the classroom design is that we may just be increasing cost, both in terms of technology and the time of instructors, without changing outcomes.

The most important reason though is that students studying online are in a different learning environment or context than students learning in a classroom, and the design needs to take account of this. This will be discussed more fully in the rest of the book.

Education is no exception to the phenomenon of new technologies being used at first merely to reproduce earlier design models before they find their unique potential. However, changes to the basic design model are needed if the demands of a digital age and the full potential of new technology are to be exploited in education.

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Bates, A. et al. (2018) [*Tracking Online and Distance Education in Canadian Universities and Colleges: 2018*](#) Halifax NS: Canadian Digital Learning Research Association

Activity 4.2 Moving the classroom model online

1. Do you agree that the classroom design model is a product of the 19th century and needs to be changed for teaching in a digital age? Or is there still enough flexibility in the classroom model for our times?
2. Do you agree that courses using LMSs are basically a classroom model delivered online, or are they a unique design model in themselves. If so, what makes them unique?
3. What are the advantages and disadvantages of breaking up a 50 minute lecture into say five 10 minute chunks for recording? Would you call this a significant design change – if so, what makes it significant?

For my personal views on these three questions listen to the podcast below:



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=118>

4.3 The ADDIE model

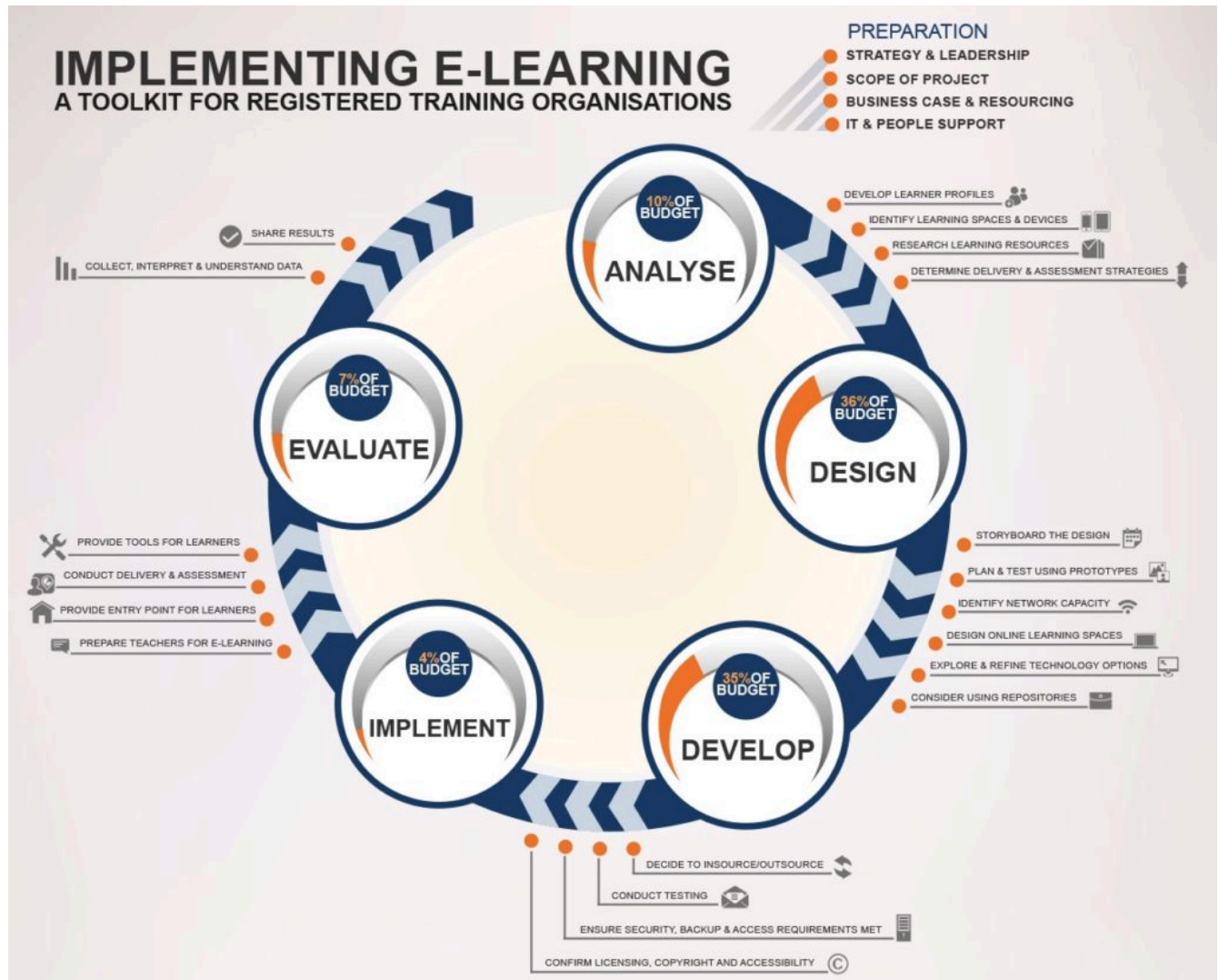


Figure 4.3.1 The ADDIE model.
© Flexible Learning Australia, 2014

There have been many books written about the ADDIE model (see for instance, Morrison, [2010](#); Dick and Carey, [2004](#)). I give here just a very brief introduction.

4.3.1 What is ADDIE?

ADDIE stands for:

Analyse

- identify all the variables that need to be considered when designing the course, such as learner characteristics, learners' prior knowledge, resources available, etc. This stage is similar to the describing the learning environment outlined in [Appendix 1](#) of this book;

Design

- this stage focuses on identifying the learning objectives for the course and how materials will be created and designed (for instance, it may include describing what content areas are to be covered and a storyboard outlining what will be covered in text, audio and video and in what order), and deciding on the selection and use of technology, such as an LMS, video or social media;

Develop

- the creation of content, including whether to develop in-house or outsource, copyright clearance for third party materials, loading of content into a web site or LMS, and so on;

Implement

- this is the actual delivery of the course, including any prior training or briefing of learner support staff, and student assessment;

Evaluate

- feedback and data is collected in order to identify areas that require improvement and this feeds into the design, development and implementation of the next iteration of the course.

4.3.2 Where is ADDIE used?

This is a design model used by many professional instructional designers for technology-based teaching. ADDIE has been almost a standard for professionally developed, high quality distance education programs, whether print-based or online. It is also heavily used in corporate e-learning and training. There are many variations on this model (my favourite is 'PADDIE', where planning and/or preparation are added at the start). The model is mainly applied on an iterative basis, with evaluation leading to re-analysis and further design and development modifications. One reason for the widespread use of the ADDIE model is that it is extremely valuable for large and complex teaching designs. ADDIE's roots go back to the Second World War and derive from system design, which was developed to manage the hugely complex Normandy landings.

Many open universities, such as the U.K. Open University and the OU of the Netherlands, Athabasca University and Thompson Rivers Open University in Canada, still make heavy use of ADDIE to manage the design of complex multi-media distance education courses. When the U.K. OU opened in

1971 with an initial intake of 20,000, it used radio, television, specially designed printed modules, text books, reproduced research articles in the form of selected readings that were mailed to students, and regional study groups, with teams of often 20 academics, media producers and technology support staff developing courses, and with delivery and learner support provided by an army of regional tutors and senior counsellors. Creating and delivering its first courses within two years of receiving its charter would have been impossible without a systematic instructional design **model**, and in 2014, with over 200,000 students, the OU was still using the ADDIE approach for many of its courses.

Although ADDIE and instructional design in general originated in the USA, the U.K. Open University's success in developing high quality learning materials influenced many more institutions that were offering distance education on a much smaller scale to adopt the ADDIE model, if in a more modest way, typically with a single instructor working with an instructional designer. As distance education courses became increasingly developed as online courses, the ADDIE model continued, and is now being used by instructional designers in many institutions for the re-design of large lecture classes, hybrid learning, and for fully online courses.

4.4.3 What are the benefits of ADDIE?

One reason it has been so successful is that it is heavily associated with good quality design, with clear learning objectives, carefully structured content, controlled workloads for faculty and students, integrated media, relevant student activities, and assessment strongly tied to desired learning outcomes. Although these good design principles can be applied with or without the ADDIE model, ADDIE is a model that allows these design principles to be identified and implemented on a systematic and thorough basis. It is also a very useful management tool, allowing for the design and development of large numbers of courses to a standard high quality.

4.4.5 What are the limitations of ADDIE?

The ADDIE approach can be used with any size of teaching project, but works best with large and complex projects. Applied to courses with small student numbers and a deliberately simple or traditional classroom design, it becomes expensive and possibly redundant, although there is nothing to stop an individual teacher following this strategy when designing and delivering a course.

A second criticism is that the ADDIE model is what might be called 'front-end loaded' in that it focuses heavily on content design and development, but does not pay as much attention to the interaction between instructors and students during course delivery. Thus it has been criticised by constructivists for not paying enough attention to learner-instructor interaction, and for privileging more behaviourist approaches to teaching.

Another criticism is that while the five stages are reasonably well described in most descriptions of the model, the model does not provide guidance on how to make decisions within that framework. For instance, it does not provide guidelines or procedures for deciding *how* to choose between different media, or *what* assessment strategies to use. Instructors have to go beyond the ADDIE framework to make these decisions.

The over-enthusiastic application of the ADDIE model can result in overly complex design stages, with many different categories of workers (faculty, instructional designers, editors, web designers) and consequently a strong division of labour, resulting in courses taking up to two years from initial approval

to actual delivery. The more complex the design and management infrastructure, the more opportunities there are for cost over-runs and very expensive programming. **It is a very good example of the industrial approach to course design.**

My main criticism though is that the model is too inflexible for the digital age. How does a teacher respond to rapidly developing new content, new technologies or apps being launched on a daily basis, to a constantly changing student base? Although the ADDIE model has served us well in the past, and provides a good foundation for designing teaching and learning, it can be too pre-determined, linear and inflexible to handle more volatile learning contexts. I will discuss more flexible models for design in [Section 4.7](#).

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Activity 4.3 Using the ADDIE model

1. Take a course you are currently offering. How many of the stages of the ADDIE model did you go through? If you missed out on some of the stages, do you think the course would have been better if you had included these stages? Given the amount of work needed to work through each of the stages, do you think the results would be worth the effort?
2. If you are thinking of designing a new course, use the Flexible Learning Australia infographic to work through the four steps of analysis they recommend. Was this helpful? If so, you might want to continue with the other recommended steps.
3. If you have previously used the ADDIE model, are you happy with it? Do you agree with my criticisms? Is it flexible enough for the context in which you are working?

I do not provide feedback on these questions as they are for you to think about based on your own experience.

4.4 Online collaborative learning

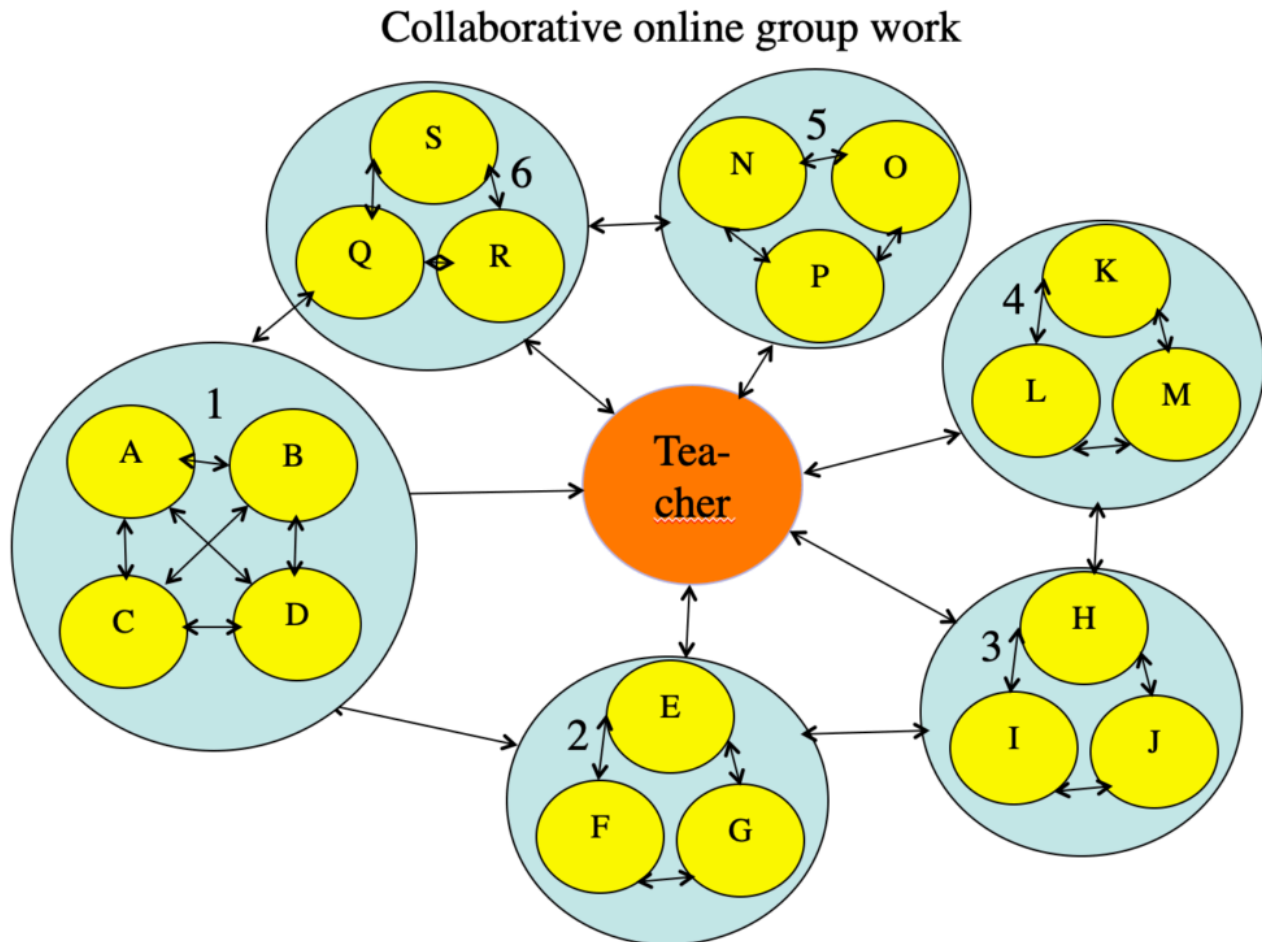


Figure 4.4.1. Collaborative group work. In this example the teacher has organized a class of 19 students into six groups. The teacher can interact with individual students or with each group as a whole. In online collaborative learning each group can have its own discussion area which can be 'closed' (except to the teacher) or open to the other students. In this model, all communication is textual, over the Internet, using online discussion forum software. However, the model could be applied to video-conferencing, but usually with smaller numbers of students due to bandwidth restrictions, or to classroom teaching. Each mode of delivery though will need its own variations in design for it to work well. Image: Tony Bates, 2019.

4.4.1 What is online collaborative learning?

The concurrence of both constructivist approaches to learning and the development of the Internet has led to the development of a particular form of constructivist teaching, originally called computer-mediated communication (CMC), or networked learning, but which has been developed into what Harasim ([2017](#)) now calls online collaborative learning theory (OCL). She describes OCL as follows (p. 90):

OCL theory provides a model of learning in which students are encouraged and supported to work together to create knowledge: to invent, to explore ways to innovate, and, by so doing, to seek the conceptual knowledge needed to solve problems rather than recite what they think is the right answer. While OCL theory does encourage the learner to be active and engaged, this is not considered to be sufficient for learning or knowledge construction.....In the OCL theory, the teacher plays a key role not as a fellow-learner, but as the link to the knowledge community, or state of the art in that discipline. Learning is defined as conceptual change and is key to building knowledge. Learning activity needs to be informed and guided by the norms of the discipline and a discourse process that emphasises conceptual learning and builds knowledge.

OCL builds on and integrates theories of cognitive development that focus on conversational learning (Pask, [1975](#)), conditions for deep learning (Marton and Saljø, [1997](#); Entwistle, [2000](#)), development of academic knowledge (Laurillard, [2001](#)), and knowledge construction (Scardamalia and Bereiter, [2006](#)).

From the very early days of online learning, some instructors have focused heavily on the communication affordances of the Internet (see for instance, Hiltz and Turoff, [1978](#)). They have based their teaching on the concept of knowledge construction, the gradual building of knowledge mainly through asynchronous online discussion among students and between students and an instructor.

Online discussion forums go back to the 1970s, but really took off as a result of a combination of the invention of the WorldWide Web in the 1990s, high speed Internet access, and the development of learning management systems, most of which now include an area for online discussions. These online discussion forums have some differences though with classroom seminars:

- first, they are text based, not oral;
- second, they are asynchronous: participants can log in at any time, and from anywhere with an Internet connection;
- third, many discussion forums allow for ‘threaded’ connections, enabling a response to be attached to the particular comment which prompted the response, rather than just displayed in chronological order. This allows for dynamic sub-topics to be developed, with sometimes more than ten responses within a single thread of discussion. This enables participants to follow multiple discussion topics over a period of time.

4.4.2 Core design principles of OCL

Harasim emphasises the importance of three key phases of knowledge construction through discourse:

- **idea generating:** this is literally brainstorming, to collect the divergent thinking within a group;

- **idea organising:** this is where learners compare, analyse and categorise the different ideas previously generated, again through discussion and argument;
- **intellectual convergence:** the aim here is to reach a level of intellectual synthesis, understanding and consensus (including agreeing to disagree), usually through the joint construction of some artefact or piece of work, such as an essay or assignment.

This results in what Harasim calls a Final Position, although in reality the position is never final because for a learner, once started, the process of generating, organising and converging on ideas continues at an ever deeper or more advanced level. The role of the teacher or instructor in this process is seen as critical, not only in facilitating the process and providing appropriate resources and learner activities that encourage this kind of learning, but also, as a representative of a knowledge community or subject domain, in ensuring that the core concepts, practices, standards and principles of the subject domain are fully integrated into the learning cycle.

Harasim provides the following diagram to capture this process:

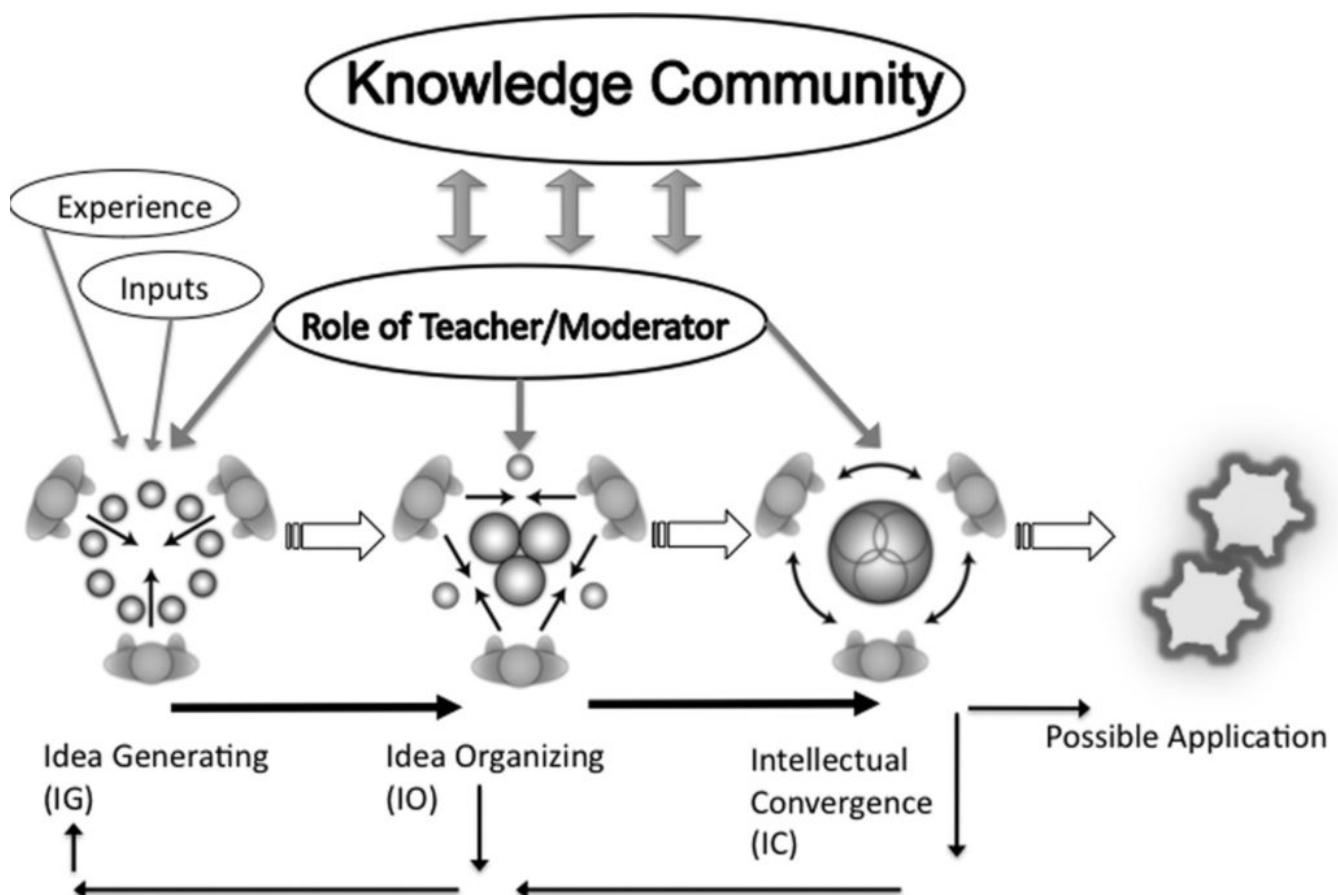


Figure 4.4.2: Harasim's pedagogy of group discussion (from Harasim, 2017, p. 95, with permission)

Another important factor is that in the OCL model, discussion forums are not an addition or

supplement to core teaching materials, such as textbooks, recorded lectures, or text in an LMS, but are the core component of the teaching. Textbooks, readings and other resources are chosen to support the discussion, not the other way round.

This is a key design principle, and explains why often instructors or tutors complain, in more ‘traditional’ online courses, that students don’t participate in discussions. Often this is because where online discussions are secondary to more didactic teaching, or are not deliberately designed and managed to lead to knowledge construction, students see the discussions as optional or extra work, because they have no direct impact on grades or assessment.

It is also a reason why awarding grades for participation in discussion forums misses the point. It is not the extrinsic activity that counts, but the intrinsic value of the discussion, that matters (see, for instance, Brindley, Walti and Blashke, [2009](#)). Thus although instructors using an OCL approach may use learning management systems for convenience, they are used differently from courses where traditional didactic teaching is moved online.

4.4.3 Community of Inquiry

The [Community of Inquiry Model \(CoI\)](#) is somewhat similar to the OCL model. As defined by Garrison, Anderson and Archer ([2000](#)):

An educational community of inquiry is a group of individuals who collaboratively engage in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding.

Garrison, Anderson and Archer argue that there are three essential elements of a community of inquiry:

- **social presence:** is “the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities.”
- **teaching presence:** is “the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes”
- **cognitive presence:** is “the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse”.



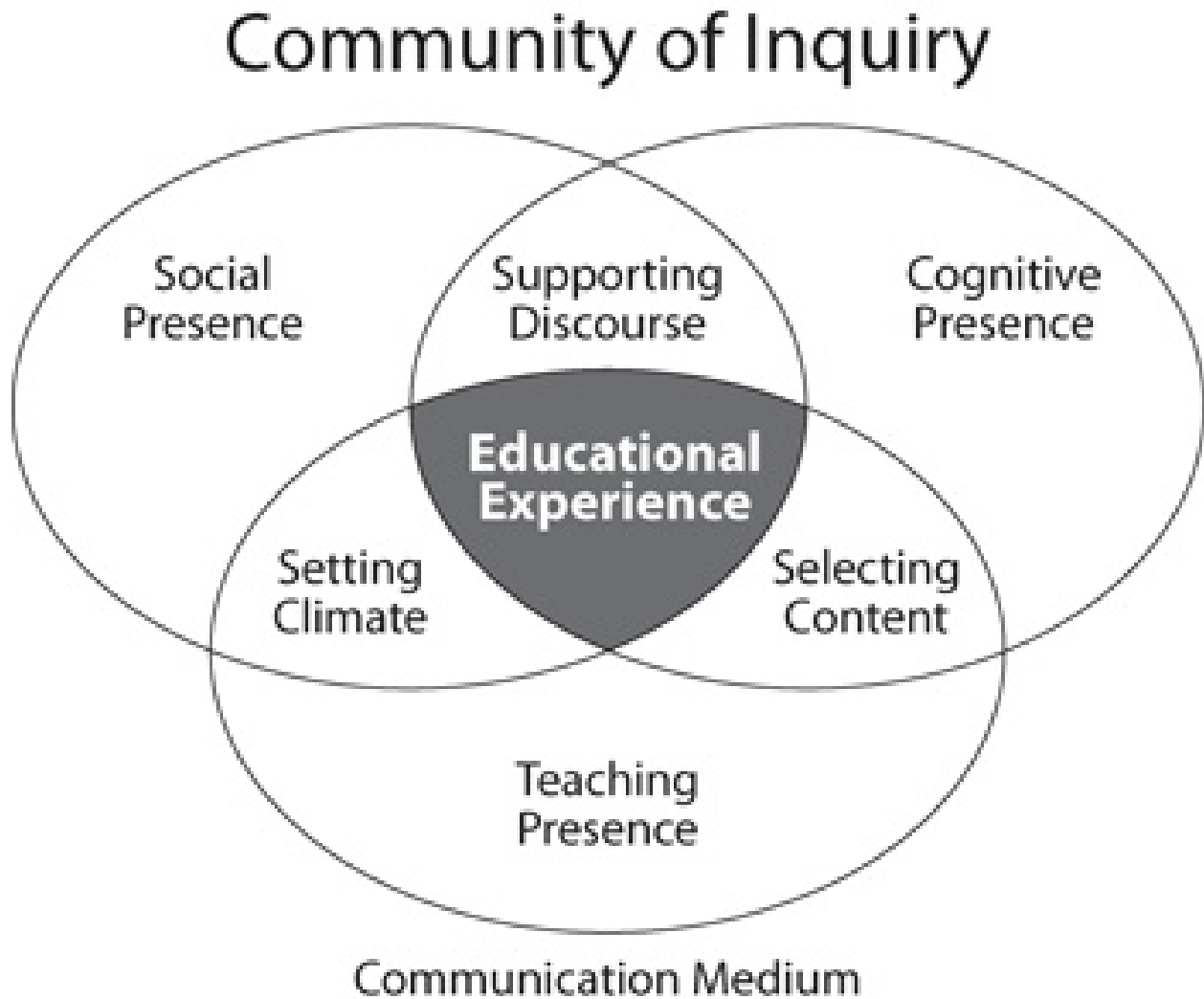


Figure 4.4.3: Community of Inquiry Image: © Terry Anderson/Marguerite Koole, 2013

However, CoI is more of a theory than a model, since it does not indicate what activities or conditions are needed to create these three ‘presences’. The two models (OCL and CoI) are also more complementary rather than competing.

4.4.4 Developing meaningful online discussion

Since the publication of the original CoI paper in 2000, there have been a number of studies that have identified the importance of these ‘presences’ within especially online learning (click [here](#) for a wide selection). Although there has been a wide range of researchers and educators engaged in the area of

online collaborative learning and communities of inquiry, there is a high degree of convergence and agreement about successful strategies and design principles. For academic and conceptual development, discussions need to be well organized by the teacher, and the teacher needs to provide the necessary support to enable the development of ideas and the construction of new knowledge for the students.

Partly as a result of this research, and partly as the result of experienced online instructors who have not necessarily been influenced by either the OCL or the Community of Inquiry literature, several other design principles have been associated with successful (online) discussion, such as:

- **appropriate technology** (for example, software that allows for threaded discussions);
- **clear guidelines on student online behaviour**, such as written codes of conduct for participating in discussions, and ensuring that they are enforced;
- **student orientation and preparation**, including technology orientation and explaining the purpose of discussion;
- **clear goals** for the discussions that are understood by the students, such as: ‘to explore gender and class issues in selected novels’ or ‘to compare and evaluate alternative methods of coding’;
- **choice of appropriate topics**, that complement and expand issues in the study materials, and are relevant to answering assessment questions;
- **setting an appropriate ‘tone’ or requirements for discussion** (for example, respectful disagreement, evidence-based arguments);
- **defining clearly learner roles and expectations**, such as ‘you should log in at least once a week to each discussion topic and make at least one substantive contribution to each topic each week’;
- **monitoring the participation of individual learners, and responding accordingly**, by providing the appropriate scaffolding or support, such as comments that help students develop their thinking around the topics, referring them back to study materials if necessary, or explaining issues when students seem to be confused or misinformed;
- **regular, ongoing instructor ‘presence’**, such as monitoring the discussions to prevent them getting off topic or too personal, and providing encouragement for those that are making real contributions to the discussion, heading off those that are trying to hog or dominate the discussions, and tracking those not participating, and helping them to participate;
- **ensuring strong articulation between discussion topics and assessment.**

These issues are discussed in more depth by Salmon ([2000](#)); Bates and Poole ([2003](#)); and Paloff and Pratt ([2005](#); [2007](#)).

4.4.5 Cultural and epistemological issues

Students come to the educational experience with different expectations and backgrounds. As a result there are often major cultural differences in students with regard to participating in discussion-based collaborative learning that in the end reflect deep differences with regard to traditions of learning and teaching. Thus teachers need to be aware that there are likely to be students in any class who may be

struggling with language, cultural or epistemological issues, but in online classes, where students can come from anywhere, this is a particularly important issue.

In many countries, there is a strong tradition of the authoritarian role of the teacher and the transmission of information from the teacher to the student. In some cultures, it would be considered disrespectful to challenge or criticize the views of teachers or even other students. In an authoritarian, teacher-based culture, the views of other students may be considered irrelevant or unimportant. Other cultures have a strong oral tradition, or one based on story-telling, rather than on direct instruction.

Online environments then can present real challenges to students when a constructivist approach to the design of online learning activities is adopted. This may mean taking specific steps to help students who are unfamiliar with a constructivist approach to learning, such as asking a student to send drafts to the instructor by e-mail for approval before posting a ‘class’ contribution. For a fuller discussion of cross-cultural issues in online learning, see Jung and Gunawardena (2014) and the journal *Distance Education*, Vol. 22, No. 1 (2001), the whole edition of which is devoted to papers on this topic.

4.4.6 Strengths and weaknesses of online collaborative learning

This approach to the use of technology for teaching is very different from the more objectivist approaches found in computer-assisted learning, teaching machines, and artificial intelligence applications to education, which primarily aim to use computing to replace at least some of the activities traditionally done by human teachers. With online collaborative learning, the aim is not to replace the teacher, but to use the technology primarily to increase and improve communication between teacher and learners, with a particular approach to the development of learning based on knowledge construction assisted and developed through social discourse. This social discourse furthermore is not random, but managed in such a way as to ‘scaffold’ learning:

- by assisting with the construction of knowledge in ways that are guided by the instructor;
- that reflect the norms or values of the discipline;
- that also respect or take into consideration the prior knowledge within the discipline.

Thus there are two main strengths of this model:

- when applied appropriately, online collaborative learning can lead to deep, academic learning, or transformative learning, as well as, if not better than, discussion in campus-based classrooms. The asynchronous and recorded ‘affordances’ of online learning more than compensate for the lack of physical cues and other aspects of face-to-face discussion;
- online collaborative learning as a result can also directly support the development of a range of high level intellectual skills, such as critical thinking, analytical thinking, synthesis, and evaluation, which are key requirements for learners in a digital age.

There are though some limitations:

- it does not scale easily, requiring highly knowledgeable and skilled instructors, and a limited number of learners per instructor;
- it is more likely to accommodate to the epistemological positions of faculty and instructors in humanities, social sciences, education and some areas of business studies and health and

conversely it is likely to be less accommodating to the epistemological positions of faculty in science, computer science and engineering. However, if combined with a problem-based or inquiry-based approach, it might have acceptance even in some of the STEM subject domains.

4.4.7 Summary

Many of the strengths and challenges of collaborative learning apply both in face-to-face or online learning contexts. It could be argued that there is no or little difference between online collaborative learning and well-conducted traditional classroom, discussion-based teaching. *Although there are necessary adaptations depending on the mode of delivery, many of the core principles of successful collaborative learning (see Barkley, Major and Cross, 2014) will apply in both online and face-to-face teaching.* Once again, we see that the mode of delivery is less important than the design model, which can work well in both contexts. Indeed, it is possible to conduct successful collaborative learning synchronously or asynchronously, at a distance or face-to-face.

However, there is plenty of evidence that collaborative learning can be done just as well online, which is important, given the need for more flexible models of delivery to meet the needs of a more diverse student body in a digital age. Also, the necessary conditions for success in teaching this way are now well known, even though they are not always universally applied.

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Activity 4.4: Evaluating online collaborative learning models

1. Can you see the differences between 'Open Collaborative Learning' (OCL) and 'Communities of Inquiry'? Or are they really the same model with different names?
2. Do you agree that either of these models can be applied just as successfully online or face-to-face?
3. Do you see other strengths or weaknesses with these models?
4. Is this common sense dressed up as theory?
5. Does it make sense to apply either of these models to courses in the quantitative sciences such as physics or engineering? If so, under what conditions?

For my comments on these questions, click on the podcast below:



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=125>

4.5 Competency-based learning

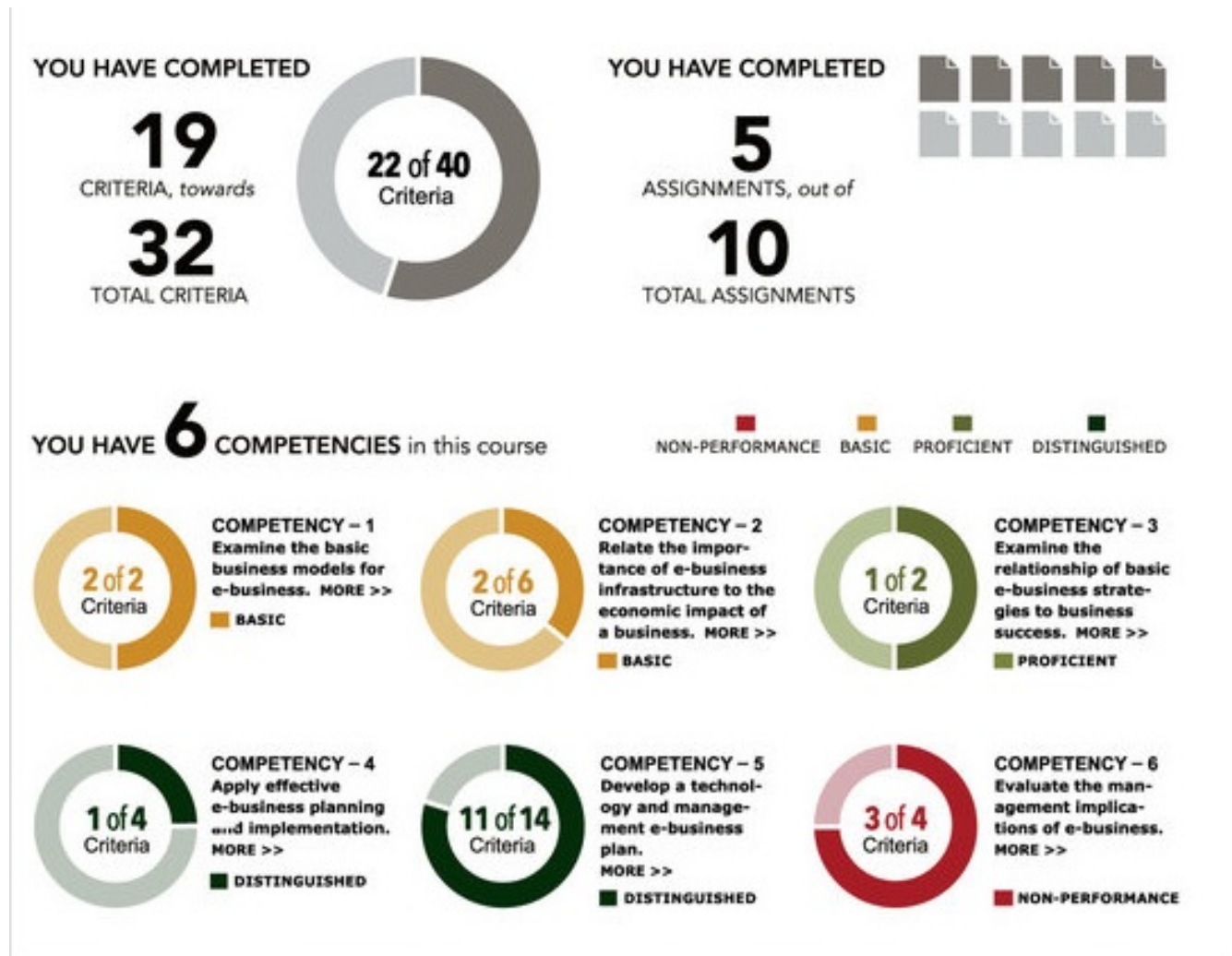


Figure 4.5.1 e-Commerce business course competencies, Capella University

4.5.1 What is competency-based learning?

Competency-based learning begins by identifying specific competencies or skills, and enables learners to develop mastery of each competency or skill at their own pace, usually working with a mentor. Learners can develop just the competencies or skills they feel they need (for which increasingly they may

receive a ‘badge’ or some form of validated recognition), or can combine a whole set of competencies into a full qualification, such as a certificate, diploma or increasingly a full degree.

Learners work individually, usually online, rather than in cohorts. If learners can demonstrate that they already have mastery of a particular competency or skill, through a test or some form of prior learning assessment, they may be allowed to move to the next level of competency without having to repeat a prescribed course of study for the prior competency. Competency-based learning attempts to break away from the regularly scheduled classroom model, where students study the same subject matter at the same speed in a cohort of fellow students.

The value of competency-based learning for developing practical or vocational skills or competencies is more obvious, but increasingly competency-based learning is being used for education requiring more abstract or academic skills development, sometimes combined with other cohort-based courses or programs.

4.5.2 Who uses competency-based learning?

The [Western Governors University](#) in the USA, with nearly 40,000 students, has pioneered competency-based learning, but, with the more recent support of the Federal Department of Education, competency-based learning is expanding rapidly in the USA. Other institutions making extensive use of competency-based learning are [Southern New Hampshire University](#) through its [College for America](#), designed specifically for working adults and their employers, [Northern Arizona University](#), and [Capella University](#).

Competency-based learning is particularly appropriate for adult learners with life experience who may have developed competencies or skills without formal education or training, for those who started school or college and dropped out and wish to return to formal study, but want their learning ‘*after school*’ to be recognized, or for those learners wanting to develop specific skills but not wanting a full program of studies. Competency-based learning can be delivered through a campus program, but it is increasingly delivered fully online, because many students taking such programs are already working or seeking work, *and because technology enables each student a distinct pathway through content based on their prior knowledge.*

4.5.3 Designing competency-based learning

There are various approaches, but the Western Governors’ model illustrates many of the key steps.

4.5.3.1 Defining competencies

A feature of most competency-based programs is a partnership between employers and educators in identifying the competencies required, at least at a high level. Some of the skills outlined in Chapter 1, such as problem-solving or critical thinking, may be considered high-level, but competency-based learning tries to break down abstract or vague goals into specific, measurable competencies.

For instance, at Western Governors University (WGU), for each degree, a high-level set of competencies is defined by the University Council, and then a working team of contracted subject matter experts takes the ten or so high level competencies for a particular qualification and breaks them down into about 30 more specific competencies, around which are built online courses to develop mastery of each competency. Competencies are based upon what graduates are supposed to know in the workplace and as professionals in a chosen career. Assessments are designed specifically to assess the mastery of

each competency; thus students receive either a pass/no pass following assessment. A degree is awarded when all 30 specified competencies are successfully achieved.

Defining competencies that meet the needs of students and employers in ways that are progressive (in that one competency builds on earlier competencies and leads to more advanced competencies) and coherent (in that the sum of all the competencies produces a graduate with all the knowledge and skills required within a business or profession) is perhaps the most important and most difficult part of competency-based learning.

4.5.3.2 Course and program design

At WGU, courses are created by in-house subject matter experts selecting existing online curriculum from third parties and/or resources such as e-textbooks through contracts with publishers. Increasingly open educational resources are used. WGU does not use a learning management system but a specially designed portal for each course. E-textbooks are offered to students without extra cost to the student, through contracts between WGU and the publishers. Courses are pre-determined for the student with no electives. Students are admitted on a monthly basis and work their way through each competency at their own pace.

Students who already possess competencies may accelerate through their program in two ways: transferring in credits from a previous associate degree in appropriate areas (e.g. general education, writing); or by taking exams when they feel they are ready.

4.5.3.3 Learner support

Again this varies from institution to institution. WGU currently employs approximately 750 faculty who act as mentors. There are two kinds of mentors: 'student' mentors and 'course' mentors. Student mentors, who have qualifications within the subject domain, usually at a masters level, are in at least bi-weekly telephone contact with their students, depending on the needs of the student in working through their courses, and are the main contact for students. A student mentor is responsible for roughly 85 students. Students start with a mentor from their first day and stay with their mentor until graduation. Student mentors assist students in determining and maintaining an appropriate pace of study, and step in with help when students are struggling.

Course mentors are more highly qualified, usually with a doctorate, and provide extra support for students when needed. Course mentors will be available to between 200-400 students at a time, depending on the subject requirement.

Students may contact either student or course mentors at any time (unlimited access) and mentors are expected to deal with student calls within one business day. Mentors are full-time but work flexible hours, usually from home. Mentors are reasonably well paid, and receive extensive training in mentoring.

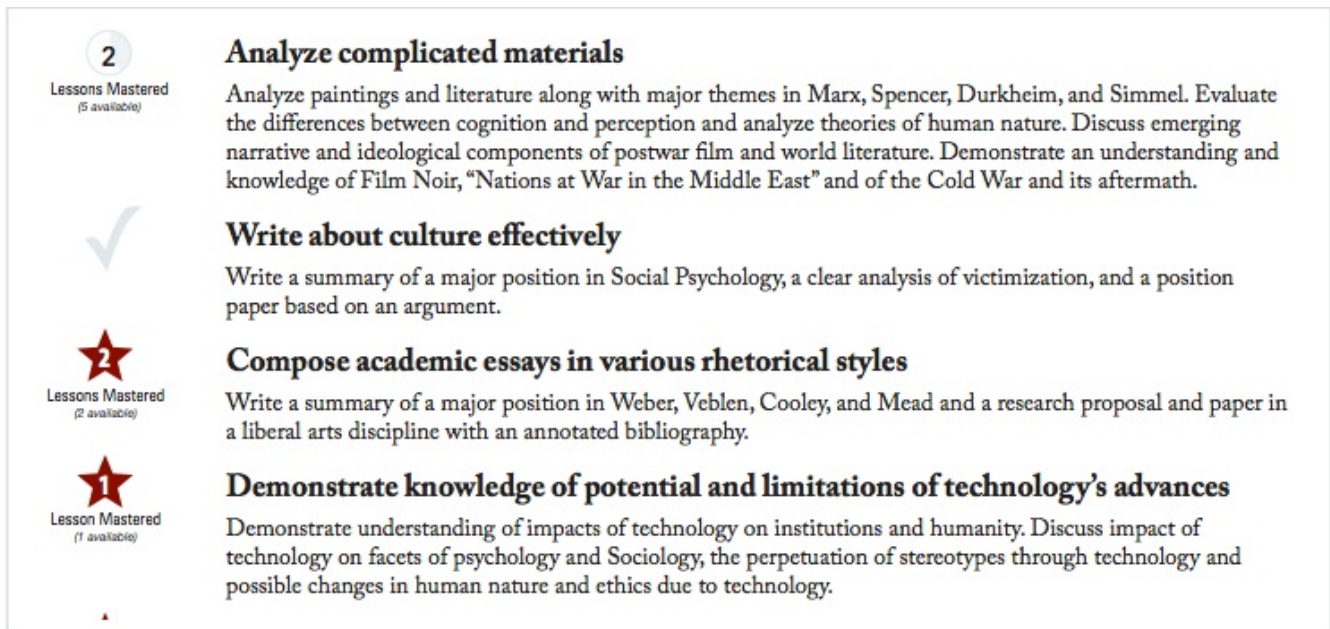
4.5.3.4 Assessment

WGU uses written papers, portfolios, projects, observed student performance and computer-marked assignments as appropriate, with detailed rubrics. Assessments are submitted online and if they require human evaluation, qualified graders (subject matter experts trained by WGU in assessment) are randomly assigned to mark work on a pass/fail basis. If students fail, the graders provide feedback on the areas where competency was not demonstrated. Students may resubmit if necessary.



Figure 4.5.2 Remote proctoring of exams at Western Governors' University

Students will take both formative (pre-assessment) and summative (proctored) exams. WGU is increasingly using online proctoring, enabling students to take an exam at home under video supervision, using facial recognition technology to ensure that the registered student is taking the exam. In areas such as teaching and health, student performance or practice is assessed in situ by professionals (teachers, nurses).



2 Lessons Mastered (5 available)	Analyze complicated materials Analyze paintings and literature along with major themes in Marx, Spencer, Durkheim, and Simmel. Evaluate the differences between cognition and perception and analyze theories of human nature. Discuss emerging narrative and ideological components of postwar film and world literature. Demonstrate an understanding and knowledge of Film Noir, “Nations at War in the Middle East” and of the Cold War and its aftermath.
✓	Write about culture effectively Write a summary of a major position in Social Psychology, a clear analysis of victimization, and a position paper based on an argument.
2 Lessons Mastered (2 available)	Compose academic essays in various rhetorical styles Write a summary of a major position in Weber, Veblen, Cooley, and Mead and a research proposal and paper in a liberal arts discipline with an annotated bibliography.
1 Lesson Mastered (1 available)	Demonstrate knowledge of potential and limitations of technology’s advances Demonstrate understanding of impacts of technology on institutions and humanity. Discuss impact of technology on facets of psychology and Sociology; the perpetuation of stereotypes through technology and possible changes in human nature and ethics due to technology.

Figure 4.5.3 Example transcript from Northern Arizona University

4.5.4 Strengths and weaknesses

Proponents have identified a number of strengths in the competency-based learning approach:

- it meets the immediate needs of businesses and professions; students are either already working, and receive advancement within the company, or if unemployed, are more likely to be employed once qualified;
- it enables learners with work or family commitments to study at their own pace;
- for some students, it speeds up time to completion of a qualification by enabling prior learning to be recognized;
- students get individual support and help from their mentors;
- tuition fees are affordable (US\$6,000 per annum at WGU) and programs can be self-funding from tuition fees alone, since WGU uses already existing study materials and increasingly open educational resources;
- competency-based education is being recognized as eligible for Federal loans and student aid in the USA.

Consequently, institutions such as WGU, the University of Southern New Hampshire, and Northern Arizona University, using a competency-based approach, at least as part of their operations, have seen annual enrolment growth in the range of 30-40 per cent per annum.

Its main weakness is that it works well with some learning environments and less well with others. In particular:

- it focuses on immediate employer needs and is less focused on preparing learners with the

flexibility needed for a more uncertain future;

- it does not suit subject areas where it is difficult to prescribe specific competencies or where new skills and new knowledge need to be rapidly accommodated;
- it takes an objectivist approach to learning; constructivists would argue that skills are not either present or absent (pass or fail), but have a wide range of performance and continue to develop over time;
- it ignores the importance of social learning;
- it will not fit the preferred learning styles of many students.

A [2015](#) report by EAB, a private educational consultancy, identified three ‘myths’ about about competency-based education:

- [high demand](#): in fact EAB reported a lack of demand from students or employers
- [faster and cheaper for students](#): in fact it is difficult for students, especially working adults, to complete competencies fast enough for there to be savings over conventional programs
- [cheaper for institutions](#): in fact, because of the need for new systems such as on-demand registration, and different reporting for government financial aid, institutional costs are often higher than anticipated

4.5.5 In conclusion

Competency-based learning is a relatively new approach to learning design which is proving increasingly popular with employers and suits certain kinds of learners such as adults seeking to re-skill or searching for mid-level jobs requiring relatively easily identifiable skills. It does not suit though all kinds of learners and may be limited in developing the higher level, more abstract knowledge and skills requiring creativity, high-level problem-solving and decision-making and critical thinking.

Further reading

At the time of writing, there is comparatively little literature and even less research on competency-based learning compared with most other teaching approaches. It is also an area that has recently evolved from earlier, more training-focused approaches to competency. I have therefore limited myself to more recent publications. The following publications are recommended for those who would like to pursue this area further:

Book, P. (2014) [*All Hands on Deck: Ten Lessons from Early Adopters of Competency-based Education*](#) Boulder CO: WCET

Cañado, P. and Luisa, M. (eds.) (2013) [*Competency-based Language Teaching in Higher Education*](#) New York: Springer

EAB (2015) [*Three Myths About Competency-Based Education*](#) Washington DC: Education Advisory Board

Garrett, R. and Lurie, H. (2016) [*Deconstructing CBE: An Assessment of Institutional Activity, Goals and Challenges in Higher Education*](#) Boston MA: Ellucian/Eduventures

Rothwell, W. and Graber, J. (2010) [*Competency-Based Training Basics*](#) Alexandria VA: ADST

Weise, M. (2014) Got Skills? Why Online Competency-Based Education Is the Disruptive Innovation for Higher Education [EDUCAUSE Review](#), November 10

The Southern Regional Educational Board in the USA has a comprehensive [Competency-based Learning Bibliography](#)

Activity 4.5 Thinking about competency-based education?

1. What factors are likely to influence you to adopt a competency-based approach to teaching? Could you describe a scenario where you could use this approach effectively?
2. What are the advantages and disadvantages of students studying individually, rather than in a cohort? What skills are they likely to miss out on through individual study?
3. Is competency-based learning something an individual instructor should contemplate? What institutional support would be necessary to make this approach work?

For my response to these questions, click on the podcast below:



An audio element has been excluded from this version of the text. You can listen to it online here:
<https://pressbooks.bccampus.ca/teachinginadigitalagev2/?p=130>

4.6 Communities of practice



Figure 4.6.1 [Bank of America's Vital Voices](#) program links women executives of small and medium sized enterprises from around the world

Image: © Belfast Telegraph, 2014

4.6.1 The theories behind communities of practice

The design of teaching often integrates different theories of learning. Communities of practice are one of the ways in which experiential learning, social constructivism, and connectivism can be combined, illustrating the limitations of trying to rigidly classify learning theories. Practice tends to be more complex.