EXPERIENCE EXCHANGE

Preparing student nurses for contemporary practice: The case for discovery learning

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Abstract

Nursing in the 21st Century is characterised by continuous change. In addition nurses increasingly have to care for: patients with multiple pathology; chronic diseases and who come from more diverse backgrounds than ever before. In order to prepare nurses to function in such an environment nurse education will need to adopt pedagogical approaches that will engender the necessary cognitive and meta- cognitive skills. One such pedagogical approach is Bruner's theory of discovery learning.

This paper explores the ways in which discovery learning can be used by nurse educators. It reviews the factors that led to the growth of modern constructivism and how nurse educators can use concepts such as heuristics and scaffolding and spiral curricula in order to better prepare nurses to be fit for graduation as registered nurses.

Key words

Discovery learning, Constructivism, Heuristic learning, Scaffolding, Spiral curriculum

1 Introduction

For some considerable time nurse education literature has paid substantial attention to the merits of student-centered pedagogy [1-5]. Regardless of this it has remained wedded to a conventional, teacher-centered approach [6-11] and has subsequently been accused of being: '…teaching heavy and learning light' [12]. But the question facing nurse education is whether such an approach is capable of preparing nurses for today's complex health care environment?

Contemporary health care is characterized by kaleidoscopic change requiring the use of sophisticated technologies and the need for systems thinking [13]. In addition, nurses are increasingly caring for sicker, older, and more diverse groups of patients suffering with a myriad of chronic conditions. If nurse education is to truly prepare nurses to function in this environment then the aim of nurse education has to change from "learning what is known" towards "educating for the unknown future" [14]. Thus more than ever before it needs to adopt pedagogical approaches that engender the cognitive, meta-cognitive and social competencies that such a changing environment demands if it is to ensure students are 'fit for purpose' at the point of graduation [15].

This paper proposes that constructivism provides the philosophical framework through which this can be achieved. An exploration of how Bruner's [16] theory of discovery learning offers a basis for an educational experience that is more congruent with the changing needs and demands of today's and the future health care environment. In order to understand the limitations of teacher-centred learning this paper explores the historical philosophical context that led to the constructivist revolution.

1.1 The behaviourist school and its impact on teaching & learning

Teacher-centred pedagogy is an approach that stems from the behavioural school of psychology. Behavioural psychologists, such as Skinner [17, 18], Hull [19] and Gagne [20] dominated early education theory. Behaviourism is primarily concerned with observable behaviour, as opposed to internal events like thinking and emotion. Observable (external) behaviour can be objectively and scientifically measured and is based on the 5 key assumptions described in table 1:

Table 1. Five key assumptions of behaviourism

- People have no free will – a person's environment determines their behaviour
- When born our mind is 'tabula rasa' (the epistemological theory that individuals are born without built-in mental content and that their knowledge comes from experience and perception)
- There is little difference between the learning that takes place in humans and that in other animals.
- Behaviour is the result of stimulus – response. Thus all behaviour, no matter how complex, can be reduced to a simple stimulus – response association.
- All behaviour is learnt from the environment and new behaviour is learnt through classical or operant conditioning.

The view that learning was the result of the accumulation of stimulus – response associations was made clear by Skinner when he said;

> *"The whole process of becoming competent in any field must be divided into a very large number of very small steps, and reinforcement must be contingent upon the accomplishment of each step. .... By making each successive step as small as possible, the frequency of reinforcement can be raised to a maximum, while the possibly aversive consequences of being wrong are reduced to a minimum." [18].*

Another major influence at the time was the work of Thorndike. Thorndike was both the originator of associationist learning theory and the 'father' of 'scientific measurement' [21] and fostered the development and dominance of the "objective" test. He postulated that learning took place through the differential strengthening of bonds between situations and actions. Teaching, therefore, was concerned with shaping the responses of the student through using instructional methods such as modelling, demonstration, and reinforcement of closer approximations to the targeted response. From this perspective, academic tasks were analysed in order to identify their component parts.

1.2 Behavioural pedagogy

The 5 key assumptions of the behaviouristic model have had major consequences for the way in which teaching and learning was conceptualised. The pedagogy that best reflects the tenets of behaviourism is direct instruction teaching. The hallmark of this approach is the active and directive role assumed by the teacher, who maintains control of the pace, sequence, and content of the lesson. While this approach is thought to be an effective means of teaching great amounts of factual content, there is less evidence that the approach is of use in developing higher order cognitive skills such as reasoning and problem solving [10, 22-24]. Nor is there sufficient evidence that direct-instruction teaching results in transferable learning in which students are able to use the targeted strategies in differing contexts [25]. Miller [26] coined the phrase 'poisonous pedagogy' as way of describing the negative effects of this form of teaching. He went on to assert that for teachers to mould the learner into a form that they believe reflects the world 'as it really is' is destructive to the learners development.

Freire [27] referred to behavioural pedagogy as the Pedagogy of the Oppressed and likens it to a banking model in which education becomes an act of depositing knowledge, in which students are the repositories and the teacher the depositor. There was, therefore, a growing discontent with behavioural pedagogy. At the same time there was a growing interest in human information processing in complex cognitive activity and so the cognitive perspective assumed prominence.

1.3 The cognitive revolution

Unlike behaviourism, which treats the learner as a passive recipient of knowledge, cognitive theory recognises the importance of the mind in making sense of the material with which it is presented [28]. According to cognitive psychology, learning is less concerned with behavioural responses and more with what the learner knows and how they acquire it. Although seen by some as the antidote to behaviourism Bruner [29] argues that the cognitive revolution was meant to do more than simply be an improvement on behaviourism; it was also meant to promote a psychology that focused on 'meaning making'. In order to explain the concept of meaning making, cognitive psychologists introduced cognitive structures (such as schemata and heuristics) as the representations of knowledge in memory. These cognitive structures are assumed to underlie such phenomena as problem solving and transfer ability [30].

2 Defining constructivist philosophy

The essential epistemological assumption of constructivism is that meaning is a function of how an individual creates meaning from their experiences [31]. As individuals our conception of external reality is different and is based on our own unique experiences with the world and our beliefs about them. As such constructivism is not a specific pedagogy but a philosophy which states that learning is an active process of creating meaning from different experiences [32]. In other words, students learn best by trying to make sense of something on their own with the teacher as a guide. Thus the learner is much more actively involved in a learning partnership with the teacher creating or constructing new meanings. Lebow [32] identifies 5 principles of constructivism (see Table 2):

Table 2. The 5 key principles of constructivism

• Maintain a buffer between the learner and the potentially damaging effects of instructional practices.
• Provide a context for learning that supports both autonomy and relatedness.
• Embed the reasons for learning into the learning activity itself.
• Support self-regulated learning by promoting skills and attitudes that enable a learner to assume increasing responsibility for the developmental restructuring process.
• Strengthen the learner's tendency to engage in intentional learning processes, especially by encouraging the strategic explanation of errors
(Taken from Lebow 1993)

3 The growth of modern constructivism

Although constructivism has a history spanning centuries it is Kant who is widely referred to as the first true constructivist [33]. Bruner [34] asserts that constructivism emerged from Kant's Critique of Pure Reasoning [35] in which he argued for a priori of knowledge that precedes all reasoning. It is what we know, and we map it onto a posterior knowledge, which is what we perceive from our reactions with our environment. However, what we know as individuals is what the mind produces.

By the twentieth century a number of educational psychologists were increasingly concerned with what went on inside the human brain as opposed to how to get in it, most prominent of these are Dewey's Audacity of Imagination [36], Piaget's Cognitive Constructivism [37], Vygotsky's Social Constructivism [38] and Bruner's Discovery Learning [39]. But the essential factor that unifies these constructivists' perspectives is the rejection of the view that the locus of knowledge is in the individual; learning and understanding are regarded as inherently social; and cultural activities.

Modern constructivism believes that:

> *'When one constructs for oneself a solution to a problem, the bits of knowledge that one's resulting ideas consist in and which yield their own satisfactions in one's life become a part of oneself.' (Gruender [40])*

What Gruender means by this is that by working out a solution to a problem the student internalizes the knowledge involved and develops an affinity for it due to the intellectual reward of solving the problem.

3.1 Bruner's discovery learning

In his 'landmark' text—The Process of Education, Bruner [41] revealed his particular view of constructivism- the theory that learners actively construct their own knowledge based upon the things they know now and have known in the past. He referred to this form of learning as discovery learning. Discovery learning has a long and complex history in education but it is Bruner [42] who is largely credited with being the first educational theorist to propose the approach. Discovery learning reached its heyday as a pedagogical framework in the 1960s. Since then its popularity has waxed and waned. However the emergence of simulation environments and e-learning [43] and the fact that it is taking a pivotal position within the constructivist revolution means that it is undergoing a renaissance.

Discovery learning is an inquiry-based theory which encourages students to be active agents in their own learning process [44]. As such a major theme in this theory is that learning takes place in problem solving situations, where the learner draws on their past experience and existing knowledge to discover facts and relationships and new truths [45]. As a result, students may be more likely to remember concepts and knowledge discovered on their own (in contrast to a traditional transmissionist model). In addition it allows the student to go beyond the information given. Guided discovery, problem-based learning, simulation-based learning, case-based learning, incidental learning, are some of the learning models that are based upon discovery learning model.

Bruner emphasized teaching as a means of enhancing cognitive development; hence the role of the teacher is to translate information to be learned into a format appropriate to the learner's current state of understanding. The emphasis is on the teacher encouraging students to discover principles by themselves, and both students and teachers should engage in an active dialog (Socratic learning).

3.2 Heuristic learning

Bruner [16] theorized that discovery learning fosters intrinsic motivation, leads to an understanding of and inclination toward the heuristics of inquiry, and allows for the active self-organization of new knowledge in a way that fits the specific prior knowledge of the learner. Heuristic methods, heuristic strategies, or simply heuristics, are rules of thumb for making progress on difficult problems [46]. Similarly Mazur [47] refers to heuristics as general suggestions on strategy that are designed to help when we solve problems. In effect, therefore, heuristics are ideas that have been useful in previous problem solving that we might be employed when solving a new problem. Heuristics is widely used in the fields of mathematics [48], chemistry [49] and physics [50]. Within nursing the use of heuristic learning has been found to strengthen the relationship between theory and practice [51] and enhance problem solving within the practice setting [22], including diagnostic reasoning [52] and critical thinking [53].

3.3 Scaffolding

Bruner maintains that effective teaching requires teachers to provide assistance and guidance a process he called scaffolding. Scaffolding is the process by which a teacher provides students with a temporary framework for learning by which students attempt to understand new ideas and complete new tasks [54]. If done correctly this structuring encourages a student to develop their own initiative, motivation and resourcefulness. Once students build knowledge and develop skills on their own, elements of the framework are dismantled. Ultimately scaffolding allows students to become independent learners.

According to McKenzie [55], the defining features of successful scaffolding include clear direction, purpose, and expectation. Results include on-task activity; better student direction; reduced uncertainty, surprise, and disappointment; increased efficiency; and palpable momentum.

> *"Scaffolding requires continuous sorting and sifting as part of a 'puzzling' process—the combining of new information with previous understandings to construct new ones. Students are adding on, extending, refining and elaborating. It is almost as if they are building a bridge from their preconceptions to a deeper, wiser, more astute view of whatever truth matters for the question or issue at hand"* [55].

3.4 Bruner's spiral curriculum concept

Bruner recommended that the early teaching of any subject should emphasize grasping basic ideas. After that, he believed, the curriculum should revisit these basic ideas, repeatedly building upon them until the student fully understands them. A process he called the spiral curriculum. This was further developed in Reigeluth and Steins [56] seminal work on "The Elaboration Theory of Instruction". It advocates that when structuring a programme of study, it should be organised in a simple to complex, general to detailed, abstract to concrete manner. In order for a student to develop to more complex aspects of a programme certain prerequisite knowledge and skills need to be mastered first. This prerequisite sequencing provides linkages between each session/lesson as students spiral upwards in a study programme. Thus the student gradually develops a rich depth and breadth of information and knowledge. Although this sounds a very logical process modularisation of curricula, often means that topics are delivered as discrete elements that are disconnected from each other resulting in fragmentation of learning and a lack of coherence [57]. Didactic and clinical learning remain separate and detached.

4 Implications of discovery learning for nursing curricula

The practical application of discovery learning in the classroom presents additional challenges and benefits to both the teacher, and the student. The challenge for the teacher is to provide relevant frameworks upon which the student can construct knowledge and understanding, and to act as a facilitator rather than knowledge-bearer during the process. Students must become much more actively engaged in their learning experience, rather than act as passive recipients of information. This may prove challenging for those students who are used to didactic approaches and may feel frustration, anxiety and insecure about their ability succeed using this approach to their learning or feel unsafe doing so. So the development of the ability to be more autonomous in the learning process needs to occur early in the educational programme. An approach that has been found to be beneficial in raising the confidence of those being exposed to discovery learning for the first time is through the introduction of a module based on discovery learning at the very beginning of a nursing programme [58].

Learning to let go

Why after so many years of discussion and debate does nurse education remain entrenched in teacher-centred pedagogy? There are a number of answers to this question. Dalley et al [59] suggests a major reason for this is that there is a vast amount of health care information that is continually flowing into nursing curricula but very little, if any, content is taken out. This has resulted in what Diekelmann [60] and Ironside [13] refer to as the additive curriculum, an inevitable consequence of which is that curricula become overcrowded. Dalley et al [59] believe that it is this overcrowding of curricula which is responsible for nurse educators resorting to teacher- centred approaches because it is the only way they have been able to fit all of the content in. However, others, such as Bellack [12], proposes that the real reason why nurse education remains mired in conventional pedagogy is because nurse educators prefer this form of delivery because it enables them to stay in their 'comfort zone' by being in control of the content and thereby ensuring quality.

But in deconstructing what was considered to be "official knowledge", Apple [61] identified how the control of content, although espoused as a means of ensuring quality actually militates against it. This is because it limits a teachers' ability to respond to the context of learning; students' questions, interests, and concerns; and the larger community issues in which learning occurs. All of which are essential if nursing students are going to be adequately prepared to deliver the complexity of care required in a modern health care environment [62].

Bellack [12] uses the analogy of Sisyphus to explain why nurse education remains wedded to a teacher centred approach. Sisyphus had been condemned by the gods to ceaselessly rolling a rock to the top of a mountain again and again, forever. But in actual fact:

> *"Sisyphus is in love with the rock. He cherishes every roughness and every ounce of it... Life is unimaginable without it... He doesn't realize that at any moment he is permitted to step aside, let the rock hurtle to the bottom, and go home."* [63]

In other words despite protestations about not being enough time in the curriculum many nurse academics like the use of teacher- centred approaches.

What is increasingly obvious is that if nurse educators are going to pay more than lip service to student-centred education there is a need for a programme of staff development and support which enables nurse academics to move out of their comfort zone and adopt more contemporary pedagogy such as discovery learning.

5 Conclusion

Modern health care takes place in an extremely complex environment and is continuously placing new demands on nurses. If nurse education is truly going to prepare nurses for this environment it needs to adopt a pedagogy that is congruent with this aim. Hence the behavioural approach is no longer an option. Nurse educators will need to overcome their fears and resistance to change, and adopt a pedagogy in which there is an active learning partnership between students and educators. Constructivist approaches such as Bruner's discovery learning offer a real alternative in that through the development of heuristics can promote the students problem solving ability, self-efficacy and motivates learning. However, nurse academics will need appropriate help and support in not only seeing the merits in the approach but also with moving out of their comfort zone.

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