Panta Rei - A Pedagogy for the New Millennium

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ABSTRACT

Herbert Gerjuoy (Gerjuoy 1970) said, "Tomorrow's illiterate will not be the man who can't read; he will be the man who has not learned how to learn". If we want to future-proof our students we must develop in them the ability not only to learn, but to change. This is particularly important in the area of computing where the useful life of knowledge is only a few years and falling. These are not new ideas. Around 500BC the philosopher Heraclitus espoused his philosophy of "everything changes" or "Panta rei". He even went so far as to suggest that only change itself really existed. Education itself has changed from a situation where people learn skills that enabled them to survive in a hostile agrarian world to again teaching the ability to survive, but this time in the future. The wheel has turned full circle. We discuss the skills that are necessary for our students to learn to change and describe a course created to embody these principles.

KEYWORDS

Pedagogy, learning, computing, content, skills, Panta rei.

1. INTRODUCTION

Herbert Gerjuoy (Gerjuoy 1970) said, " Tomorrow's illiterate will not be the man who can't read; he will be the man who has not learned how to learn". This idea is not new; around 500BC Heraclitus espoused his philosophy of "everything changes" or "Panta rei". His theory even went so far as to suggest that only change really existed. Philosophers such as Plato and Socrates suppressed Heraclitus' theories but the "Panta Rei" theory, like the future, is still "out there" today. To future-proof our students we must teach them not just to learn, but to be able to respond to change, to learn to learn independently. This is particularly important in the area of computing where the useful life of knowledge is only a few years and falling. We are told that our role has changed from "the sage on the stage" to "the guide by your side". The mentor has replaced the learned professorial lecturer. How we deliver learning is also changing. Previously both lecturer and student were present in the same

physical space. Now students increasingly study by distance away from the teacher, in a different time period and increasingly on-line. Luckily education is one of the few products that can be both processed and delivered digitally. Often with a little perseverance from us the students will learn more from each other than they will learn from us. The fixed trimester has given way to an open model where the student studies for an unspecified period of time over a calendar year and takes the examination at a time to suit him or herself. Universities and Polytechnics that once used to prescribe what students must learn in order to obtain a degree from their institution now actively encourage students to collect credits from several Universities throughout the world to make up their degree. What skills must we provide our students with to enable them to survive in this changing world? What new skills must we ourselves develop to enable us to teach these skills? If we take the essence of Heraclitus' theory that everything is constantly changing then we must view knowledge and learning not as something that is fixed, but rather as a temporary phenomenon. The subject specialist quickly becomes a dinosaur if she or he does not change as the knowledge about the subject changes. We must be in a state of constant or life long learning just to stand still. This takes no account of the extra knowledge that we must also acquire as knowledge expands. Education has changed from learning skills that enable survival in a hostile agrarian world, to providing the individual with survival skills that allow them to survive in the future. In effect the wheel has turned full circle. It is not so much the skills that we learn that are important rather the skills that enable us to change.

2.   CONTENT OR SKILLS?

It was once commonplace for students to memorise facts and regurgitate them in an examination only to be forgotten days later. Quite recently, knowledge has become subordinated to the need to acquire the skills to process knowledge, and to solve problems. Gerjuoy (1970) said "The new education must teach the individual how to classify and reclassify information, how to evaluate its veracity, how to change categories when necessary, how to move from the concrete to the abstract and back, how to look at problems from a new direction - how to teach himself." Has education listened? The recently revamped New Zealand Institute of Management

course, "Introduction to Computing", does not examine the students' knowledge, rather their skills to find, organise, process and report on information. Knowledge is a by-product of learning the skills needed to process that knowledge, ensuring that in the future when the knowledge changes the student is equipped to reacquire and relearn the changed knowledge.

3.   SOME LEARNING THEORIES

Theories abound on how learning occurs and how teachers should best put across their knowledge (Kearsley 2001). In this paper we are examining theories that develop the ability to learn. We will look at the essence of each relevant theory first.

Andragogy (Knowles 1975)

According to Knowles adults need to be involved in the planning and evaluation of their instruction. They need to experience their learning activities and are interested in learning about subjects that are immediately relevant to their job or personal life. Adult learning should be **problem-centred not content-oriented**.

Drive Reduction Theory (Hull 1943)

Hull believes that the student must be driven to learn. The student must be paying attention and be **actively learning rather than passively listening**. Learning will only take place if the learning satisfies a need in the student.

Experiential Learning (Rogers 1982)

Rogers believes that students learn when the materia1 is relevant to the personal interests of the student. **Learning should take place in a safe environment and be self-initiated**.

Genetic Epistemology (Piaget 1970)

People have different explanations of reality at different stages of cognitive development. People develop their cognition doing activities or being involved in situations that engage them and require them to change. They should only be asked to perform tasks that match their ability at that stage

in their life but **active participation in challenging activities** is essential.

Gestalt Theory (Wertheimer 1959)

Learners should be placed in situations where they have to **find out the underlying properties of a topic or problem or the relationship between the elements**. Recognising missing information, incongruous information or disturbances are a necessary element for learning to take place.

GPS (A. Newell & H. Simon 1972)

Essentially this theory says that all problems can be broken down into smaller units and that the **learner should concentrate on solving the smaller problems**.

Minimalism (Carroll 1990)

Carroll requires **learners to be given meaningful tasks to do with little prior theory. They should be allowed to fill in the gaps in their knowledge themselves. Learners should have the opportunity to compare their work against a correct answer and note any errors. Preferably the activities should be self-contained.**

Situated Learning (Lave 1988)

Lave believes that **learning should take place in context and involve collaboration.**

4. USING THE LEARNING THEORIES

In 1999 we developed a new version of the New Zealand Diploma in Business course, 150 Computer Concepts. We based the course on the ideas highlighted above, seeking to create a course that engaged the students in problem solving and self-teaching in a situated learning environment. As with all courses which are written down the information contained within becomes dated and references to textbooks become invalid as editions change. For this reason we decided to produce a course that was purely based around problem solving and had little knowledge content. All content was in the textbook

that was updated annually by the publishers. This also allowed us to offer textbooks for students with different versions of Office or Works. Any references in the course materials to the textbook were topic related rather than to a particular page number. Students were invited to use the index, as they would have to do in a real life. The course is based around a case study that follows the fortunes of a company from inception to international success. The case study is written in a gender-neutral style so that men and women in any situation can readily identify themselves with the characters. As the company progresses problems arise and the student is invited to advise the company directors on the recommended course of action. The level of problem set begins at a low level and increases in difficulty by building on previously learned skills. So from visiting their local computer shop to obtain information on the difference between PCs and Macs, the student progresses through sourcing and choosing between three business computer specifications, to determining the type of LAN the company should use. Students are asked to post their answers on an electronic forum or to a regional listbot where they receive peer or tutor review. Peer review is considered to be particularly important as it develops skills in critical thinking. In another course constructed using the same principles, 250 Applied Computing, peer involvement is taken a step further by placing the students in virtual teams and using problems based on an extended version of the original case study. Students meet synchronously on a regular basis using an Internet chat facility and asynchronously using specific group threads in the forum. This allows interaction between students who might never meet face to face or virtually because of time zones separating them. Part of the assessment involves students assessing the work and involvement of others in the team. Ten per cent is allocated to this portion of the assessment to encourage participation. Although problems due to disagreements within the teams were expected no such problems arose. The result of their teamwork has been impressive. When students studied alone they averaged 76%, when they worked as part of a team they averaged 83%, those who studied the team project alone averaged 73%. We can recommend virtual teams as a technique to engage students in a distance course.

When faced with a course with no content some students required reassurance but once they

completed the first few tasks, they adjusted to the new way of working and became some of its strongest advocates. Many students expressed the view that they had learned how to learn and felt more confident in trouble shooting in their workplace. The importance of the self-confidence gained after taking such a course cannot be overemphasised.

5. RECOMMENDATIONS

We feel that a course in which the factual information is external to the course is much closer to a real life situation and forces students to search for and sift information and make informed decisions much as they would have to in real life. By carrying out the tasks the students have to learn and relearn within an ever-changing scenario. Panta Rei is an appropriate name for this particular teaching style where the student learns to learn and problem solve in a changing scenario. We urge others to adopt the same style that lends itself to our rapidly changing IT knowledge base.

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