FEATURE

Teaching Deep Learning in Asia

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Abstract: *A concern of educators today is the achievement of high quality learning outcomes in academic courses. These learning outcomes include, among other attributes and competencies, good technical, analytical, communicative, evaluative, problem solving, life-long learning, decision-making, and conceptual skills. Students have been criticized for not possessing adequately these types of skills and abilities required of graduates, which are needed in a rapidly changing work environment. Research studies over the last 30 years have suggested that student learning approaches are a key factor influencing the quality of their learning outcomes. High quality learning outcomes may not be achieved unless teachers and students adopt a deep teaching and learning approach. The call to take on deep teaching and learning has not made significant progress (Paul, 1997; SECFHF, as cited in Wirth & Perkins, 2008). This paper revisits learning approaches and the elements that have been identified as factors influencing student learning orientation, and suggests ways teachers can promote deep learning in their courses to address the concerns of both the professional bodies and employer groups who are currently dissatisfied with some key skills of university graduates.*

There is growing awareness among educators today that effective college and university teaching and learning extend far beyond the development of skills and knowledge in a specific subject domain (Dearing,1997) or simply teaching and learning subject content. In today's workplace, just knowing the information that is learned in school about the subject matter is not sufficient. The skills needed are much more sophisticated. Given the ubiquity of information, it is more important than ever that students have the ability to evaluate, adapt and apply that information, not merely to collect it. It is important to learn skills and knowledge, but the ability to continue to learn, to find information and then be able to analyze and adapt it to the current situation is what employers are looking for regardless of the field. Teachers often assume that, because they are

"teaching," students must be learning. Students assume that because they have read their text and memorized facts, they have learned something. The results of a study of critical thinking and college faculty conducted in California are disturbing. Although most of the faculty (seventy-five percent) claimed to value critical thinking and to promote it in the classroom, less than 19 percent were able to provide a clear explanation of critical thinking, and less than 10 percent were able to identify criteria for evaluating the quality of students' thinking (Paul, Elder, & Barrel, as cited in Wirth & Perkins, 2008). There have been calls for new kinds of learning from many parts of society (Fink, 2003). A recent call for education reform came from the Commission on the Future of Higher Education. The group released a blistering report (SECFHF, as cited in Wirth & Perkins, 2008) on the state of higher education in the U.S. The report states, "We are disturbed by evidence that the quality of student learning at U.S. colleges and universities is inadequate and, in some cases, declining," and "employers report repeatedly that many new graduates they hired are not prepared for work, lacking the critical thinking, writing and problem solving skills needed in today's workplaces" (p. 5). It is timely and useful for teachers to take time to reflect on what they are teaching students and what students are learning in their classes.

How students perceive their learning environment has been accepted as having a significant influence on the quality of their learning outcomes (Doyle 1977; Fraser, 1989; Ramsden 1992). Studies on the students' evaluation of learning environments suggest a close association with their approaches to learning (Entwistle & Tait, 1990; Meyer & Muller, 1990). Biggs (1999) argued that the students' preferences for learning would vary according to their conceptions of learning and their approaches to it. For example, students adopting surface approaches (learning as memorization) prefer to be "spoon fed," while those adopting deep approaches (learning as a personal understanding of the material) appear to prefer challenging presentations (Marton & Saljo, 1984). Entwistle and Waterson (1988) point out that student approaches to learning clearly result from interaction between their individual characteristics and their perceptions of courses, teaching, and assessment procedures. Concrete elements of the learning environment, such as workload, examinations, assignments, feedback and organization, as well as less concrete elements, such as lecturer enthusiasm and empathy, have been identified as factors influencing student study orientations (Bowden, Masters & Ramsden, 1987; Clarke, 1995; Eley, 1992; Ramsden & Entwistle, 1981; Trigwell & Prosser, 1991; Watkins, 1982).

Further, literature indicates that surface approaches to understanding are more dominant in students' approaches/experiences than deep approaches, and that surface or lower order approaches to/experiences of understanding are more dominant in accounting students (Friedlan, 1995). Studies have also linked

surface learning with lower order outcomes and deep learning with higher order outcomes (Entwistle & Ramsden, 1983).

The purpose of this paper is to revisit the elements of the learning environment, concrete and less concrete, which have been identified as factors influencing students' study orientations. In doing so, this article suggests that teachers take time to review their teaching approaches, to reflect on what they are teaching and what students are learning. The paper concludes by providing some suggestions as to how teachers and educators can manage these elements of student learning to promote the deep learning and high quality learning outcomes desired by both the professional and employer groups, who are currently critical of the quality of university graduates (Fink, 2003; Ng, Abdulah, Hwa, & Tiew, 2009; SECFHF, as cited in Wirth & Perkins, 2008). At the end of the paper, an area of further research relating to deep teaching and learning is proposed in the Asian educational teaching and learning environment.

Defining Learning Approaches

Before taking on the task stated above, a definition of surface learning, deep learning, and achieving learning is in order. A surface learning approach has been defined as an attempt to memorize course material without attempting to understand or give thought to the material memorized (Biggs, 1999). This approach relies mostly on rote learning, reproducing what is required to pass the course. The intent is to memorize information which students consider to be important in view of the types of questions they anticipate on an examination. The focus of attention is limited to the specific factors or pieces of disconnected information which are rote learned. Surface learning is the result of content teaching and learning.

On the other hand, deep learning is concerned with extracting principles and underlying meanings to make sense of facts and feelings and to integrate them with past learning. In other words, it is an intention to make sense of the course content, an interest in the course content material and a desire to maximize understanding (Biggs, 1999). Students taking this approach read widely, discuss, and reflect to satisfy their curiosity, look for meaning, relate ideas to previous knowledge and real life applications, and follow up their own interests even if they are outside the course requirements. A deep approach means that the students learn to think, and analyze more deeply and extensively about the course materials.

Researchers link deep learning to high levels of understanding, and low levels of understanding to the surface approach (Entwistle, 1988). It is also suggested that students who study their course materials deeply are likely to find the material more interesting and easier to understand. Deep learners are the

students every academic discipline desires to attract and deep learning is the approach that educators should encourage students to adopt.

The strategic or achieving approach is that approach which students are said to take when they wish to achieve positive outcomes in terms of obtaining a passing grade or better in the subject. Students taking this approach intend to obtain high grades, organize their time and distribute their effort to greatest effect, ensure that the conditions and materials for studying are appropriate, use previous exam papers to predict questions, and are alert to cues about marking schemes (Lublin, 2003). This approach, when allied with a deep approach to learning in the subject would seem likely to deliver both intelligent engagement with the subject and academic success in the class (Biggs, 1987; Entwistle, 1987). The question is how to foster the deep approach of learning in college and university courses to produce high quality learning outcomes to meet the demands of the 21st century workplace.

Research on Student Learning

Some research findings have categorized Asian students as surface learners. In studies by researchers such as Samuelowicz (1987) and Ballard and Clanchy (1991), it was claimed that Asian students were more likely to be categorized as rote learners (surface learners) compared to Western students. They classified Asian students' learning styles as passive, relying more on memorizing than understanding the subject material, compared with Western students. Biggs (1990), Watkins (1996), Volet and Kee (1993) and Ramburuth (1999) challenged the stereotyping of Asian students as surface and rote learners by testing a range of student groups. Biggs reported that the view that Asian students are surface learners was based on a misunderstanding of learning behavior. Volet and Kee (1993) found that initial differences in the approach to learning between local Australian students and newly arrived Singaporean students disappeared by the end of their first semester of study in Australia. Ramburuth (1999) found no statistically significant differences between the 78 international and 110 local students in their overall approaches to learning in an Australian university. Richmond (2007) also showed that, given the right teaching and learning environment, Asian professionals (students) were able to change their approach to learning, from the traditional rote learning approach, and to take on the critical thinking approach.

The above findings appear to suggest that learning approaches are not set in concrete. Students adopt learning approaches to meet the demands of the learning environment. In light of these findings, it may be useful to review the elements that have been found to influence students' adoption of approaches to learning and how teachers may manage these elements to promote deep learning.

A common concern of educators is the achievement of high quality learning outcomes for students. For students, these outcomes include good technical skills and competencies (Booth, Luckett & Mladenovic, 1999) and the development of analytical and conceptual thinking skills (Davidson, 2002). However, accounting students, for example, have been criticized for not possessing the types of skills and abilities required of graduates, and those skills needed in a rapidly changing accounting profession (American Accounting Association, 1986). Criticism of accounting graduates includes a memoristic approach to learning; the inability to handle complex problems; and a lack of analytical skills, conceptual thinking and communication skills (Booth et al., 1999; Sharma, 1977). Educators cannot ignore such criticism. Prior research indicates that accounting students often adopt higher levels of surface learning and lower levels of deep learning compared to other university students (Booth et al., 1999; Eley, 1992; Gow, Kember & Cooper, 1994). There is a need to shift from teaching content knowledge, which stresses rote learning and conformity, to higher order thinking and learning skills. A South Korean Professor made a timely comment when he said, "Our students are good at regurgitating facts but lack the initiative and creativity to apply them" ("South Korean grads," 2004, p. 9). Educators need to move students away from this focus on facts to deep learning in order to improve the quality of student learning outcomes. Research findings suggest that the learning environment and learning approaches adopted by students are key factors influencing the quality of their learning outcomes (Doyle 1977; Fraser 1989; Ramsden, 1992). The achievement of high quality learning outcomes such as analytical, evaluative, reflective, creative, decision-making, communicative, critical and conceptual thinking skills may not be achieved unless students are encouraged to adopt deep approaches to learning.

As stated earlier in this paper, student approaches to learning are changeable. Research shows that students adapt their learning approaches according to their perceptions of the learning environment (Biggs & Moore, 1993; Eley, 1992, Gow et al., 1994; Ramsden, 1992; Sharma, 1997). This means that teachers can influence the approaches to learning that students adopt by creating an environment that is conducive to deep learning and using teaching techniques and strategies that are considered suitable for the development of appropriate skills and competencies in college and university graduates. This is a challenge for teachers of the 21st century to successfully guide students into higher order levels of understanding and learning to foster qualitatively better learning outcomes for students. This will help to address the concerns of both the professional bodies and employer groups who are currently concerned about, and dissatisfied with the quality of graduates coming out from colleges and universities (Hesketh, as cited in Ng et al., 2009; Ng et al., 2009).

Promoting Deep Learning

The remaining sections of this paper will review and discuss the elements that have been identified as influencing students' adoption of learning styles. The elements in focus are perception of courses, expectations, and teaching approaches; assessment and feedback; workloads; design of assignments and student activities; and teacher enthusiasm. Some suggestions are made as to how teachers can manage these elements to encourage deep learning, which is important in producing high quality student learning outcomes. These are only suggestions. Innovative and creative educators may be able to develop many other ways of using these elements to teach deep learning.

Perception of Courses and Teaching Approaches

In planning course contents, it is not enough to presume students know what is expected. The starting point is often the construction of the course itself. Clear aims and higher order objectives are essential. Course planners need to ask two important questions at this point: What skills, concepts, knowledge, ideas, and levels of understanding do the students have now? What will be expected of them at the end of the course? It is not sufficient simply to write out the course description. Having worked out the aims and objectives of the course which are consistent with deep learning, students should be told what is required and expected of them in a similar explicit way. If this is not done, how can we expect them to know what strategies of learning to adopt? Can we expect them to achieve what is not defined? There is evidence to suggest that students' perceptions of the teachers' expectations have a profound effect on their learning approaches (Entwistle, 1990). In communicating expectations, teachers must guard against being too ambitious. At the undergraduate and even at the graduate level of teaching, teachers need to show recognition of the limitations in students' thinking and analytical abilities. It is problematic for teachers to give too much emphasis to the most advanced theoretical structures, thereby losing sight of students' perspectives.

Literature on student learning suggests that the teacher needs to adopt particular strategies in the organization of the course and teaching techniques that facilitate deep learning (Lublin, 2003). These include ensuring a coherent course structure, clearly spelling out course objectives, arousing enthusiasm and reflecting on teaching, and student activities and responses in the classroom. Methods and techniques recommended for use in teaching deep learning include case studies to address analytical skills, critical thinking and decision-making in an environment of uncertainties, group-based learning and cooperative learning approaches to develop team skills and cooperation, and specific tasks designed to address communication and presentation skills (Booth et al., 1999). Teaching for depth of understanding rather than breadth of coverage and using open-

ended assignments, such as essay questions and group projects, are also useful in promoting deep learning. The teacher can be instrumental in providing students with the preconditions for deep learning using mixed groups, suitable learner activities, and an interactive learning atmosphere. These require the provision of sufficient choices, opportunities for effective group work in case studies and presentations, and group projects, mentioned above, which require teamwork and application of the concepts learned in the course. These teaching strategies and techniques are suitable for the development of the appropriate competencies, skills and abilities required of graduates.

There is a direct link between learning objectives and teaching methods (Lublin, 2003). An educator's choice of teaching methods will in turn have a strong impact on how the students approach their learning. If the objectives include actions indicating higher cognitive abilities, students should be encouraged to *apply, deduce, generalize, hypothesize, reflect, analyze, solve, justify, argue, criticize,* and *evaluate*. The teacher or educator would need to use teaching approaches and activities that would support the development of these higher order skills (Lublin, 2003). Teaching and learning strategies that support the development of higher order skills will involve active participation on the part of the students, such as case studies, problem solving, defending a point of view, presenting an argument, and critical analysis of current issues. Students who are actively engaged in this way will have more meaningful learning outcomes.

Teachers are hired because of their deep subject expertise and the knowledge they can share with students. The problem is that the number of class hours per semester has not changed, but the amount of information in all areas continues to grow. Teachers and educators need to take time to re-examine their course content and the learning experiences they create for their students. The writer believes that questions like the following may help the teacher to decide how to design their course most effectively. (1) What aspects of the subject must the student learn in the course? (2) What attitudes, approaches, and processes are critical for success in this field? (3) What learning outcomes and life-long learning habits must students develop in order to be successful in this field? It is not easy to find answers to these questions. It requires a considerable amount of time to be spent in reflection and some hard choices have to be made. In the end, it will help educators and teachers to make better use of the contact hours they have with students (as well as the assignments), and at the same time, assist students in gaining the skills they need to survive in this age of information explosion. The amount of information available and the speed at which it is growing suggest that the role of the teacher must also change. The teacher can no longer be seen as the content provider or the source of knowledge, but as a learning facilitator. What does this mean for the teacher who has been taking the approach of a content provider? It necessitates that the teacher re-evaluate his or

her teaching methods, revise the course content, and make more effective use of the contact hours available.

Assessment, Grades and Feedback

Assessment is commonly thought of as the single most significant influence on how students approach learning and where they will put their energy (Ramsden, 1988). It is known that students exhibit complex learning behaviors. They may adopt a surface approach to meet the requirements of the task; a deep approach to maximize understanding; or an achieving approach, where a high grade is the sole goal (Biggs, 1993). Karabenick and Collins-Eaglin (1997) alluded to the same thing when they said that assessment itself may discourage a deep approach. Tests and examination questions that emphasize recall will likely cause students to take a surface approach regardless of intended outcomes of either student or instructor. Samuelowicz and Bain's (2002) study further suggests that academics who assess only knowledge reproduction also have the same attitude to teaching.

Students can be pushed into surface approaches by the teaching and assessment strategies adopted by educators, but not as readily into deep approaches (Bowden et al., 1987). If students are successful with a surface learning approach, it is likely to become more difficult to entice them to use another approach. Educators wishing to promote deep, conceptual and analytical forms of learning and life-long learning experiences among students should ensure that assessments given are of such a nature that they will push students toward adopting deep and meaningful learning strategies. Educators and teachers can encourage deep learning by constructing assessments that test students' understanding and hence require them to adopt deep learning strategies. The evidence is compelling. Assessments can be used strategically to improve the ways students learn (Gibbs, 1999).

One way of moving away from surface to deep or full understanding, according to Pask (1988), is to require the student to explain the topic by reconstructing it, thus demonstrating an understanding by applying the principles learned to an entirely new situation. Assessment questions that induce deep learning include cases which require analysis, evaluation, problem solving and decision-making; questions requiring students to present an argument; questions requiring students to apply concepts learned to new situations; situations requiring students to defend a position; use of why questions rather that what questions; open-ended questions, and including ethical dilemmas rather than seeking expected answers. To encourage creative and critical thinking, "what if" questions are helpful. The limit of designing assessments to promote deep learning is the imagination and the innovation of the educator. If the teacher uses deep learning strategies and yet tests surface learning, students

will be very skeptical and surmise that there is a 'hidden curriculum' (Ramsden, 1988).

An emphasis on grades is not conducive to deep learning. It has also been found that students' perceptions of the way marks are awarded strongly influence the approaches to learning (Entwistle, 1988). In the strategy of teaching deep learning, marks should not be awarded for memorization or other forms of surface learning. Entwistle (1988) pointed out that one of the worst results of schools which either deliberately or accidentally encourage rote learning is the long-term effect. Students may be left with the idea that learning is memorization. Although some memorization may be required in learning and some memorized information may stay for years in the mind, such fragmentary knowledge is rarely useful.

Feedback also plays an important role in encouraging deep learning (Lublin, 2003). It tells the students about their achievements as a result of their adoption of certain approaches to learning and informs the teachers what students have learned. All assignments and tests should be assessed and returned to the students with appropriate comments as soon as possible. Assignments and assessments given should be tied to learning outcomes. Assignments and out-of-class work should not be given merely to keep students busy. Busy work is not necessary learning and does not add value to a course. It is important for teachers and educators to give careful thought to designing assignments and student activities to ensure that time spent in doing those activities adds value to student learning and helps generate the desired learning outcomes.

Workload, Appropriate Content and Approaches to Learning

The literature on approaches to student learning makes significant comment about the pressure on students to adopt surface approaches to learning. The results of Entwistle's *Lancaster Approaches to Study Questionnaire*, an adaptation of Biggs' *Study Process Questionnaire* (Ramsden, 1992) claim that a key factor in pushing students into surface learning approaches is their perception of excessive workload. There is mounting evidence to show the relationship between excessive workloads and surface approaches to learning (Sharma, 1997). Entwistle and Tait (1990) also stress the undeniable importance of student workload. There is clear evidence of the correspondence of overload tasks to memorizing, and of demanding courses and bad teaching to poor performance in examinations.

Research studies have established that the amount of time a student devotes to study is an important factor in determining the adoption of an approach to learning. Ramsden (1988) has remarked that enough time should be made available to the students to relate and distinguish new ideas to previous knowledge, to relate concepts to everyday experiences, to relate, and distinguish

evidence from argument, and to organize and structure content. Students need help to gain a perspective on what they are studying, why and how they are studying it, and a concern for learning themselves (E. Chambers, 1992). Moreover, there is a relationship between perception of difficulty and interest in the topic (R. Chambers, 1984). Students are not able to study meaningfully if the subject matter is seen as difficult, and students who find a course very difficult feel anxious and overburdened, which further affects their studies.

For deep and effective learning, students need help and time to develop individual perspectives on the subject matter. It should be the primary concern of course designers and course writers to develop appropriate content and workload to make the learning environment conducive to deep learning. Some of the implications of this sort of teaching include the following:

> Teachers may actually need to restrict the scope of a curriculum, especially in the early stages of students' careers, in order to make the time and provide incentives for them to behave appropriately; to think; go back over things; work towards the broader frame and context from and within which to make their own meanings (individually and in group settings); experiment with their writing; and come to an understanding of how important it is that they begin to find their own 'voice' within these discourses. If students do not have time to do these things, if they are always driven on by the demands of the curriculum, we leave them little choice but to skim along on the 'surface' of things, merely echoing their teachers' voices. (E. Chambers, 1992, para. 17)

Sharma (1997), in his study on variation in students' approaches to learning, draws the same conclusion: that the pressures of workload force students into surface approaches. Educators should be sensitive to institutional contingencies such as workload and course content. They should ensure that students are not overloaded with assignments and other requirements leaving them little time to reflect on their learning in ways such as relating concepts to everyday experience and relating and distinguishing evidence and argument. They need time to gain a perspective on what they are learning, and why and how they are learning it. When students perceive their workload to be heavy, they will often attempt to cope by adopting a surface approach to learning.

Enthusiasm and Learning Approaches

Less concrete elements, such as lecturers' enthusiasm and empathy, have been identified as factors influencing a student's study orientation (Bowden et al., 1987; Clarke, 1995; Eley, 1992; Ramsden & Entwistle, 1981; Sheppard & Gilbert, 1991; Trigwell & Prosser, 1991; Watkins, 1982). Teachers are often

instrumental in arousing enthusiasm for their subject or course. It is much more likely that students will adopt a deep learning approach if the teachers are enthusiastic and knowledgeable about the courses they teach. There are several ways of engaging students, including giving recent issues of controversy within an academic subject area. An alternative way is to encourage students to be aware of the way they have learned in the past and to explain the requirements and benefits of deep learning. Students learn better when the instructor has a well structured and up-to-date knowledge base or is sufficiently familiar with the parts of the subject to be able to make connections between them and relate to students' existing knowledge base (Biggs & Moore, 1993). The way course materials are presented can also be instrumental in motivating and inspiring students to investigate the course contents more deeply, hence adopting a deeper approach to learning.

Summary and Conclusion

Good teaching can influence students to take a deep approach to learning, while poor teaching can pressure students to take a surface approach. Students adopt learning approaches to meet the demands of the learning environment. Research shows that students adapt their learning styles according to their perceptions of the learning situation. 'Spoon feeding' tends to produce surface learners while those learning for understanding and meaning appear to prefer challenging presentations. Researchers have linked deep learning to higher levels of understanding and low levels of understanding to the surface approach to learning.

It has been shown that students' perception of the learning environment has a significant influence on the adoption of approaches to learning and the quality of their learning outcomes. Course structure, relevance of subject matter to students, assessment methods, awarding of grades, work load, feedback, course objectives, design of student assignments and activities, teaching styles, teacher expectations, teacher enthusiasm, and teacher knowledge of subject content are the elements in the learning environment that have been found to influence students' learning approaches.

Literature indicates that surface approaches to understanding are more dominant in students' approaches than deep approaches. The challenge for educators is to successfully guide students into higher order levels of understanding and learning to foster qualitatively better learning outcomes for students. Literature on student learning suggests that adopting a deep learning approach in teaching and student learning can help to address the concerns of both the professional bodies and employer groups who are currently dissatisfied with some key generic skills (e.g., communication, time management, problem solving, etc.) of graduates. The adoption of deep learning strategies by students

and the use of deep teaching strategies and techniques by educators are considered appropriate for the development of the competencies, skills and abilities required of college and university graduates.

Further Research

From this review of literature on teaching and student learning strategies, a number of elements or factors have been identified as important in influencing students' choices of learning styles—surface learning, achieving learning and deep learning approaches. The elements discussed include the course structure, students' perceptions of the relevance of subject matter, assessment methods, awarding of grades, work load, feedback, course objectives, design of student assignments and activities, teaching styles, teacher expectations, teacher enthusiasm, and teacher knowledge of subject content. Assessment is commonly thought of as the most powerful influence of all on how students approach learning and where they decide to put their energy (Lublin, 2003). A further study is being done by the writer of this paper to investigate the importance of each of these elements from students' and teachers' perspectives in determining students' choices of learning approaches in the Asian educational environment. Knowing the relative importance of each of these elements in influencing teaching and learning approaches may be useful for teachers who are attempting to encourage deep learning among their students.

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