

Evaluation of four different learning theories and models



In this section of the essay I will describe and critically evaluate four broad theories of learning in the context of my subject areas. I have a numerate background with undergraduate degree in Physics and an MSc in Software Engineering. I have a PhD in Ecological modelling and my research is focussed on the simulation and visualisation of complex systems. The subject areas I teach are numerate based, and range from mathematics, statistics, computer programming and visualisation and my teaching activities are across three schools: SCS, CES and IAGM.

Learning theories/models

The first learning theory to be researched in the 19XX', based on the work of Pavlov and Skinner, is known as the behaviourist theory. In behaviourist theory learning is a mechanical process of habit formation, by means of frequent reinforcement of a stimuli - response sequence, this can be thought of as conditioning. Behaviourist learning has been traditionally used in the teaching of languages. Pavlov's behaviourist theory (Ref) underpinned the Audiolingual Method of the 50's and 60's. Some features of the audiolingual method that align well with the behaviourist theory include: the sequence of learning a new language is rigid and involves, hear, speak, read and write, frequent repetition essential for effective learning and all errors immediately corrected. Other disciplines such as Chemistry and Physics have used behaviourist methodologies for practical laboratories. Behaviourist learning is still used in universities today as part of the whole teaching and learning process. In fact it can be argued that we do indeed reward our students by allocating good grades as a consequence of their demonstration of their learning. In this way good learners get rewarded with good grades.

Behaviourist theory was criticised in the 1960's when Chomsky questioned how the mind was able to transfer what it had learned in one stimulus-response sequence to other novel situations. Chomsky (1964) proposed that if thinking was rule governed a small, set of finite rules enabled the mind to deal with potentially an infinite range of experiences it may encounter. The obvious implication of this was to consider learning as the acquiring of rules and not habits as with the behaviourist model. This is stated more recently in Stevick (1992) when he considers that learning is much more than imitative habit formation. This was the rise of cognitive theory and one of the key features is the process of acquiring new rules i. e. expanding the cognitive network, drawing on the individual's experiences. This way the individual is an active processor of information (Ausubel et al XXXX) rather than passive receiver of information. Cognitive learning is exemplified in basic teaching activities such as problem solving which is used, albeit to varying degrees, in most disciplines.

The next development in learning theories was constructivist approach, led by Jean Piaget and Bruner. Unlike the cognitive approach which encourages learners to use mental powers, to distill a workable rule from information provided but was teacher centric, the Constructivist approach is very much learner centric and led to the learner-centred educational paradigm. This is highlighted in the Learning Theories text (REF) which states ' With the constructivist approach learner enquiry, discovery, autonomy and self motivation are key elements of the learning process'. This emphasises the difference with cognitive approaches where the teacher shapes the content

therefore little room is left for learners own self discoveries, adjustments and enhancements.

Experiential learning a recent learning models and depending on the teaching activity can be categorised as a cognitivist or a constructivist approach. Kolb (1984) matched types of cognitive processes with specific types of instructional design strategies that encompass four learning styles: Reflector, Activist, Pragmatist and Theorist. In this respect, Kolb's model differs from others since it offers both a way to understand individual learning styles, which he named the " Learning Styles Inventory" (LSI), and also an explanation of a cycle of " experiential learning" that applies to all learners. Kolb states " learning is the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping experience and transforming it." This is illustrated in the diagram below. Depending upon the situation or environment, the learners may enter the learning cycle at any point and will best learn the new task if they practice all four modes.

Science uses mainly constructivist approach but different models will be used at different.

Different domains use different approaches to varying degrees, in order to be a good scientist a degree of curiosity is required which explores ideas and possible solutions, applying the process of science to open minded enquiry and combining new experiences with information already acquired as a personally constructed meaning is formed . Extyensions of Kolb's work

include that of Honey and Mumford (1986). The main difference being
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I will now discuss the application of each of the models in my subject areas and describe personal encounters with these models. Within my subject areas behaviourist theory is still applied for example rote memorization, drill and practice. Also the use of a token system to reinforce positive academic performance and student behaviour. A classroom application of using drill and practice includes using computer software, such as Math Blaster's. These types of software provide positive and negative reinforcements for answering math problems correctly or incorrectly. A final example highlighting the behaviourist theory is rote memorization. Rote memorization may include memorizing addition or multiplication facts or memorizing state capitals (Woolfolk XXXX).. The behaviourist approach to teaching has practical applications in education. In particular, understanding basic skills and core subject knowledge. The approach of using positive and negative reinforcements to elicit desired behaviours of students is also useful in establishing and maintaining classroom management. Cognitive theories however move beyond the habit formation process of behaviourism and when teaching mathematics or programming the learner should be provided with the opportunity to spot patterns and infer relationships between concepts in order to construct their own understanding. With cognitive approaches they are usually teacher directed I use this approach in practical classes for both statistics and 3D graphics programming where the first half of the lab is directed to help learners apply the concepts of the lecture and to ensure coverage of specific material. Typical classroom instruction,

consistent with the constructivist learning theory that are used in my subject area include: problem-based approach to teaching, hands-on activities, experimentation, and simulations. Hands-on activities are also used in the constructivist model. This example is taken from Bruner (1973): " The concept of prime numbers appears to be more readily grasped when the child, through construction, discovers that certain handfuls of beans cannot be laid out in completed rows and columns. Such quantities have either to be laid out in a single file or in an incomplete row-column design in which there is always one extra or one too few to fill the pattern. These patterns, the child learns, happen to be called prime. It is easy for the child to go from this step to the recognition that a multiple table , so called, is a record sheet of quantities in completed mutiple rows and columns. Here is factoring, multiplication and primes in a construction that can be visualized." Overall, the constructivist approach to teaching allows students to actively be involved in decision-making and problem-solving scenarios. In 3D graphics students are often given simulations and demo programs of a particular technique i. e. the Phong lighting model that they can manipulate and change to see the effect. The student's task would then be to implement their own version of a Phong lighting model. . Prior knowledge and past experiences help shape student connections to new material. Students use higher level processing skills and apply that knowledge to the world in which they live.

The use of Kolb's model has been applied in at least two of my reaching activities, teaching computer programming for visualization and the mathematics of 3D graphics.

Kolb's model applied to learning a software program:

Active experimentation - Jumping in and doing it.

Reflective observation - Thinking about what you just performed.

Abstract conceptualization - Reading the manual to get a clearer grasp on what was performed.

Concrete experience - Using the help feature to get some expert tip

Kolb's model applied to learning algebra:

Abstract conceptualization - Listening to explanations on what it is.

Concrete experience - Going step-by-step through an equation.

Active experimentation - Practicing.

Reflective observation - Recording your thoughts about algebraic equations in a learning log.

Now when I teach these topics I introduce Kolbs model and encourage student to use it to in order have a more effective approach to learning.

In conclusion, I have described the 3 main learning theories and how they can be used in my subject areas. From this it can be concluded that a single core learning theory can not be used in HE alone, even in one specific discipline. It is clear that each of these models has its own strengths and limitations. I hope I have shown that teachers have to adopt a balance between each of the learn ring models paying particular attention to

satisfying individual preferences of approaches by developing inclusive teaching materials.

Bruner, J. (1973). *Going Beyond the Information Given*. New York: Norton.

Critique the development of a major educational policy and practice in UK Higher Education since 1950

Higher Education has evolved during the last half a century in terms of provision availability and participation and this is partly due to changing policies, practice and the rise of technology. I will describe in this essay the key policy drivers that have been introduced in HE and discuss how they have changed the face of Higher Education.

In the 1960's the government (Labour at the time) set up a working committee to identify solutions to the lack of participation in Higher Education and to encourage lifelong learning to cater for the postwar bulge. This committee was chaired by Lord Robbins and were defined with a clear task:

" to review the pattern of full-time education in Great Britain and in the light of national needs and resources to advise Her Majesty's government on what principles its long-term development should be based. In particular, to advise, in the light of these principles, whether any new types of institution are desirable and whether any modifications should be made in the present arrangements for planning and co-ordinating the development of the various types of institution."

The committee's findings were set out by 180 recommendations that can be summarised into three categories: 1) Courses of higher education should be available for all those who are qualified by ability and attainment to pursue them and who wish to do so: 2) The expansion should be carried out mainly by development of existing kinds of institutions-existing universities, the creation of new ones, the granting of university status to Colleges of Advanced Technology (CATs) and later to some Teacher Training Colleges (TTCs) and Regional Technical Colleges; 3) should be self-governing and financed by grants distributed through an independent Committee like the present.

After the recommendations of the report that coincided with the 1960s saw the rise of 'plate glass universities, incidentally Robbins was not responsible for their foundation, the rates of participation in higher education soared ahead of most expectations. The speed and the scale of the expansion have been unprecedented within the UK and some outstanding achievements deserve to be recorded and celebrated. For example, the statistics show that within one generation the UK has achieved equal proportions of women and men in undergraduate HE. (Edwards 1997, Williams 1977) This was achieved

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by expanding the university network from the well known ancient and redbrick universities to include the plate glass universities. The number of institutions subsequently rose from 20 to 43 in a X year time frame.

The success of the Robins report is much debated, it contributed to the expansion of universities, although it was the University Grants Committee in the later 1950s/early 1960s that was responsible for the emergence of the 'Plate Glass' universities, known as 'Plate Glass' due to architectural style.

Moreover, the system has still to develop a strategy for lifelong learning. (Tight 2009), this was later addressed in the Dearing report. Others state the recommendations based on evidence presented was biased and incomplete.

And if other statistics and figures had been used that it could have trumpeted the achievements of the British system (Tooley 1996). To address wider access issues in 1969 the UK government founded the Open University on the belief that communications technology could bring high quality degree-level learning to people who had not had the opportunity to attend campus universities. This was a unique and innovative approach to HE in several aspects: its open admissions policy and distance learning strategy.

There was little major policy renewals and recommendations in the 1970's 80's . Since the Robbins report powerful forces, technological and political, were driving the economies of the world towards greater integration and the Dearing report was commissioned in the 1990's, tasked to make recommendations on how the purposes, shape, structure, size and funding of higher education, including support for students, should develop to meet the needs of the United Kingdom over the next 20 years. In the report titled Higher Education in a Learning Society there were a total of 93

recommendations made and perhaps the most notable change in funding was a shift from undergraduate tuition being funded entirely by grants from the government to a mixed system in which tuition fees were supported by low interest government loans. Those that benefit from HE should pay for it, as it is assumed that better paid jobs will be attainable with a higher degree. This was not baulked at as in the 90's there had been a lot of uncertainty in Higher Education and policies had lurched from contracting the number of students to increasing them. Underfunding had left universities so stretched they were about to snap (Sheppard and Crace 2007) . The amount universities had to spend on teaching had halved, and funding for infrastructure and research had been reduced. The crisis in 1996 was the result of a period of very fast growth in student numbers, financed in very substantial part by severe reductions in the unit of resource [the amount a university spends on each student] for teaching, and massive decay in research infrastructure. Other key issues raised were pursuing quality in our teaching and research and a commitment to high standards and as a result the Quality Assurance Agency (QAA) was set up to monitor standards of education in HE institutions in the UK in all teaching activities. The Research Assessment Exercise initiative was established to assess institutions quality of research. Each institution department receives a score on the quality and impact of their research and mapped to the score are research funds from the UK Research Councils. The RAE is now superseded by the REF which is deemed to be fairer. The Dearing review has been deemed successful and there have been quantitative figures published by Watson that calculated that 28% of Dearing's recommendations have made a difference, 16% have

been overtaken by events, 11% were rejected, 29% happened slowly and 16% have seen no specific progress.

Since the Dearing report there have been political drivers to ensure that the UK skill market for 2020 can maximise economic growth, productivity and social justice. In 2006 the Leitch report was tasked to consider this and to consider the policy framework required to support it. It reports on skills from level 1 - 4, level 1, 2, 3, and 4 maps to numeracy and literacy, GCSE's, A levels and higher degrees respectively. One of its goals is that more than 40% of adults should be qualified to Level 4 and above in 2020 (equivalent to degree-level qualifications), up from 29% in 2005.

Another issue linked to the Leitch report is that of graduate employability. There is no debating that a major responsibility for the smooth integration of graduates into professional life and hence society, lies with the HEI's. (Pukelis et al 2007). This is changing the shape of Universities and requires universities to be more outward looking. Recognition of this responsibility has prompted considerable debate within educational, employer and political spheres about the skills and attributes expected of graduates, and how these might be fostered. Universities are devising strategies for ensuring that their graduates possess a set of graduate attributes that can be linked to employability and managing rapid socio-cultural, political, economic and technological change.

To summarize HE has changed significantly from the 1960's. The increase and projected further increase in student numbers is one important change. Concurrent with this has been the greater equality and diversity in the profile

of HE. students. The advancement of technology and methods for distance learning have evolved, devolving the notion of a central University to a distributed University, aiding the increase in student numbers. As student numbers increased there was a strong focus on maintaining quality via the QAA policies and strategies for ensuring quality of research and teaching have been overhauled and change the manner in which University's teaching and research are assessed. There has been a move for universities to be more skill oriented where level 4 generic skills, also termed graduate attributes, can be engendered in students and potentially measured. Finally there is a move for to become more outward looking.

<http://www.timeshighereducation.co.uk/story.asp?storyCode=92887&ioncode=26>

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Plan, deliver and reflect on learning and teaching sessions within a particular subject discipline

The purpose of a curriculum design methodology is to try and increase the effectiveness and efficiency of the learning process based on current knowledge of how people learn. There are several methodologies available to curriculum design but a basic methodology that can be applied in the design of all types of teaching/learning scenarios is the Systems Approach. The systems approach tries to mould the input of a course/module in such a way to enable the optimal assimilation of knowledge and skills to take place during the learning process and hence maximise the quality output, [Ross TLA guide 3]. A diagram of the systems approach can be found in Appendix A.

For the purpose of this report theories must be analysed with respect to the lecturer's subject discipline. As an example the curriculum design of SE216 Operating systems and Networks will be discussed. The author ran this module last session but did not write the original module descriptor.

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The first stage in the systems approach is to consider the target population characteristics and the topic area. The 2nd year cohort will mostly consist of continuing students with a few direct entrants. It is important to profile the different educational backgrounds in terms of their previous knowledge to achieve a balanced approach to the planning of SE216. Another example of this which is indirectly related to the authors experience, is in the design of first year curricula to accommodate changes in the pre university curricula and to provide a smooth transition to higher education in the face of an increasingly diverse student population, (Cox, B. & Ingleby, A., 1997).

The next stage is to estimate the relevant existing skills and knowledge of learners. Students upon entering University possess a variety of skills all to varying degrees. The 1st year Dip HE Computing and IT, (replaces the HND) students are a mixture of school leavers and direct entrants. These students are given a series of study skill seminars so that they all know what is expected of them and to bring them to a common level. Another example of students bringing different histories to university is apparent in the teaching of first year programming - SE111. These students encompass a vast range of abilities from those who have never programmed to the 'expert' programmer. The teaching approach cannot be tailored to meet every student's needs however the tutorials/labs were streamed to be aware of the vast individual differences and to ensure that the students received quality teaching, whether they needed to be taught from a beginners' level or their knowledge reinforced.

After taking these issues into account the next stage is the formulation of objectives/Learning Outcomes. It is the learning outcomes that encapsulate <https://assignbuster.com/evaluation-of-four-different-learning-theories-and-models/>

the new skills, knowledge or attitude that the new students will acquire.

Listed below are the current objectives and suggested content of SE216 not written by the author:

Objectives

Understand the role and features of an operating system.

Utilise at least one operating system to perform common tasks.

Understand network topologies and protocols.

On studying these the author felt that the objectives are ambiguous and vague using expressions such as understand and concept which are too illdefined to convey the exact nature of the behaviour being sought. It is extremely important that the objectives and learning outcomes are clear and concise to the student. Learning outcomes should be written in future tense and conveyed by verbs, which describe exactly what the student is, expected to be able to do after completing the learning process. More importantly the LO's should be written in such a manner that the students can easily understand them. A good educational objective is one, which contains an action verb describing an observable measurable performance, (Gronlund 1978, Mayer 1990). Taking this into account the previous objectives were rewritten by the author and are as below:

Learning outcomes

By the end of this module the student will be able to:

Define the role and main features of an operating system.

Demonstrate the use of at least one operating system to perform simple tasks.

Describe various network types, protocols and topologies.

Outline the OSI Interconnection model and compare with existing operating system implementations.

Once the LO's have been formulated the appropriate teaching method must be selected. There are numerous teaching methods available but one is confined by institutional constraints. The teaching methods must be selected with the appropriate LO/objective in mind and a combination of teaching methods can be used for a particular course. In SE216 a lecture is given which is the practical and most common way to convey information to a large group. The students also participate in a tutorial and lab group. Since one of the LO's is to be able to utilise an operating System it was felt that this learning process was best suited to an active laboratory. In the tutorials group discussions were encouraged also providing the students with an active part in learning the content of the module. It has been researched that group learning and discussions improves the quality of learning, (MCB, 1990). Directed study of material in textbooks is also used however well structured handouts were given out at each lecture which link the content of the lecture to the LO's more closely than the directed study. However it was felt that the directed reading was an important part in developing a culture of independent and deep learning. Students adopting a deep learning approach to their normal studies related new material to their own knowledge and experience, stressing the importance of reorganising new

information in terms of existing knowledge structure, (Svennsson, 1977). Independent learning is encouraged as it leads to increased responsibility and autonomy on the part of the learner, (Richardson, J., 2000). There is a multitude of teaching approaches and it is important that the educator must feel comfortable with his/her choice of teaching methods or it will not be successful.

Once the teaching methods have been decided the course must be assessed. The aim of assessment is to provide feedback and guidance to the learner and to judge the extent of learning. The assessment should test each LO and it has been found that varied assessment leads to improved learning, (Cox, B. and Ingleby, A., 1997). In the case of SE216 it was felt that the learning outcomes were attainable to two distinct areas the cognitive and the psychomotor domain. The cognitive domain applied to LO 2, 3, and 4, which required the acquisition and application of knowledge and understanding. Learning outcome 3 belongs to the psychomotor domain and deals with the development of manipulative or physical skills. The psychomotor LO1 was assessed by a logbook which recorded the students actions and experiences whilst carrying out specific lab sheets. The second part of the assessment dealt with LO 2, 3 and 4, which involved knowledge and understanding of the content, (lower cognitive skills) and was tested in an exam. The exam was structured such that the student had to develop higher cognitive skills in the synthesis and processing of their knowledge i. e the first part of the question was knowledge based and the second part was application of this knowledge in a particular context.

It is vital to realise that the systems approach is a cyclic procedure. Poorly achieved objectives/LO lead to a course designer to examine the entire system to see where improvements can be made. In SE216 less ambiguous statements of LO/objectives may improve student learning. Also a prior knowledge of Computer Architecture, SE215 was wrongly assumed even though it is a prerequisite on the module descriptor. A small collaborative group has been set up within the SE division to ensure that a consistent stream of Computing Infrastructure/Networks runs through the 1st - 4th year BSc Computing course. The module descriptors of modules have been modified to reflect this. This will ensure that the students upon undertaking SE216 have the relevant background knowledge to do so. As an extra precaution the lectures will be modified this session to include a revision of computer architecture. On evaluation, (via questionnaires) of the module some students felt the module was biased with the bulk of the content on Operating Systems. The updated module descriptor aims to get a more balanced content with respect to Operating Systems and Networks.

Finally there are disadvantages associated with the systems model. The main disadvantages being that the course/module may become too prescribed and lack spontaneity with an over emphasis on the LO's, REF. I felt that these disadvantages can be overcome by the educator bearing these points in mind and remembering that the LO's are only a guide to give the student an idea of the content of the module.

Evaluation and Reflection

The TLA principle, which is the focus of this narrative, is a lecture given to 2nd year BSc Computing students. The lecture is from SE216 Operating
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Systems and Networks. The module is split into two sections, part one being Operating systems and part two being Networks. This narrative pertains to one lecture given out of seven on Operating Systems.

The aim of the series of lectures is to provide the students with the theoretical foundation relating to O/S. Each lecture is not treated independently or in isolation of other lectures but rather each lecture provides the basis for future lectures in the series ultimately building a coherent picture of Operating Systems.

The delivery method chosen for this particular module was the traditional approach. This was found to be the most practical considering the large number of students, the type of material being taught and the environmental and staff constraints. The lectures were well structured always stating the aims and objectives of that particular lecture and providing a summary at the end. The lecture was always introduced so that the students were aware of that particular lectures relevance and how it fitted in with the previous lectures and future lectures. The author feels that this encourages effective learning, Bligh 1998. REF - holistic approach. The lectures were always written in simple English, which is also thought to help students synthesise the material. It was also felt appropriate to involve the students in the lecture, which encourages active learning stimulating deep learning. Stalling the lectures and providing discussion questions based on important and fundamental issues achieved this. The students were also expected to sketch their own diagrams and carry out their own calculations.

At the lecture handouts were also given out. It was felt that these were necessary to allow the students to listen and synthesise the material rather than spending most their time writing notes. Writing their own notes has disadvantages such as slow writers are penalised. However on evaluation next session a full set of lecture notes will not be provided. Instead a partial set of notes providing the students with the bullet points will be provided. The students will then be expected to add any details they felt were important which will again provide a more active learning experience.

Directed reading was also given to the students to encourage deep learning. The main disadvantage of directed reading is that the student may not be able to relate the information to the LO's. It was felt that the directed reading was necessary so that the student would engage in independent learning which is the main aim of learning. REF

Although the traditional approach was utilised it was felt by the author that it incorporated modern flavours making the lectures more interactive, fun and interesting. This hopefully encouraged the students to learn independently and deeply. It was felt that on the whole this was achieved. It is however vital to remember that this did not just depend on the mode of delivery and style of teaching but also on many uncontrollable factors. These include amount of reading, prepar