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'Your thrust is to understand' – how academically successful students learn

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The article sets out to understand how academically successful students learn. Self-regulated learning theory is used as a lens to explicate the learning strategies adopted by a cohort of academically successful dentistry students. Data were collected from self-report interviews, observations of individual student's learning in a quasi-realistic context, and post-observation interviews. Discussion focuses on the cognitive and metacognitive strategies adopted by these students, and highlights the way in which positive motivation supported their use of these strategies, especially when learning was challenging. The paper concludes by drawing on these findings to argue for appropriate ways to support effective learning for all students.

Keywords: learning; dental students; self regulated learning theory; cognitive strategies; metacognitive strategies; motivation

This paper draws on self-regulated learning theory (Greene and Azevedo 2007; Heikkila and Lonka 2006; Pintrich 2000, 2004; Pintrich and De Groot 1990; Zimmerman 2008), and observation and interview self-report to examine and explain the learning of a cohort of academically successful dentistry students. Understanding how successful students learn has the potential to inform both teaching and learning (Alexander 2006). Insights might inform the kinds of development provided for less successful candidates (Camahalan 2006), as well as teacher development for university educators (Trigano 2006).

The paper commences with a brief outline of self-regulated learning theory. The research context and methodology are then described. The significance of observation and interview self-report as appropriate methodology is highlighted. Thereafter, findings from the study are discussed in detail, interpreted through the lens of self-regulated learning theory. The paper closes with brief reference to the implications of the study for teaching and learning.

How students learn

Self-regulated learning theory is a useful framework for examining the variety of student characteristics that influence successful learning (Pintrich and De Groot 1990; Stone 2000). The model of self-regulated learning synthesizes cognitive, motivational, affective, and social-contextual factors in the construction of explanations of learning (Pintrich 2000, 2004). Two components are recognizable

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(McWhaw and Abrami 2001) – 'skill' (aspects related to cognition and metacognition) and 'will' (affective and social-contextual factors that influence motivation). Pintrich (2004, 388) highlights that the interplay of these factors contributes to academic success – the 'individuals' self-regulation of their cognition, motivation, and behavior that mediate the relations between the person, context, and eventual achievement'.

The 'skill' component comprises the cognitive strategies used to learn, remember and understand material (rehearsal, elaboration, and organization – manifest as making notes in the text or margin, underlining/highlighting text, selection of main ideas, and paraphrasing the main idea), and metacognitive strategies (planning, monitoring, and regulating cognition during learning – manifest as information seeking, time management, and critical thinking) (McWhaw and Abrami 2001; Pintrich 2004; Zimmerman 2008).

The motivational component refers to goal orientation and assumptions about task value (including 'interest' and 'utility value') (McWhaw and Abrami 2001). Goal orientation highlights the reasons the student has for engaging in the learning task (Greene and Azevedo 2007; McWhaw and Abrami 2001). Task value focuses on the student's interest in the subject and assumptions about its importance and usefulness (Pintrich 1989; Pintrich and Schrauben 1992). Overlaying the motivation are affective reactions to the subject, as well as the learner's assumptions about his or her potential competence in the subject (Greene and Azevedo 2007; Stone 2000). Students who believe they are capable engage in more metacognition, use more cognitive strategies, and are more likely to persist at a task (Greene and Azevedo 2007).

In this study, self-regulated learning theory is used to understand the strategies and motivations of a cohort of academically successful dentistry students.

Context and methodology

Studies of learning based on self-report questionnaires abound in the literature (for example, Kieser, Herbison, and Harland 2005; Murphey and Tyler 2005; Pintrich and De Groot 1990; Yip 2007), and there is an emerging agreement that these questionnaires can assess aptitudes or inclination to use self-regulatory strategies (Pintrich 2004). Self-report questionnaires are, however, less effective in capturing actual events or for recording on-going dynamic processes of self-regulation (Pintrich 2004; Zimmerman 2008). To this end, studies in authentic contexts using computer traces, think-aloud protocols, diaries of studying, direct observation, and microanalyses are emerging (Camahalan 2006; Perry et al. 2002; Schmitz and Wiese 2006; Willem, Aiello, and Bartolome 2006; Winne and Jamieson-Noel 2002; Zimmerman 2008).

Pintrich (2004) highlights the potential of observation as a strategy to support self-report in assessing the use that students make of self-regulatory strategies. However, only a few studies make use of this methodology, and these tend to be with young learners (Camahalan 2006; Perry et al. 2002) or using observation to record the strategies of teachers (Perry et al. 2002). Willem, Aiello, and Bartolome (2006) used interviews to ascertain students' accounts of their learning but this was not triangulated with any observation. No studies were available that made it possible to draw conclusions between what students said about how they learnt and direct observation of their actual strategies in authentic contexts.

This paper makes a contribution by using observation as a strategy to support self-report in assessing the use that students make of self-regulatory strategies. Interview self-report, observation of learning, and evidence from post-observation interviews are used to assess the self-regulation strategies of a cohort of academically successful dentistry students. The analytical framework is that of self-regulated learning theory. Methodology draws on a synthesis of aspects of grounded theory (Strauss 1987) and traditional qualitative approaches that use literature as analytical lens.

This synthesis was deemed appropriate for ensuring the best quality data collection and analysis because collection and analysis needed to be informed by what other studies had found about how students learn while remaining sensitive to the unexpected – to factors that were unique to the cohort or which had not been recorded before because other data collection methodologies had not made their recognition possible. Traditional qualitative approaches highlight the importance of grounding observation in current literature since '(n)eglecting to read others' work condemns the researcher to rediscover what is already known and to repeat mistakes that could have been avoided' (Sandstrom and Sandstrom 1995, 180). Research in self-regulated learning theory was used to alert the researcher to the kinds of factors that are currently deemed significant for learning. However, Strauss (1987) warns against the researcher imposing prior expectations on the research context or the data – in other words, finding what the researcher is looking for even if it isn't there, and not seeing what is there. Therefore, data collection and analysis were simultaneously informed by grounded theory, and were sensitive to the need also to allow evidence to emerge (Kennedy and Lindgard 2006).

The cohort was drawn from the third academic year of a five-year dentistry program. The cohort pool consisted of the 10 students (of a class of 100) who had obtained more than 65% in 'dental materials'. Seven students agreed to be research subjects. Although this cohort was small, further students were not included as this would have violated the inclusion criteria of 65% or more. The subject, 'dental materials', was selected because it consists of a large body of theoretical information that needs to be understood in order to be applied in the clinical context in later academic years. Examining how successful students learn such a subject had the potential to reveal the strategies that successful students use when engaged in conceptual learning where mastery of core facts is pre-requisite for understanding.

Triangulation – the collection of data through more than one method (Cohen, Manion, and Morrison 2000) – was a key principle in the collection of data. It is argued that studying human behavior from more than one standpoint provides a richer, fuller account (Cohen, Manion, and Morrison 2000; Denzin and Lincoln 2007), and is a powerful way of ensuring concurrent validity (Cohen, Manion, and Morrison 2000; Denzin and Lincoln 2007).

Triangulation was achieved through compilation of three sources of data – pre-observation interview, observation of student learning, and post-observation interview. Although all three took place within a single bounded period of time, they met the criteria for triangulation (Cohen, Manion, and Morrison 2000; Denzin and Lincoln 2007) as each form of data is independent – self-report for the pre-observation, observed behavior for the quasi-realistic activity providing corroborative evidence or otherwise with regard to the self-report, and self-reflection providing the meanings that subjects ascribe to past observed behavior.

Initial data were collected from a combined interview and observation session that took about two hours per student. The session commenced with a semi-structured one-on-one interview which provided extended self-report information regarding learning strategies, perceptions of personal competence, and attitudes toward, and perceptions of, the relevance of particular learning. This interview was audio-taped and later transcribed.

The self-report interview was followed with observation of learning in a quasi-realistic context in order to record what learners actually do rather than what they recall or believe they do. Each student spent about 45 minutes learning a section of 'dental materials' content of the student's own choice. I argue that this learning should be considered a quasi-authentic task since it needed to be done for the frequent assessments in the subject and was thus authentic. However, the context of that learning was the Education Advisor's Office and therefore not the student's normal learning environment.

The observation was recorded in the form of 'running records' (Perry et al. 2002). Running records are a detailed description of the event being observed. Spradley (1980, 68) highlights the importance of 'concrete language' when describing observations. Researchers are cautioned against generalizing, condensing, or abbreviating the details. Rather, the observer should 'expand, fill out, enlarge, and give as much specific detail as possible' (Spradley 1980, 68). While the literature regarding self-regulatory learning was used to inform the framework for the observations and the subsequent coding, detailed observation was used to record all behavior so as not to neglect unexpected evidence. Immediately after each interview and observation, the running notes were annotated with details regarding events and actions that I had no time to record during the observation.

The final section of the contact session was given over to an interview with the student regarding what had been observed. This was an opportunity to ask the subjects in-depth questions regarding the potential meaning of what I had observed (Gold 1958), and to elicit further information about aspects of their behavior during the observations that was not readily available (for example, metacognitive processes) (Perry et al. 2002). This interview was also audio-taped and later transcribed.

Analysis was influenced by the dual methodology approach. I wished to acknowledge existing literature while simultaneously remaining open to possible new findings – what Strauss (1987) highlights as a mix of analytic and emergent categories. Analysis was carried out in three phases. First, a grid was used to create categories for understanding the evidence. Codes for the names of the students were entered in the first column. As a theme emerged, it was given a descriptive tag (for example, 'concerted linkages with prior knowledge') and recorded in the top row. When evidence from a theme occurred in the interview transcript or observation schedule of a particular student, the page number was recorded under the appropriate heading in the row allocated to the student. As analysis proceeded, more themes emerged. This meant going back to data from previous students to see if there was evidence fitting into the emerging themes that had previously not been recognized as significant.

To confirm the analysis, for each student, the evidence from the interview transcripts and the observations were recorded in full alongside each of the themes. The students were asked to comment on the researcher's interpretation. None of the students disagreed with the thematic interpretations. This strategy also serves as a

form of triangulation as it allows subjects to confirm or refute the researcher's interpretation of the data, thus providing evidence about subjects' interpretation of their own actions.

Only after these two steps had been completed were the descriptive tags compared with characteristics from self-regulated learning theory. This allowed the researcher to make claims that what had been observed and reported was consistent with self-regulated learning theory. It would thus be possible to argue for a relationship between academic success and the use of self-regulation strategies in this particular authentic learning context.

Understanding learning

In the following discussion, qualitative evidence indicates that academically successful students are self-regulated learners. This evidence contributes to Pintrich's (2004) plea to map rich, qualitative data onto psychological models of motivation and learning. For ease of reference, Table 1 indicates the distribution of the tags across the cohort and for each individual. The table permits a brief interpretation of the relative significance of each tag in the learning endeavor of the cohort. The numbers refer to pagination within the interview transcripts and give a sense of the length or brevity of engagement with a particular tag. 'Obs' refers to observation of the factor during the learning activity.

Cognitive strategies

The cognitive strategies of self-regulated learning include rehearsal, elaboration, and organization. Rehearsal manifests as recognition of key points (highlighting or underlining main idea; McWhaw and Abrami 2001) and their repetition (through memorization; Pintrich and De Groot 1990). Elaboration is characterized by strategies like summarizing and paraphrasing (Pintrich and De Groot 1990). Organization is evident when a student creates a personal summary or outline to facilitate learning (Pintrich and De Groot 1990).

Interview self-report, observation, and evidence from the post-observation interviews indicated that cognitive strategies were adopted by all the students for identifying what needed to be learnt. Two descriptive tags referred to *recognition of key points* – identifying the main idea ('I highlight as I go through, what I think is important, so that I know what the key issue is') and looking for cues ('I looked at the topic and I looked at the pictures'; 'I will first study the headings'). Another tag highlighted *repetition through memorization* ('I will try to do it maybe twice or trice'; observation record of student pacing and reciting). The tag, 'strategies for remembering', highlighted *elaboration* and *organization* strategies. These included strategies for *summarizing* (creating mind pictures, 'I have an imagine in my mind of the topic'; writing to remember, 'I can't study without my pencil,' and observation of three students' keynotes in the margins of their texts), *paraphrasing* (for example, teaching someone else, 'the best way of recapping is teaching'; creating a narrative account, 'I'm trying to create a story'), and *organizing* (for example, storing facts under headings, 'by storing in certain headings, I find it is easy for me to remember'; tabulating concepts, 'this table in my head'; constructing mind maps – observed).

Table 1. Distribution of tags within the cohort.

	Recognition of key points			Elaboration and organization			Preparation, planning, and organization of learning				Goal orientation		Interest			Utility and persevere			Affective reaction		
Student	Identifying the main idea	Looking for cues	Repetition through memorization	Remember : summarize	Remember : paraphrase	Remember : organize	For and in class	To understand	Used assessment	Management of time and workload	For dentistry	Useful and important	Interest	Pleasure in learning	Enjoyment of challenge	Learning needs to be done	Clinical relevance	Employment	Self-efficacy	Role models	Lack of test anxiety
C	14, 15	14	20, 21, 22, 37, obs		23		9	6, 7, 9, 10, 14, 16, 17, 18		4, 6	10, 18	10, 18	5, 15	5, 15	4, 5, 10	5, 15	10, 18	10, 18	4, 5, 10	7, 8 9, 10	
Lm	19, 21, obs	20, 21, 22		20		21, 22, 23	5, 6, 7, 8, 17, 23, obs	5, 13, 15, 17, 18, 20, 21, 23, 24, 26, 27, obs	24	5, 8, 9, 12, 13, 14, 18	15, 17, 18, 23, 24, obs	15, 17, 18, 23, 24, obs	10	10	10, 12, 17	10, 17, 18	15, 17, 18, 23, 24, obs	15, 17, 18, 23, 24, obs	4, 9, 10, 12, 16, 17	1, 3, 9, 16	27
S	17, 18	15	5, 6, 13, 16				10, 11, 12	3, 5, 7, 9, 10, 13, 15, 17, 20, 22	22, 23	5, 8, 9, 12, 16	7, 13, 22	7, 13, 22	7, 9, 12, 13	7, 9, 12, 13	6, 7	7, 9, 12, 13	7, 13, 22	7, 13, 22	6, 7	2, 3	
D		20, 21, 27, 28	19, 28	20, 25	20	6, 10, 20, 25	4, 5, 8, 10, 11, 12	6, 8, 11, 13, 15, 16, 17, 19, 23, 24, 25, 26, 27	16, 17, 23	8, 9, 11, 14, 15, 17, 19, 24	6, 13, 15, 23, 25, 27	6, 13, 15, 23, 25, 27	5, 7, 13, 14, 15	5, 7, 13, 14, 15	3, 4, 5, 12, 14	5, 7, 13, 14, 15	6, 13, 15, 23, 25, 27	6, 13, 15, 23, 25, 27‘	3, 4, 5, 12, 14	2	17, 19

Table 1 (*Continued*)

	Recognition of key points		Elaboration and organization				Preparation, planning, and organization of learning				Goal orientation		Interest			Utility and persevere			Affective reaction		
Student	Identifying the main idea	Looking for cues		Remember : summarize	Remember : paraphrase	Remember : organize	For and in class	To understand	Used assessment	Management of time and workload	For dentistry	Useful and important	Interest	Pleasure in learning	Enjoyment of challenge	Learning needs to be done	Clinical relevance	Employment	Self efficacy	Role models	Lack of test anxiety
Lf		14	16, 18, 19	19	15	7	4, 5, 10, 12, 14, 17	5, 6, 8, 9, 13, 15, 19, obs	16	3, 4, 5, 6, 7, 11, 12	6, 9, 13	6, 9, 13	3, 4, 5, 6	3, 4, 5, 6	3, 4, 5, 6	3, 4, 5, 6	6, 9, 13	6, 9, 13		2, 3	9, 10, 19, 23, 28, 32, 33, 34
O	25, 26, obs	Obs	27, 31, grid	10, 27, 28, grid	10	10	1, 12, 13, 28	2, 10, 14, 18, 25, 26, 28, 29, 32	31	1, 9, 12, 13, 15, 16, 17, 23, 30	10	10	13, 14, 16, 18	13, 14, 16, 18	3, 4, 5, 8, 9, 13, 18, 29	13, 14, 16, 18	10	10	3, 4, 5, 8, 9, 13, 18, 29	5, 6, 7	
A		19	18, obs	4, 13, 21	13	13	3, 4, 14, 15	4, 8, 10, 11, 16, 17, 19, 20, 21, 22	23	6, 7, 10, 13, 18	4, 10, 17, 21, 22	4, 10, 17, 21, 22	8, 9, 17	8, 9, 17	8, 9, 13, 17	8, 9, 17	4, 10, 17, 21, 22	4, 10, 17, 21, 22	9, 13	2, 3	11, 19

Metacognitive strategies

Metacognitive strategies plan, monitor, and regulate cognition during learning (McWhaw and Abrami 2001), and manifest when learners consciously plan, monitor, and regulate their learning strategies (Pintrich and De Groot 1990).

Interview self-report, observation, and evidence from the post-observation interviews indicated that cognitive strategies were adopted when thinking about learning, including preparation, planning, and organization of learning. One tag referred to *planning* for classroom learning ('I would like to review some notes and have some core knowledge before we start the lecture so when the lecturer is talking about certain things it is familiar to you'). Another descriptive tag signaled *regulation* of learning in class ('actually sitting and listening and looking'), and *monitoring* of that learning ('Listening solely to the lecturer . . . and the thinking of what questions you can ask for elaboration').

A further tag indicated that these students *planned* for understanding because 'it is easier to learn if you understand'. They consciously adopted strategies that encouraged understanding (for example, identifying the core, 'you should know the general basic principles'; identifying similarities and differences, 'that helps with my understanding – like comparing the difference between the two'; visualizing the clinical application, 'if I don't understand something, I try in a clinical sense to see for myself'; referring back to earlier building blocks of conceptual knowledge, 'I have a pathology book and I can go and read up on that if I really don't understand it').

Yet another descriptive tag indicated that students consciously used assessment requirements to help them *plan, monitor,* and *regulate* their learning. While emphasizing that mastery of the subject was for its later clinical application ('You need to identify what is important so as to diagnose correctly and treat correctly'), they still consciously used assessment to structure their learning ('if you knew her notes as well as she wanted you to know them, it is just all there'). Students were strategic in their methods of study, consciously choosing strategies that addressed both assessment and mastery requirements ('it is better for me to understand it but there are a few chapters or paragraphs that you have to learn parrot fashion. Even though I do understand it, you have to know the details, so you have to parrot-fashion').

A final tag related to management of time and workload. Students *planned* the interface of time and workload ('I set up a timetable as what sections I am going to cover'), *monitored* the interface ('some of the subjects had to be written off, so I ended up dividing my time'), and *regulated* their behavior in this regard ('so I prioritize what I need to do and give it my full attention and then I move on'). In observation, time management strategies were evinced in the way that all these students overviewed what they were planning to learn and explained in post-observation discussion that this strategy allowed them to map what needed to be learnt within the time available.

Motivation

The motivational component highlights goal orientation and task value (including 'interest' and 'utility value'; McWhaw and Abrami 2001). Goal orientation reflects

the reasons the student has for engaging with the learning task (Greene and Azevedo 2007; McWhaw and Abrami 2001). Task value focuses on the student's interest in the subject and beliefs about its importance and usefulness (Pintrich 1989; Pintrich and Schrauben 1992). Overlaying motivation are personal assumptions about potential to succeed in mastering the subject (Greene and Azevedo 2007; Stone 2000).

A number of descriptive tags from the analysis referred to aspects of motivation. Central was a tag revealing students' beliefs about the value of what they were learning and signaling simultaneously *goal orientation* and assumptions about *task value*. Their belief that they needed mastery in the subject in order to be safe and effective dentists served as *goal orientation* ('I actually see why it is so important to understand dental materials. You can't not understand dental materials and go put a filling in a patient's mouth'). This assumption shaped their beliefs about the *usefulness* and *importance* of the subject ('We use dental materials every day so you have to understand the properties. You have to understand what you are doing also').

These assumptions in turn shaped students' *interest* and attitudes toward learning about dental materials, and were revealed in three descriptive tags related to interest ('It interests me so that I like to learn stuff like that'), pleasure in learning, even when it was difficult ('That is why you have to study. It is not studying, if it is not challenging. It is more interesting once it is challenging'), and enjoyment of the challenge of learning, especially things that were perceived to be difficult ('The whole idea of going against the odds. It is interesting and I enjoy it. So I thought that it would be an ideal opportunity to actually show what I am made of. It is all about motivation').

Thus motivated, these students revealed through two descriptive tags how they persevered and managed their efforts. While effort management is arguably a metacognitive strategy for managing learning, Pintrich and De Groot (1990) imply that it reflects rather the attitude to the task than the strategy – as, for example, in persisting even when learning is boring or difficult. The descriptive tag, 'learning needs to be done', best encapsulates this attitude and indicated how students threaded their goal orientation with their motivation to study ('By hating it or running away from it, it is not going to help you as a clinician or a dentist in the future'). A tag highlighting assumptions about clinical relevance accounted for students' perseverance ('I didn't have any expectations of it in the beginning. I just feel that you have to do it. You have to know these things. It is important'). And when all else failed, as revealed in the descriptive tag related to employment, students wove the imperatives of employment with clinical competence in order to sustain their motivation ('The only way I can get a qualification is through learning. It is like the only way I can earn money at the end of the day').

Embedded, however, within these students' accounts of their motivation was the assumption that they would be able to master any learning that they set their mind to ('There is no piece of work that can't be learnt. You just have to psyche yourself up for it'). According to Pintrich and De Groot (1990), *affective reaction* to learning tasks, as well as students' assumptions about their ability to perform the task influence motivation and choice of learning strategies. Students who believe they are capable engage in more metacognition, use more cognitive strategies, and are more likely to persist at a task (Fincham and Cain 1986; Paris and Oka 1986; Schunk 1985). Three descriptive tags related to perceptions of *self-efficacy* (i.e. perceptions of competence and confidence in learning) (Pintrich and De Groot 1990). The first tag

related to assumptions about the relationship between effort and success ('Those are subjects that require a bit more time. That is what it is all about'). However, accounts synthesized both 'doing' (effort) and believing that you can do ('We can only do basically what we believe we can. If I set my mind on doing something, I will get it done'). The students were explicit about the importance to success of believing in yourself ('People tend to step back and say, "I can't". You have to trust yourself').

The second tag relating to self-efficacy highlighted the significance of role models – someone who could be held up as an example of how to behave as a learner, and who reinforced the ideal that effort and self-confidence paid off ('My elder brother was quite phenomenal at school in terms of his grades, his commitment to studying. He was keen on aspects of time management. Having a figure like that, no one needs to teach you').

Finally, Pintrich and De Groot (1990) indicate that 'test anxiety' also plays a role in motivation to learn, the choice of learning strategies, students' attitude and behavior when being assessed. The tag related to attitude to assessment indicated that none of the students feared formal assessment. In keeping with their goal orientation, based on assumptions about the centrality of 'dental materials' to their future effective clinical practice, they constructed assessment as an opportunity to check whether they were on track with regard to mastery ('The assessments would just be personal reading of how much you are taking in – that's all. For feedback'). Indeed, enjoyment while learning and the confirmation of mastery through high marks appeared the driving reward rather than the marks themselves ('I like being stimulated and I like knowing things – so I do it for myself and actually do it for the test. It is nice to know that I can do it').

In describing how these academically successful students learn, discussion has highlighted strategies, metacognition, and motivation. Alexander (2006) signaled that their inter-relationship defines the quality of learning, 'when interest is added to this mix, other critical interactions emerge'.

Supporting effective learning

The purpose of this study was to understand how academically successful students learn so as to support the academic development of less successful students, as well as to inform lecturers of how teaching might better support learning. Analysis, supported by literature, has indicated that three fields of endeavor will need to be developed – strategies for understanding, learning, and remembering; ways to think about and plan for understanding, learning, and remembering; and the desire, will, and confidence to tackle understanding, learning, and remembering.

Four sets of strategies for understanding, learning, and remembering emerged from the data – recognition of key points (identifying main idea and looking for cues), ways to understand, and ways to remember. These cognitive strategies might be thought of as the 'what' of effective learning – what does a student need to *do* to be successful. These are well-known strategies from the study skills self-help literature (Ellis 1995). Research findings suggest that the best predictor of academic performance is study strategy (Diseth and Martinsen 2003; Yip and Chung 2005). Where students come to an academic program without these strategies in place (for example, where individuals struggle academically or where learners are first

generation tertiary candidates), it is recommended that these strategies are explicitly taught (McMillan 2005, 2007). Lecturers can explicitly explain what the main learning outcomes for a session are, where the key ideas are signaled in a particular literature, and how to recognize what it important in a particular subject discipline.

Five metacognition strategies emerged from the analysis. These strategies all focused on planning. Students planned how to use time and to manage their workload in order to be best prepared for class, for learning, for understanding, and for assessment. These strategies might be described as the 'how to' of effective learning – *how* does the student think about and plan for using the cognitive learning strategies. These strategies are less easy to teach as they are more than mechanical. They involve understanding the need to plan, and then utilizing the appropriate planning strategy. However, it is arguable that unless a student *understands* that she/he does need to plan for using the learning strategies (like seeking main idea), she/he is unlikely to make the effort to try. While the metacognitive strategies can and should be taught (McMillan 2005), it is arguable that role models play a significant role in the development of these strategies, and in how they get applied. This much was clear from the testimony quoted earlier. Where such role models are not available, university teachers will need to fulfill the role (McMillan 2005, 2007) – explicitly explaining and demonstrating how planning for learning facilitates effective learning.

Finally, effective learning is supported by a motivational component. This aspect might be understood as the 'why' of learning – what gets that student to engage with the learning activity in a way that makes learning possible. Students from the cohort highlighted five reasons, summarized as valuing the future use of what they were learning, both clinically and for employment, and experiencing pleasure in taking up a challenge and being successful. At the heart of their attitude was a positive self-image. These students believed that they were already successful, and that all they needed to stay successful was to take up the challenge of engaging with something that they already found interesting and relevant. 'Engagement' seems to be central to the attitude of these students. It is doubtful that engagement could be explicitly taught as an academic literacy skill. However, it is arguable that a learning environment could be created that encourages and facilitates engagement (McMillan 2007). Characteristics of this environment would include a learning climate that supports inquiry, opportunities to learn alongside others, a teaching and learning culture where mistakes are seen as part of learning, and opportunities for authentic assessment (Chickering and Gamson 1991; Dunne, Mcaleer, and Roff 2006; Smith et al. 2005).

In the foregoing discussion, the learning strategies and attitudes of effective learners have been enumerated. Discussion has extrapolated the academic literacy knowledge, skills, and attitudes that might appropriately be highlighted for and developed in all tertiary learners. The significant role that the teacher plays in supporting this development has been foregrounded. Indeed, while strategies can be taught to and applied mechanically by students, it is only in a learning environment that makes sense to the learner and where she/he feels safe and valued that effective learning can occur. The learning environment that the teacher creates is thus a significant contributor to the academic success of all learners.

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