

Learning and Teaching Strategies Adopted

David A. Kolb's (1984) model of experiential learning supports cognitive theory and is central in many discussions of the theory and practice of adult education. For Kolb, experience is a cycle in which information is processed moving from the concrete through the abstract via reflection back to the concrete by experimentation. Consequently, his model of experiential learning was created out of the four elements: concrete experience, reflective observation, abstract conceptualisation and active experimentation.

The theory sets out these four preferences in the learning process which are also possible different learning methods, consequently each element of the cycle describes a preferred learning method.

- doing (active experimentation)
- watching (reflective observation)
- feeling (concrete experience)
- thinking (abstract conceptualisation)

A strategy adopted in the degree course is that of a virtual company. Setting up a virtual company in a learning environment supports the concept of Kolb's Model of Experiential Learning (1984). Learners are engaged actively in a computer based project as they take up different roles in the company. Learners use project work, case studies and simulations which create an active learning environment which in principle epitomises the concept of experiential learning. Solving technological problems brings problems to life as connections are made with real life situations. Creativity is essential as problem solving is closely related to lateral thinking which generates unusual but appropriate responses to problems or questions.

Working within the virtual company also implements the strategy of self directed learning. Convey (1995) describes the principle of self-directedness as follows:

'It means that as human beings, we are responsible for our own lives. Our behaviour is a function of our decisions, not our conditions. We have the initiative and the responsibility to make things happen. (Convey, cited in Barell, 1995)'

One vehicle for self-directed learning is the project-based method. Educators have also pointed out that setting of individual goals is central to most theories of self-directed learning (Schunk, 2001). Goals are more successfully attained if they are specific, short-term, and moderately difficult and set by the learner. Other researchers support the belief that students are more successful when they control their own goals. From her study of Design and Technology students Atkinson (1999) states:

'The common belief that ownership develops a sense of responsibility, pride, and motivation to succeed would support the use of strategies that would enable pupils to retain ownership of their idea throughout the project than the loss of ownership witnessed among many pupil'

Self directed learning can be implemented for all these positive reasons but present circumstances of cutbacks in hours have almost made it a necessity. Another strategy adopted and used in the virtual company would be collaborative learning in which the emphasis is on teamwork. This strategy favours dialogue and is the core of Russian psychologist, Vygotsky's (1997) social constructivist theory based on social interaction. Learning is an active process where individuals construct their information in interactive, social settings. This suggests that it is through peer interaction that students learn. Collaborative learning enables learners to share alternative viewpoints, to develop critical thinking skills, and to reflect and improve on their own learning. According to Gokhale (1995) this is achieved "through discussion, clarification of ideas, and evaluation of others' ideas". In the structure of the learning in the virtual company the collaborative team consists of a manufacture student and a design student pooling their expertise.

Taking into account the diversity of the student profile highlights the significance of Gardner's (1985) theory of Multiple Intelligence. His theory proposes 7 types of intelligence. He argues that some people are strong in one kind of intelligence while others are stronger in another. Gardner (1985) defines intelligence as:

'the capacity to solve problems or to fashion products that are valued in one or more cultural settings'.

His types of intelligence are: Bodily-kinaesthetic, Interpersonal, Intrapersonal, Musical, Logical-mathematical, Linguistic, and Spatial. Creativity in technology, or ingenuity, directly involves bodily-kinaesthetic, logical-mathematical and spatial capacities. Gardner (1985) claimed that each type of intelligence had no more importance over another. They did not form a hierarchy as logical-mathematical intelligence had no more importance than linguistic intelligence. Even though intelligence was separated into categories all operated concurrently and not independent of each other. In other words, learners used all types of intelligences in order to succeed within the learning experience. Therefore, the educational implication was that an educational experience developed the different aspects of intelligence of each learner in order for them to succeed.

Teaching strategies have to respond to the diversity of learning styles of the students. All students have a preferred learning style and assimilate information differently. Although we tend to use all senses in learning, generally one is dominant. These would cover the areas of visual, aural, read/write and kinaesthetic. Depending on the dominant sense different teaching methodologies and approaches are required and used in the product design option. They include.

- Lecture, seminar/workshop, and laboratory based classes
- Project based
- Focus on application & practical
- Field trips – Domestic and Foreign
- Co-operative education / Professional placement

- Visiting speakers
- Learning support web-site
- Team problem-solving 'games'
- Role play
- 'Virtual' company
- Class debates

References

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