TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

How Students Learn

A learning and teaching resource

Victoria Business School—Orauariki

Contents

Foreword

The 2014–2015 Strategic Plan for Victoria Business School (VBS) articulates a clear statement of the defining contribution of learning and teaching:

VBS is committed to policies, practices and a culture of continuous improvement in learning and teaching. The critical factors that enable this commitment to be realised include the professionalism of VBS teaching staff, a university-wide strategy with direct support from the centre and an architecture that supports continuous improvement. This commitment to excellence in learning and teaching reflects, and is one expression of, the Victoria University of Wellington Strategic Plan, which includes, as one of its primary strategies, the provision of a "holistic learning, teaching and student experience that is second to none".

That primary strategy also discusses the importance of a research-enriched learning culture that will be "characterised by professional course and programme design that fosters a high level of student engagement, by excellent learning opportunities and facilities and by effective use of digital technologies for learning and teaching … Teaching practices will be inclusive and continually refreshed by attention to evolving methodologies and technologies."

This publication is a contribution to sustaining the kind of learning culture that informs the University vision and strategy and to which VBS is strongly committed. The culture is one reflecting the fact that, as a community of teachers and learners, we operate in a market where students have choices.

I want VBS to be the provider of choice when it comes to undergraduate and postgraduate education and executive education for the disciplines and professions encompassed by our School. That is a matter of reputation and it is a precondition for viability. But that culture should also, at its best, reflect a vibrant professional community of teachers who place learners at the centre of what we do, who embrace reflective teaching practices focused on quality learning outcomes and who take considerable professional pride from being teachers and learners.

Professor Bob Buckle ONZM
Pro Vice-Chancellor and Dean of Commerce
Victoria Business School

Initial thoughts

Perhaps the most important question we can focus on as teachers—whether in the role of lecturer, tutor, workshop or placement supervisor, or in those interactions we have with students after classes—is, "Have we produced a learning environment?" And come the end of a programme of study—whatever the level—the question becomes, "Have we provided a learning environment that has encouraged students to meet the learning goals and outcomes for this programme of study or degree?" Assessment assists with those kinds of questions, as do the kind of assurance of learning processes that operate within VBS.

The underlying question that we need to be asking ourselves—when we are designing a course and as we teach, tutor, support and assess—is, "How do students learn?" This booklet seeks to answer that question and it is our hope that it will assist in starting a process of reflection, a conversation between colleagues or conversations between learners and teachers about how students learn. The initial conversation may be one that you have with yourself.

This resource doesn't purport to provide a comprehensive survey. If you want to know more (and apply what you know in course or programme design and delivery) there are plenty of options, including participating in the VicTeach network or enrolling in one of the courses or degree programmes focused on higher education learning and teaching that are offered by our colleagues at the Centre for Academic Development.

In this booklet we examine how students learn. We encourage student-centred learning. This means acknowledging that students learn in a range of ways. One of the key take-out messages is that there is no one best or correct way of going about teaching. Individual teachers will bring their own personal styles and strengths, and different topics will require particular approaches to teaching and learning. At the end of the day, whatever our chosen approach to learning and teaching, whatever the level of study and whatever the subject matter, it is about learning. It is about starting the journey—whether that journey takes the form of a single tutorial or lecture, or a course or a degree programme—by reflecting on the questions, "How do students learn?" and "What can I do to best ensure that we have an effective learning environment?"

Research commissioned by VBS and undertaken by Dana Nicklin forms the basis of much of this learning and teaching resource. Dana has superb research skills, a passion for the subject (and a passion to know more about it), a capacity to empathise with the situations facing learners and teachers and an ability to distil essential lessons from a voluminous literature. I am grateful to colleagues at the Centre for Academic Development for their support of this project from the outset; particular thanks are due to Megan Hall and to Lily Zeng for providing constructive comments on an initial draft and adding significant value. Thanks also to the Dean and Pro Vice-Chancellor of VBS for his support and to the supportive team within the VBS faculty office. Particular thanks to Ann Thompson and Nicole Green for overseeing the production and publication process.

Finally, thanks to the readers, of whom I hope there will be many. At its best, a university is a community of learners. This resource is for that community and a contribution to the very necessary process of its ongoing affirmation and renewal.

Dr Chris Eichbaum
Associate Dean (Learning and Teaching)
Victoria Business School

Ma whero ma pango ka oti ai te mahi.

With red and black the work will be complete.

This proverb refers to cooperation in which, if everyone does their part, the work will be complete. The colours refer to the traditional kowhaiwhai patterns on the inside of meeting houses.

Introduction

This booklet shows that there is not just one kind of learning and teaching or one approach to learning and teaching.

Individual learners learn in distinctive ways, and individual teachers teach in a variety of ways. Different approaches may produce learning outcomes of equally high quality. It is all about the learning.

As teachers, we bring our knowledge, experience, personalities and preferences to the design and delivery of teaching. Sometimes, our approaches may be quite intuitive: we are not sure why a technique works, but we know—through assessment, student or course evaluation or assurance of learning—that it does. Sometimes, we are given hints by the immediate responses of students, whether in a lecture or a tutorial.

Good teaching is something that can be planned. All that is required is a bit of theory, a few different perspectives and some creativity in bringing things together. That may well result in a personal teaching style.

Readers are encouraged to reflect on what we do and what we might do differently and, hopefully, to better effect. Good teachers have always been reflective teachers. The availability of new digital platforms for learning and teaching, and greater use of blended learning (and even flipped 'classrooms') provide further opportunity for reflection. With reflection may come experimentation and innovation. When learning is varied and exploratory, it is enjoyable and it is effective. More often than not, effective learning is intrinsically enjoyable.

Learning and teaching remains at the heart of what it is that we do, and what it is that our university is about.

The first section focuses on learners and reviews some different theories of learning. The second focuses on the particular context within which we operate—higher education—and explores what it is to be a learner, the context for university learning and the value that can be added by learning strategies. The third and final section introduces course design and delivery and discusses a range of approaches to learning and teaching. A glossary of terms (some of which appear in the text, and some of which are additional and designed to complement the material that precedes it) and a list of references are included.

Section 1: Learners

This section:

- describes theories of learning
- introduces some key contributors to theorising on learning
- introduces key concepts around learning theory.

SCHOOLS OF THOUGHT

Behaviourism: A psychological paradigm adopted by B.F. Skinner and Ivan Pavlov in the early twentieth century that sees learning as being achieved through the right conditioning (such as occurring through repeated positive reinforcement of desirable behaviour).

Constructivism: A form of developmental psychology that links cognitive development with knowledge gathered through experience. It is based upon Jean Piaget's theory of cognitive development, which describes the ways in which children grow in learning as they pass through different stages of understanding.

Critical pedagogy: Learning that occurs through critical examination of experience and implicit understanding.

Humanism: Developed in the Humanist Manifesto in the 1930s, humanism is an individual-centred approach that, when applied to education, sees learning as arising from internal motivation.

Observational learning: Founded by Albert Bandura in 1961; learning that occurs through observation of others.

Outcome-based education: A form of education adopted in the 1990s that designs courses around achieving specific learning outcomes rather than simply transferring content knowledge.

Progressive education: Arose from the Progressive Education Movement in the 1880s; a form of experiential learning that sees learning as occurring in the context of social experience.

Socratic method: A form of dialectical teaching that uses dialogue to identify central truths.

Zone of proximal development (ZPD): Learning occurs in the ZPD when learners are assisted to do something that they could not do on their own. In other words, the ZPD is the difference between what learners can already do on their own, and what they can do with the help of others. Assistance may occur in the form of scaffolding, which teachers gradually withdraw as students become more competent.

TYPES OF LEARNING

The social context

In the late nineteenth century, John Dewey was the founder of a type of education known now as progressive education.

John Dewey

http://dewey.pragmatism.org/

Lived: 1859–1952
Nationality: American
Schools of thought: progressive education; humanism

Received PhD from Johns Hopkins University in 1884

Became Chairman for the Department of Philosophy, Psychology and Pedagogy at the University of Chicago, 1894

President of the American Psychological Association, 1899

President of the American Philosophical Association, 1905

Dewey believed that learning occurs in a social context, which gives meaning and direction to instincts arising in the individual (Dewey, 1897).

Children adapt their behaviour to the environment, gathering social information from the responses that they receive from the expression of these instincts. They then carry this social adaptivity into future uncertain environments.

Albert Bandura also saw learning occurring from social observations (observational learning), and Jean Lave and Etienne Wenger, as well as Randy Garrison and Heather Kanuka, believed that knowledge and learning develop simultaneously in communities of practice (Lave and Wagner) and inquiry (Garrison and Kanuka).

Paulo Freire saw learning as not only arising from the social context but also contributing towards it. His critical pedagogy, developed in the mid-twentieth century, describes the interaction of learning with the learners' praxis, where learning aims to understand and break down preconceptions so that learners have control over their social world.

Critical pedagogy breaks through to central ideas in a cognitively deconstructive manner similar to the dialectical Socratic method. Freire uses this method to challenge society and teaches students self-reflection so that they can gather learning opportunities from their own experiences.

Psychological theories

In the early twentieth century, psychologists brought a behavioural approach to the understanding of human learning (Stewart, 2013).

Thinkers such as Ivan Pavlov and B.F. Skinner showed the ways in which animals learn habitual responses through the association of rewards with certain behaviour. This is known as positive reinforcement.

Behavioural theory is linked to an outcome-based approach when applied to the classroom. The classroom is structured in such a way as to reinforce learning behaviour, and the curriculum is focused on the achievement of set tasks.

Another psychological approach focuses on the internal motivation of learners. Carl Rogers, a humanist, sees students taking responsibility for their learning, with teachers in charge creating the kind of needs-fulfilling environment that facilitates self-growth and motivation (see Figure 1, Maslow's hierarchy of needs).

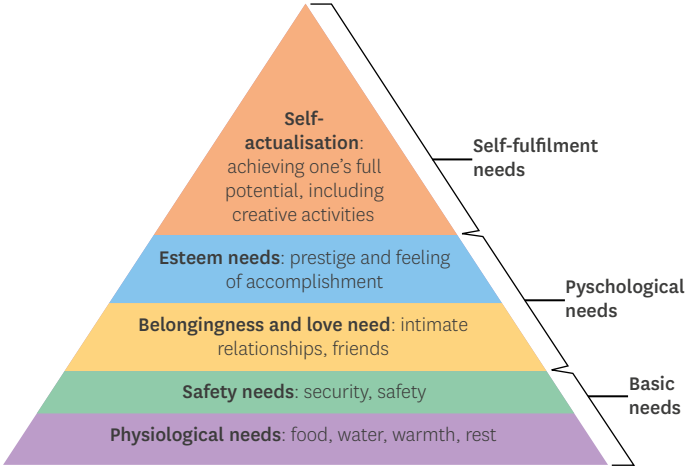

Figure 1: Maslow's hierarchy of needs

As this diagram shows, the learning environment is not considered to consist entirely of physical factors, though these are important. Attribution theorists focused on the upper levels of the pyramid, describing the ways in which the external environment could affect self-perception and motivation.

According to attribution theory, learning occurs best when students feel that the learning is valuable, and that their efforts will be valued and will contribute towards a positive outcome.

If learners feel that their success comes from their own efforts, their locus of control (Julian Rotter) will be locating internally and they will be intrinsically motivated. Motivation may also be associated with reward or punishment, as in the extrinsic motivation used by behaviourists; it may be focused towards the achievement of certain tasks in the achievement motivation fostered by an outcomes approach; or it may be focused on succeeding socially (for example, in an experiential learning classroom). This type of motivation is classed as social motivation.

Intrinsic motivation is the most enduring form of motivation. It creates the strongest positive attribution of success to learning ability and develops the drive to become a self-motivated lifelong learner.

Cognitive theories

Jean Piaget viewed learning as arising from knowledge gathered from experiences. These experiences, however, could be processed only according to the capabilities present in learners' cognitive stage of development.

His theories display a form of sequential constructivism known as cognitive constructivism. Constructivism is a theory of knowledge that views knowledge as being constructed internally by an individual rather than imposed from the outside. This knowledge is organised into schemata, the structures of understanding through which a person makes sense of the world.

Understanding occurs once the schemata has been internally formed. However, teachers may externally assist their students to build schemata by providing scaffolding support as the students move through the ZPD (Lev Vygotsky).

Benjamin Bloom was a pivotal thinker in applying cognitive theory to learning. He developed a taxonomy describing the cognitive stages involved in assimilating new concepts (Bloom's taxonomy). Bloom viewed each instance of learning as progressing through stages of access, understanding, processing, manipulating and evaluating before new knowledge is integrated and able to be used.

David Krathwohl later adapted Bloom's taxonomy to an educational setting. The stages remain essentially the same, except that Krathwohl identified different kinds of knowledge (the first stage of learning) and introduced the concept of metacognition, which is consciousness about the thinking process itself.

DOMAINS OF LEARNING

The domains of learning are:

- cognitive domain: conceptual learning
- affective domain: emotional processing
- psychomotor domain: tacit knowledge
- interpersonal domain: social understanding.

Building on Bloom's analysis of the cognitive domain, psychologists have, over time, divided thinking into three further domains: affective, psychomotor and, more recently, interpersonal.

In the cognitive domain, information is remembered as facts and ideas, understood in the context of theories and problems, turned into useful information and applied to the outside world. Information is received in abstract form, coded through association with existing knowledge, analysed using metacognitive processes and consciously assimilated into thought structures.

However, information can equally arrive in the form of emotions (the affective domain), or may be immediately inputted into physical (psychomotive) or social (interpersonal) knowledge. These later domains have not yet been deconstructed in the same way that the cognitive domain has been, though David Kolb goes a way towards recognising the place of different kinds of learning in his experiential learning cycle (see Figure 2).

For Kolb, learning begins at the concrete experiential, or 'feeling' stage. This is where information is received from direct experience and coded for later processing. If learning occurs in a social environment, it is likely that the information will be coded in the interpersonal domain.

In the reflective observation, or 'watching' stage, learners step back from the experience and begin to extract meaning from it. The affective domain is particularly helpful for accessing embedded information and bringing it towards the conscious intellectual manipulation that occurs in the abstract conceptualisation, or 'thinking' stage.

At this stage, the instinctual information that has been gathered from reflection on experience can be entered into the cognitive domain as accessible information, which can then be intentionally applied to an environment in the active experimentation, or 'doing' stage. The new concepts are channelled through the implicit thought structures and skills of the psychomotive domain, and so have come full cycle in contributing to the environment from which they have arisen.

The following is a model depicting the way that 'good practice' operates, with knowledge springing from, and returning to, a social pool of practical wisdom.

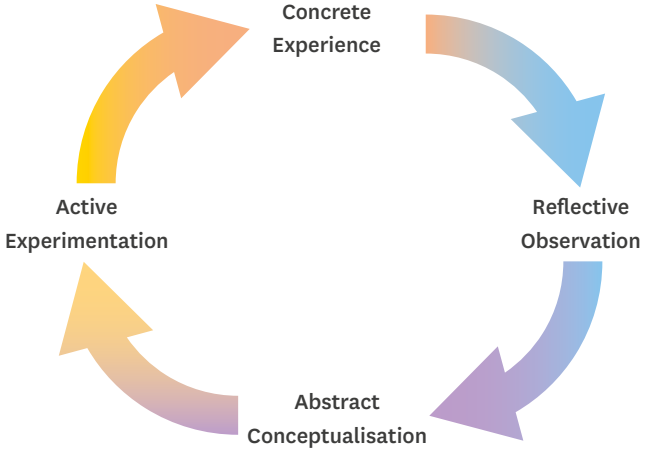

Figure 2: Kolb's experiential learning cycle

THRESHOLD CONCEPTS

Sometimes, scaffolding can help students move from inert knowledge to ritual knowledge. However, if students become stuck in intellectual mimicry, and do not learn to create their own intellectual scaffolds, they may remain in the state of liminality, where information is held but not understood.

Until information is understood, it cannot be applied to new situations. However, information must be understood as a conception and not just a concept: ideas cannot be applied individually, but must be connected to the threshold concepts that tie the ideas to a wider school of thought.

In the realm of education, threshold concepts can be expressed as learning competencies (see Meyer & Land, 2003), but they are different from other competencies in that they describe central tenets without which a subject cannot be understood. Furthermore, while threshold concepts may be easily identified when they emerge from the cognitive realm, threshold concepts in other domains of knowledge may be harder to pin down.

As such, threshold concepts are considered to be 'portals' to understanding rather than specific points at which understanding is expected to occur. Threshold concepts are passed through, and bring learners into, new understandings of the whole body of information they have collected so far.

Although it is difficult to identify threshold concepts, sometimes the nature of particular information lends itself to threshold thinking. Thus information that is transformative provides irreversible understanding, is integrative, acts as a boundary or is generally 'troublesome', and may be identified as 'threshold' information.

CONCLUSION

Learning occurs in different ways, through different stages; there are different kinds of learning; and learning occurs for different purposes.

Section 2: University students

This section:

- **describes the university student**
- **describes the university learning environment**
- **introduces learning strategies.**

UNIVERSITY STUDENTS ARE TREATED AS ADULTS

While pedagogy deals with the theory of teaching in general, andragogy, a term developed in the late twentieth century by Malcolm Knowles, refers to ways in which adult learning may differ from that of children.

Andragogy describes a learning approach that could be applied to children as well as adults. However, Knowles recognises that the life experience and previous learning of adults affects the way that adults approach education. For children, learning is an adventure in itself, with knowledge imposed from the outside and absorbed without consideration of purpose. Adults, however, construct knowledge intentionally with an aim to solving real-life problems.

Adults approach learning from a store of knowledge and life experiences. They appreciate learning as a tool that helps them to get where they want to go. They have learnt how learning works, and know how to get more learning. They have also experienced the way that knowledge is applied in the workplace.

Andragogy describes the skill of lifelong learning: an ability to continue learning that is one of the core competencies of the education system.

Secondary school students will have begun to develop the kind of independent learning described by andragogy. However, although they might be encouraged to take initiative in their education, their learning process is still largely directed by others.

Tertiary learning terms

Andragogy: the style of independent learning developed by a mature learner.

Disciplines: a cluster of subjects in tertiary study that develops its own style of thinking and vocational and academic aims.

Graduate skills: the set of skills that tertiary students are expected to have developed before they graduate.

Lifelong learning: the ability to gather knowledge throughout a lifetime.

Spiral curriculum: a curriculum that is based upon the ever-more complicated understanding of key disciplinary concepts.

First-year university students who have come from secondary school may benefit from the presence of mature and part-time students in their class. However, life experience does not necessarily guarantee learning maturity. This is because the basic skill of independent learning will be developed differently depending upon the setting. An academic in a conceptually focused subject may develop an entirely different method of learning from a professional who applies their secondary school learning directly to the workplace. This difference can be seen within subjects as well as in the divide between vocationally focused subjects and those that develop strict methods of disciplinary thinking.

However, once people have developed the ability to guide their own learning, they may adapt their methods to suit the situation. Thus, while pre-tertiary education develops a hunger for learning in students, it is only once students have control of their own learning outside secondary school that they begin to develop autonomy and independence in learning. Although these skills will be implicitly useful in a workplace, they are essential for the development of academic thinking and are a core competency for any tertiary programme.

Secondary school students should have developed the skill of independent thinking, in the sense that they have approached different topics from different perspectives. However, they have not necessarily developed skills in independent learning—the ability to guide their own learning. They are used to information being interpreted for them by their teachers, and they must now produce large pieces of work from their own understanding and seek assistance from teachers when they need it (Connelly & Forsyth, 2010). Students must pace their own learning and transform their own learning material.

Students must develop confidence in their ability to think and will eventually learn to see academics as intellectual equals rather than as elevated sources of wisdom.

LEARNING STRATEGIES AND THRESHOLDS

When we explore learning strategies and thresholds we may encounter the following terms.

Cognitive approach: adaptable approach to learning that determines whether information is processed in a holistic or atomistic manner.

Cognitive personality style: fixed approach to using and processing information.

Intelligences: a combination of skills and modes of learning that influence a person's learning style.

Learning strategy: the way in which a learner approaches a learning task (can be adapted).

Learning style: the medium through which a learner learns.

One of the most important things students need to learn is how to take a deep approach to study. A deep learner knows how to scan for relevant information and how to code that information for retrieval by fitting it within current frameworks of understanding. A shallow or surface learner, on the other hand, will code information for short-term retrieval but will store the information in a scattered and fleeting manner.

Deep learners, then, remember themes, creating an intellectual landscape with markers that open up different areas of knowledge. A shallow learner's intellectual landscape is populated by lists and isolated facts. A shallow learner can recall information, but will have trouble applying concepts to situations. A deep learner, on the other hand, will transform learning material in such a way as to create pathways of association that activate complicated concepts on recall.

Jerome Bruner

http://insidetheacademy.asu.edu/jerome-jerry-bruner

Born: 1915
Nationality: American
Schools of thought: cognitive psychology, educational psychology and social constructivism

Received PhD in psychology from Harvard University, 1941

Helped to found the Center of Cognitive Studies at Harvard in the late 1950s

Served on the Educational Panel of the President's Science Advisory Committee in the 1960s

Introduced the spiral curriculum in the 1960 book *The Process of Education* and helped to develop the concept of scaffolding in a 1976 *Journal of Child Psychiatry and Psychology* article

President of the American Psychological Association, 1965

It is essential for first-year university students to develop deep learning skills, not least because the spiral curriculum structure of academic learning requires students to pass through threshold concepts in order to achieve ever-higher levels of understanding.

The school curriculum is based upon the idea that society has certain cultural needs that can be divided into disciplines—areas of thought with particular conventions, strategies and ways of thinking and speaking. The school curriculum aims to acclimatise learners to these disciplines by channelling learning into specific subjects in secondary school that mirror and prepare for academic specialties. These disciplines have key concepts—stages of understanding through which learners must pass before they can become experts in the field.

Primary and secondary school teachers assist students across learning thresholds by presenting material repeatedly in varied formats and by providing students with constant feedback and personalised attention. The generalised nature of pre-tertiary education allows for the development of capability over specific conceptual outcomes, so that thresholds provide opportunities for learning rather than obstacles. University disciplines, however, aim to shape thinking along strict lines within a short time period. University students must quickly master key concepts in order to continue to move forward. This can be achieved only through deep learning and the linkages that it forms. Knowledge must be built, or constructed (see constructivism, page 6), it cannot simply be gathered.

The difficulty for university lecturers is that, although they can try to guide students across thresholds of understanding, and they may want to encourage independent and sophisticated thinking and learning, these are skills that students must learn themselves. Deep thinking and threshold advancement, then, are not adequately captured by learning outcomes, but rather flow from self-reflective development of metacognitive learning skills. It is important for teachers to talk to students to find out what the students think their obstacles to learning are.

There are, however, certain teaching environments that will encourage shallow thinking and make it difficult for sophisticated thinking to develop (Marton & Säljö, 1976). While front-of-class lecturing, for example, (the so-called chalk-and-talk method) does not necessarily encourage shallow learning, it is a passive form of teaching that fails to provide metacognitive frameworks for students who may not have yet developed deep thinking (Burnett et al., 2003).

Even tutorials can encourage deep or shallow learning, depending on how well tutors engage students or whether they simply teach from the front of the class in a similar way to a lecturer.

Summative, norm-based assessments are also likely to encourage shallow learning in students, as they encourage competition between students and memorisation rather than understanding. Formative, criterion-based assessments, however, will encourage students to reflect on their progress and will reward the development of skills rather than the ability to recall information.

The main point to consider is that some students will already have strategies of deep learning that can carry them through difficult conceptual landmarks but others may need some guidance in developing learning strategies appropriate to academic thinking.

Case study: Deep and shallow or surface learning

Learning approaches

Shallow learning	Deep learning
Facts	Meaning
Relationship between sections	Relationship between ideas
Memorising	Understanding
Extrinsic motivation	Intrinsic motivation
Focus on text	Focus on context

A referential approach

A 1974 study by Ference Marton identifies deep versus shallow referential approaches to studying text. A deep learning focus views the text as an end in itself, with learning as the aim, and a shallow approach gathers knowledge for an external purpose and views the text as the means to an end.

Teaching the deep approach

A 1975 study by Roger Säljö attempts to encourage the deep learning approach by providing questions for reflection while studying. Shallow learners 'technified' their approach to meet perceived learning demands as reflected in the questions.

Intrinsic motivation

In 1977, Fransson identified that learners naturally adopt a deep learning approach when they are relaxed and interested in the subject.

Attitudes towards learning

In 1984, Rossum & Schenk identified different attitudes towards learning between deep and surface learners. Deep learners relate learning to real-world phenomenon, seeking meaning in texts to help them to understand the world. Shallow learners memorise words and meaning and aim to increase knowledge.

Attitudes in the classroom

John Biggs and Catherine Tang (2011) apply deep and shallow learning theory to an outcomes-focused classroom. Fragmented, hurried and disinterested teaching correlates with disengagement and stress amongst students. This intellectually chaotic environment encourages a shallow learning approach. Deep learning is likely to occur in a positive, directed environment where teachers build up the knowledge base of students and nurture their desire to learn.

LEARNING STYLES

Learners develop different skills and strategies across a lifetime of learning. However, they will remain more constant in the way they approach an environment, process information and express and use knowledge.

Different cognitive styles describe the way that information is processed and learning styles describe the ways in which people interact with ideas and experiences.

A cognitive style (Riding and Cheema) determines whether a person focuses on parts (an analyst) or the whole (holist) or whether they engage the world using words (a verbalist) or images (a visualist) (Stewart, 2013).

The analytical/atomistic cognitive approach is also applied by the theorist (Peter Honey and Alan Mumford) and assimilator (Kolb) learning styles (Fry et al., 2009). An analyst focuses on abstract concepts and processes them by the concepts into individual components and organises the parts. The analyst dwells within the abstract-reflective quadrant of the Kolb-Biglan classification of academic knowledge axis (Tamblin & Ward, 2006).

Riding and Cheema's holist type displays a holistic cognitive approach that is similar to Honey and Mumford's reflector and Kolb's diverger. These learners can be found in the concrete reflective quadrant of the Kolb-Biglan axis. They like to gather information from the world around them, apply different perspectives to problems and come up with a range of solutions.

Different types of learning situations also lend themselves towards different processing mediums. The verbalists, for example, may use their oral and written communication skills to solve problems in an interpersonal environment as an accommodator (Kolb). They may be stimulated by the social environment as an activist (Honey and Mumford), gaining and applying social knowledge as it arrives through verbal channels. This kind of immersive learning occurs in the concrete-active section of the Kolb-Biglan model.

A visualist's aptitude with images and objects may be used by a pragmatist (Honey and Mumford) to find practical solutions to problems. The ability to visualise may also allow visualists to conceptualise technical solutions to problems and apply solutions as a converger (Kolb). Pragmatists and convergers dwell in the abstract active quadrant of the Kolb-Biglan model, displaying both intellectual flexibility and practical innovation.

The quadrant of learning personalities is located within Kolb's experiential learning cycle. In the reflective observation/abstract conceptualisation quadrant, the assimilator/theorist observes and analyses, thinking about what they see. The diverger/reflector involves themselves in experiences (concrete experience), observing their performance (reflective observation). The accommodator/activist learns as they go (active experimentation/concrete experience) and the pragmatist/convergent tests ideas (abstract conceptualisation) by applying them to real-world situations (active experimentation).

As well as learning personalities there are learning styles (Robert Dilts) which reflect the medium through which learners prefer to learn, and different intelligences (Howard Gardner) which describe the types of environments within which learners of different types flourish.

Some mediums of learning are visual, auditory, kinaesthetic and tactile; and the intelligences are logical, spatial, kinaesthetic, intrapersonal, musical, naturalist, verbal and interpersonal.

Learners do not tend to fall into one cognitive or learning style, but display a combination of learning capabilities/preferences to different degrees.

APPROACH: ATOMISTIC

Type: Conceptual/Theoretical

Analyst
processes information in its component parts

Theorist
focuses on information in its component parts

Assimilator
works with concepts

APPROACH: HOLISTIC

Type: Relational/Theoretical

Holist
identifies relationships between concepts

Reflector
systematically gathers and analyses information

Divergent
generates ideas

MODE: VISUAL

Type: Conceptual/Applied

Visualist
remembers and communicates through images

Activist
stimulated by challenges

Converger
uses ideas to solve problems

MODE: VERBAL

Type: Relational/Applied

Verbalist
remembers and communicates through words

Pragmatist
applies theory within a context

Accommodator
learns through experience

Figure 3: Cognitive styles

DISCIPLINES

Disciplines are flexible and people display and use multiple learning styles and approaches. Disciplines also seek to develop particular kinds of thinking in students. Kolb and others found that different disciplines fall in different quadrants of the Kolb-Biglan axis (see Becher, 1989).

Thus, the pure sciences rest in the cognitive domain and develop conceptual problem-solving skills; the scientific professions develop tacit learning that applies skill sets to practical problems; the social professions develop theories through practice as they act within society; and the humanities develop social theory through self-reflection and observation of the world around them.

Along with these outcomes, particular subjects within faculties will have their own course outcomes, which fall under the general skill set of the faculty but are tailored to particular courses. Universities will also have generic graduate outcomes (or attributes) that they expect students to develop (eg. creativity, independent problem solving, professional skills, independent thinking, communication skills, teamwork and lifelong learning). Go to **www.victoria.ac.nz/graduate-profile** for Victoria's graduate profile.

IMPLICATIONS

Though lecturers are limited by the nature of the tertiary environment, with its sometimes strict guidance of thought and values, the variety of learners who teachers will find in their class necessitates some variation in the way that material is presented and learning is facilitated.

Although lecturers may develop certain ways of thinking by focusing on a particular quadrant of the learning cycle, they cannot change the inherent cognitive personality and style of learners. However, lecturers can influence the learning strategies that students employ by creating an environment that encourages participation and depth of thought, and by accompanying students on their learning journey.

Final assessments may be set by the faculty but activities and assessments throughout the year may be designed to provide scaffolding for students and to explore different ways of approaching and processing material. Lecturers should not be afraid of inspiring students by presenting traditional material in new ways.

Cognitive domain	Cognitive (conceptual structural)	Psychomotor (tacit—conceptual implicit)	Interpersonal (social implicit)	Affective (social structural)
Learning cycle	Theory/conceptualisation	Application/experimentation	Evaluation/experience	Reflection/observation
Type of thinking	Abstract-reflective/hard, pure	Abstract active/hard applied	Concrete active/soft applied	Concrete reflective/soft pure
Capability	Interpret and apply knowledge through conceptual structures	Apply knowledge and integrate into a personal skills set	Acquire and integrate knowledge using social perspectives	Acquire and interpret knowledge through meaningful paradigms
Cognitive style	Assimilator	Converger	Accommodator	Diverger
Learning personality	Pragmatist	Activist	Theorist	Reflector
Thinking style	Analyst	Visualist	Verbalist	Holist
Learning environment	Structured; journalling	Practical problem solving	Field work	Lectures and readings; case studies
Subjects	Theoretical science: economics; maths; theoretical physics; chemistry	Scientific professions: economics/business; physics; history; engineering; law; medicine	Social professions: commerce; education; political science; geography; public policy	Social theory (humanities): English, history, philosophy, sociology
Type of intelligence	Mathematical/logical	Spatial, kinaesthetic, naturalist	Interpersonal, verbalist/linguistic	Intrapersonal, musical
Activities	Abstract symbols/formulae/outlines/sequences/problem solving/deciphering	Role playing, drama, sports; relating to natural world	Group work, social perception, feedback; listening, speaking, humour, reading, writing	Emotional processing, strategies, reflection, concentration; music
Coursework	Lecture, papers, creating models, projects	Simulations, case studies, labs, field work, projects, observations	Primary readings, simulations, field work, readings, problems, examples	Journalling, discussion, brainstorming, rhetorical questions
Assignments	Journal articles, lab report—informative writing	Scientific paper, lab report, case report—informative writing	Essays (persuasive writing), proposals	Essays (persuasive writing), creative writing, reflective diaries
Faculty outcomes	Career development, cognitive goals	Career development, cognitive goals	General education, character, critical thinking, academic	General education, character, critical thinking, academic
Graduate outcomes	Critical thinking	Problem solving; teamwork	Professional skills; communication	Creativity; lifelong learning

Figure 4: Learning styles and the classroom

Section 3: Building a learning environment

This section:

- **introduces course design and delivery**
- **describes some approaches to teaching.**

TEACHING METHODS

When we examine the range of teaching methods that are in use or might be considered, we may encounter unfamiliar terminology. Some of these new terms are listed below.

Blended learning: the use of technology inside and outside the classroom to allow for a varied learning experience.

Chalk-and-talk: a teacher-focused style of teaching that has the teacher dispensing information from the front of the class with the assistance of notes written or displayed on a screen.

Narrative teaching: a case-based method of teaching that creates a dialogue around problem solving.

Outcomes approach: a student-focused method of teaching that structures teaching and assessments around specific learning outcomes.

Problem-based learning: learning that occurs in response to practical scenarios, in which concepts are applied to problems and situational solutions developed.

Reflective teaching: a cooperative form of teaching in which students reflect on their own learning and teachers adapt their teaching style in response to the learning needs of the students.

COURSE DESIGN AND DELIVERY

Designing a course

The way students learn is influenced by the learning environment. The learning environment consists of whether:

- the style of teaching is active or passive, and teacher- or student-focused
- students are independent, competitive or cooperative (the learning focus)
- the classroom structure is highly structured or students take charge of their own learning
- the type of assessment is focused on course work (formative assessment) or end-of-year examination (summative assessment)
- the type of motivation is extrinsic, social, achievement-focused or intrinsic.

A well-designed course will achieve constructive alignment (Biggs & Tang, 2011), or congruence, between the type of learning teachers want to produce (learning outcomes) and the approach to teaching they take (teaching approach).

Activities and formative assessment may embrace a variety of methods to help students achieve learning outcomes.

One way of achieving variation in course work is through the use of blended learning. A blended course can cater for social/verbal and psychomotive/visual learners by delivering course content in a traditional synchronic face-to-face learning environment. At the same time, an asynchronic digital forum may provide conceptual and reflective thinkers with a deep medium for communication that allows them to develop their thoughts (Arbaugh et al., 2009). The former environment may include didactic lecturing, group work and modelling by teachers and subject experts. The latter environment may be in the form of an online discussion board, blogging or a live course site.

Another method is to give students different levels of ownership over their learning environment. An online environment can be one that lends itself to peer management. In a face-to-face setting, students may be encouraged to develop a cooperative framework for the running of the class, thus developing interpersonal skills and preparing them for a professional environment.

Teamwork can also be developed through group projects and peer assessments. However, this does not necessarily have to be cooperative. It may be useful to introduce an element of competition in preparation for certain kinds of professions. Competitive teaching may be characterised by rigorous questioning during lectures and the setting of intellectual challenges. This type of teaching will particularly inspire activists, who like to be 'kept on their toes'.

Finally, it is useful to allow time for directed independent work such as traditional readings, self-reflection and assessment tasks. This type of learning will be particularly important for analysts and reflective learners, who need to devote time to developing their own independent thinking style.

Constructive alignment

Constructivism is self-construction of knowledge through schemata.

Alignment is aligning assessment tasks to learning outcomes.

Intended learning outcome (ILO) describes what will be learnt, and to what standard.

Teaching/learning activity (TLA) describes how learning will occur.

Assessment tasks (AT) are the tasks that will be used to test and guide learning. Constructively aligned assessment tasks will be open-ended and criterion-referenced (testing knowledge) rather than norm-referenced (comparing abilities) or competency-based (testing ability).

Constructive alignment is a form of outcomes-based teaching; it aligns assessment criteria with intended outcomes. However, constructive alignment aligns the whole learning process through its intentional design of learning activities.

Outcomes-based teaching

Outcomes-based teaching aims to achieve a set of goals that are part of a wider learning strategy.

Outcomes-based approaches will be of interest to constructivist teachers, who follow the progression of learning through stages of mastery. This progress is monitored by teachers and students through the use of feedback and self-evaluation.

Outcomes-based teaching is appropriate for disciplines that aim to teach key concepts and skills that build up a store of professional knowledge with real-world applications.

The scientific professions, in particular, are interested in students achieving core competencies that will allow students to work within certain scientific fields. This is because students must develop a particular set of skills and understanding in order to be proficient at operating in the professional world.

Practical competencies are developed through fieldwork and laboratory projects, which are then presented in a scientific format and related to key concepts in case reports, lab reports and journal articles. Competency evaluation lends itself to criterion- rather than norm-based assessment, and so students will be tested with criterion-based assessment rather than norm-based assessment.

The scientific outcomes approach may be teacher-focused, where teachers are viewed as the experienced professionals with access to essential knowledge and skills. However, the practical element of the scientific professions means it is important for students to develop their own skills. Teaching may be student-focused, where it develops students' ability to evaluate their learning process.

Reflective teaching

Reflective teaching encourages metacognitive self-awareness in both teachers and students.

Self-assessment, peer assessment and teacher feedback assist students in a reflective learning environment to troubleshoot their own learning experience. Student assessment of teachers encourages a collaborative environment, and helps teachers in their self-reflective practice of teaching as inquiry.

Reflection on practice may be particularly valuable when applied to the social professions (Fry et al., 2009), providing a framework for the development of professional skills in real-life situations. In this setting, work placement allows students to gather practical information they can then reflect upon in order to improve their understanding (see page 9, Kolb's cycle of experiential learning).

Courses must be structured to allow space for this experiential learning and students must be given tools to assist them in processing the information (Stewart, 2013). Feedback and reflective assignments such as journalling will be particularly helpful, and the ideas that are developed through reflection may be explored further in persuasive essays.

Reflective teaching can be teacher-focused when teachers are observing their own teaching practice and when they are modelling skills and learning for students. It can also be student-focused when students are encouraged to find their own ways of understanding their experiences.

The professions: real-world learning

As a social theorist, Lee Shulman locates learning within a social context that reflects the different backgrounds of teachers and students. Behind teachers is their discipline community, and students bring their own skills, culture and experiences to the learning environment. Intersecting between teachers and learners are the wider social community and the professional community (Shulman, 2004).

The narrative teaching approach projects students into the practising community by teaching them to apply problem-solving frameworks to case studies. It is through this narrative that teachers guide students into a professional mode of thinking that will allow them to apply judgement to real-life scenarios.

Narrative is formed by the academic and professional community in conjunction with learners' own internalisation of knowledge and experience. The disciplinary narrative is built upon the case studies that the academic community gathers from the professional community, and the theory that is developed by the academic world is then fed back into professional practice. The students themselves carry these ideas to the professional world when they finish their studies, begin their careers and develop their own case studies as they apply learning to the workplace.

This narrative is built around problem-based learning, with its focus on troubleshooting and the development of practical skills. Problem-based learning provides a professional framework for thinking about problems, teaches students to develop their own thinking and provides examples of real-world implications of ideas (Biggs & Tang, 2011).

Work placement and team projects are particularly helpful for vocational students. In the social professions, work placement is likely to be highly reflective, with theory constantly developing in the field and students exploring their own interactions with the environment. In the scientific professions, work placement and teamwork is likely to be focused on practical problem-solving skills rather than self-development and analysis of environments.

Glossary

This glossary is not an exhaustive or complete list of relevant terms. It includes some that are referred to in the sections of this booklet and some that are not.

SECTION 1

attribution theory: A theory linking achievement to motivation.

- **achievement motivation**: Motivation that is focused upon external markers of success.
- **extrinsic motivation**: Motivation that is externally motivated (eg. through reward or punishment).
- **intrinsic motivation**: Motivation that comes from within.
- **social motivation**: Motivation that arises from the desire to succeed socially.

coding: The way in which new information is organised so that it can be retrieved in the future.

cognitive constructivism: The construction of knowledge from past experience.

community of practice: A community of people engaged in learning.

community of inquiry: The community within which common knowledge is formed.

competency: The capability to apply or use a set of related knowledge, skills and abilities required to successfully perform tasks.

developmental psychology: Psychology that explores the stages of social, physical and intellectual development that occur in a person's growth.

dialectic learning: A form of learning that uses dialogue to discover key points or reach agreement.

experiential learning: Learning that occurs through reflection on experiences.

metacognition: An individual's consciousness of their own thinking and learning processes.

observational learning: Learning that occurs through watching the behaviour of others.

positive reinforcement: The act of encouraging positive behaviour by rewarding instances of its occurrence.

praxis: A person's life experience and perspective.

scaffolding: The act of temporarily assisting students in order to help them complete more complex tasks or reach higher levels of skill and comprehension.

schemata: Constructs of knowledge that integrate information into a world view.

threshold concept: An essential concept that holds together a body of knowledge.

- **inert knowledge**: Unorganised knowledge that has not yet been integrated into a schemata.
- **liminality**: The sense of uncertainty as new information is being processed and understood.
- **mimicry**: Imitation of knowledge and behaviour without understanding.
- **ritual knowledge**: Instinctual knowledge of procedures that is not connected to schemata.

SECTION 2

assessment: The variety of methods that teachers use to evaluate, measure and document the academic readiness, learning progress and skill acquisition of learners.

- **criterion-based assessment**: A form of assessment that compares each student's performance with a pre-defined set of criteria or standards (a rubric, for example).
- **formative assessment**: An assessment that gathers information about progress. Formative assessment is typically of an ongoing kind with feedback provided to improve student learning.
- **norm-based assessment**: A form of assessment that compares each student's performance with that of the other students (eg. whether a student performed better or worse than a hypothetical 'average' student).
- **summative assessment**: an assessment that determines whether knowledge has been achieved (normally at the end of a unit of learning, a course or an academic programme).

cognitive approach: The cognitive strategy used for approaching a learning task.

- **atomistic cognitive approach**: An atomistic learner analyses elements and patterns within the text but does not view the text as a whole.
- **holistic cognitive approach**: A holistic learner uses the main points of a text to search for the author's intention, and grounds them in the wider context.

experiential learning model: Developed from Kolb's experiential learning cycle, the model places the stages of learning along a concrete/abstract input axis and an active/reflective processing axis.

- **abstract active**: Learning that involves the application of concepts.
- **abstract reflective**: Learning that involves the intellectual manipulation of concepts.
- **concrete active**: Learning that occurs through active participation.
- **concrete reflective**: Learning that occurs through observation of experiences.

intelligences: The combination of input and processing styles that determines how knowledge is gathered and used by an individual.

- **interpersonal intelligence**: Skill in interacting with others.
- **intrapersonal intelligence**: The ability to understand oneself.
- **kinaesthetic intelligence**: The ability to use the body.
- **logical/mathematical intelligence**: The ability to organise ideas and concepts.
- **musical intelligence**: Skill with music.
- **naturalist intelligence**: The ability to recognise and categorise natural objects.
- **spatial intelligence**: The ability to visualise objects in three dimensions.
- **verbal/linguistic intelligence**: Skill with language.

learning strategy: The way in which a learner approaches a learning task.

- **operational learning strategy**: The way in which a strategy is applied to a learning task.
- **referential learning strategy**: The motivation and intention behind a learning strategy.

learning style: The medium through which a learner processes information.

- **auditory learning**: A preference for learning through the spoken and written word.

kinaesthetic learning: Learning that is stimulated through physical activity.

tactile learning: Learning that is stimulated through touch.

visual learning: A preference for learning through the mediums of images and pictures.

tacit knowledge: Knowledge that has been integrated so that is instinctual. It expresses itself in habitual skills and implicit understandings.

technification: The act of adjusting learning strategies to meet external standards.

SECTION 3

blended learning: The use of technology as part of the learning process.

asynchronic: Distance learning (eg. using technology).

synchronic: Face-to-face learning (ie. in the classroom).

constructive alignment: The construction of a learning experience through activities and assessments that work towards the achievement of learning outcomes.

learning outcomes: A set of skills, capabilities or concepts that students are expected to master.

teaching approach: The way in which a learning experience is structured so as to achieve teaching objectives.

teaching as inquiry: The process of adapting teaching methods to the learning needs of students.

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