Metacognition and Its Role in the Development of Team Competencies

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ABSTRACT

When graduates now enter the professional workplace, their ability to work as effective team members will contribute much to their immediate levels of productivity. Various types of group work are already being incorporated into higher education pedagogies with the stated intention of preparing students for modern workplace environments. Yet preparing for such an important vocational skill is not always so enthusiastically embraced by students. Many students openly state that they do not like working in groups because they believe that they can achieve better outcomes on their own. We investigate in this paper the metacognitive processes that students might engage in to help explain why group activities in an academic environment may be so unpopular.

Keywords: Team work, metacognition, pedagogy, team-learning

INTRODUCTION

There has never been a greater need for mastering team learning in organizations, as team learning will be a critical step in building learning organizations:

"Team learning is vital because teams, not individuals are the fundamental learning unit in modern organizations", (Senge, 1992, p10*).*

Within institutes of higher education, the incorporation of various types of group work into pedagogies is already widespread, yet many examples fail to embrace a rationale for, or the potential benefits of, multiple contributor environments essential in a knowledge intensive society. While perhaps being an ideal candidate to capitalise on the benefits of knowledge sharing behaviours, higher education has generally not realised its potential. The teaching of team learning extends beyond commonly used approaches merely requiring students to produce a report in which they can adopt a jig-saw approach (Biggs 2003) where each individual places their piece in the final task or puzzle.

One high performing post-graduate student recently summarised the apparent view of many when he commented in an email on 3 October 2006:

"My honest opinion is that the way in which we as students are encouraged to work in teams has little or no relevance to the 'real world' (whatever that is) that this university is preparing us for."

It would appear that collaborative learning as a group approach, as distinct from cooperative learning, continues to monopolise the intention of teaching students to learn to work with others, a goal synonymous with team learning. The emergence of newer online learning approaches such as 'intergroup collaboration' still emphasises knowledge access as distinct from knowledge sharing (Palloff & Pratt 1999), dependant on the co-production of knowledge, which itself is dependant on particular contexts or environments in which learning is socially situated (Brown, Collins, & Duguid 1989).

Group work does have a place in learning as one strategy which develops particular skills such as communication, and providing avenues to practise small and discrete skills. In contrast, however, team learning is a significant approach to knowledge sharing which harnesses the synergy of collective knowledge.

Data collected recently from students undertaking various IT degree courses indicated that they were aware of individual qualities that might contribute to team competencies, ably nominating several (Jewels & Ford 2006). However, their ability to apply those qualities was questionable, with many claiming they did not really understand how to be a successful contributor to sustain a team outcome, and particularly how to function in a high performance team. This not only applies to students, it reflects the real world as noted by Katzenbach & Smith (1993).

Knowing what students know about themselves when functioning in the social-cognitive context of teams, and how they monitor this, provides insight into the development of a theory of team learning and a significant contribution to taxonomy of team competencies.

A better understanding of how individuals function in teams, and how teams can learn together would appear to have some important practical benefits.

"Until we have some theory of what happens when teams learn (as opposed to individuals in teams learning) … Until there are reliable methods for building teams that can learn together, its occurrence will remain a product of happenstance", (Senge, 1992, p238).

While others have described ideal team practices and how team building can be encouraged, as yet no-one has developed a theory. To advance the teaching of team learning and its inherent shared knowledge, a conceptual framework is required; one that will embrace the synergy and energy created when individuals aspire to excellence and are intrinsically motivated to accept challenge in dealing with conflict, in order to arrive at new knowledge.

Extending on previous works by Jewels & Albon (2006, 2007), this paper specifically examines the contribution of metacognition in identifying the basis for a theory of acquiring team competencies, beginning with the identification of the metacognitive processes students employ to function either in working groups or higher performing teams. The authors believe that information provided to the following question will assist to advance a theory: What metacognitive strategies do students use to know how to work competently in teams?

Senge (1992) describes the types of teams that we are discussing:

"…where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together", (p3).

Working in a team for students may be seen merely as working in a group, a situation in which they use familiar habits of doing things at the expense of being metacognitive about functioning differently. It may be that because the context involves planning and committing effort to receive a mark and eventually a grade for the unit/subject, in difference to the real world of projects, that theories of motivation are also needed in developing a theory of team learning.

There are many examples of group work currently being conducted within institutes of higher education that appears not to reflect team work at all, but is only characteristic of the poorest of the five levels of group/team performances that is described by Katzenbach & Smith (1993), where effective knowledge management practices are unlikely to occur. A taxonomy, synthesising works

Table 1. Taxonomy for the assessment of team competency maturity (Jewels & Albon, 2006)

Levels of Group/ Team Maturity	Examples of Competency		
	Individual	Team	Organisational
Working Groups	Individuals are only nominally a group coming together to report on individual progress.	Members help each other at a peripheral level in the belief that each member can best perform for the group by working individually.	The organisation only expects group members to provide individual inputs. Tendency to reward individual not group performance.
Pseudo Teams	Psychologically members know they must contribute to team output but cannot see beyond their own view & perspective.	Members know their contribution must interact in the final product and so are prepared to assist each other. Effort is made to listen to and respond to each other.	Explicit acknowledgement of value of teams but no resources or incentives given for team output.
Potential Teams	Members recognise their individual responsibilities but yet to recognise team responsibility.	Members recognize personal skills and those of others; are aware how these can contribute to the success of the team project; have nominated strategies but lack collective accountability.	Support given for overall team performance but lack of acknowledgement of the individual's team responsibilities.
Real Teams	Prepared to up-skill and do additional work as part of accountability to team.	Members hold themselves mutually accountable for the projects direction, development and outcome.	Support and resources given to teams and the individuals in them for current work.
High Performance Teams	Members recognise each others strengths and weaknesses and how the final project can be shaped by these factors.	Members all deeply committed to each others personal growth and success. Contribute so member's contributions are optimised for the collective good.	Support provided to teams and individuals for personal growth that is focussed towards current and future work.

from Katzenbach and Smith, Barnett, and Frame, developed by Jewels & Albon (2006), (Table 1) enables group or team work to be defined and in turn enables educators to set criteria for assessments in accordance with the expectations of each team description or level.

METACOGNITION

Metacognition, a term originally associated with John Flavell (1979), is often referred to as '*thinking about thinking*'.

"Metacognition refers to one's knowledge concerning one's own cognitive processes or anything related to them, e.g., the learning-relevant properties of information or data", (Flavell, 1979, p232).

Metacognition and its inherent internal monitoring of thinking, 'cognitive processes, knowledge, cognitive and affective states, and the ability to consciously and deliberately monitor and regulate' (McCaslin 2004, p279), has a significant role to play in the development of team competencies and their successful application in challenging and complex assessments in higher education contexts.

Most of the research on metacognition has focussed on cognitive factors with little to no studies conducted on social influences on learning (McCaslin, 2004). Flavell (1971) recognised that knowledge of others influenced an individual's thought processes and behaviour. He identified that one monitors one's behaviour in response to differing social contexts. A clear example is the control of people's language in differing social groups or situations: with mates, with the Vice Chancellor, parents or the court room.

Levine, Resnick, & Higgins (1993) have called for more research in understanding cognition in the real world in which *'emotions, social meanings, social intentions and social residues'*, (p64) are inter-related with cognitive activity. Functioning successfully in teams is one such activity which demands we teach students how to understand and monitor themselves, if they are to participate productively in the future world of work, either through implicit structures and behaviours or through direct instruction. Being better informed about what students understand about team performance and its inherent competencies, and also how students might adapt to working in teams, will contribute to enhancing the taxonomy of team competencies originated by Jewels & Albon (2006, 2007).

In contrast to the typical metacognitive instruction used by learners to help them monitor and control effectiveness in learning and problem solving behaviour, this research extrapolates ideas and principles from Lin, Schwartz, & Hatano (2005) and their adaptive metacognition (AM) developed for teachers. AM *'involves both the adaptation of oneself and one's environment in response to a wide range of [classroom] variability'*, (p245).   In a similar way to the action of teaching, in which new and novel problems and situations present themselves, interacting successfully in teams as an integral member also requires individuals to move beyond habit and routine and take on adaptive behaviour. This is in contrast to existing and usual research which has focussed only on individualistic approaches to metacognitive thinking, where problems or needs are clearly defined, environments are stable, and learners are responsive. AM posits that the teaching environment and therefore this current research on the individuals who make up teams that *'problems are ill-defined, and involve a variety of values that may not be in complete harmony'*, (p247). The team member handles *'many interacting factors simultaneously that often cannot be neatly decomposed and treated one at a time'*, Lin et al. (2005, p248), and *'reflects on their values and the consistency between their own values and those of other members…to guide them towards an acceptable solution'*, (p248).

CONTRIBUTION FROM MOTIVATIONAL THEORIES

Self-determination theory (Reeve, Deci & Ryan 2004) raises the issue of the sociocultural forces that support autonomy, competence, and relatedness. Do students perceive the learning environments of universities to value collectivist ideas and solutions? Team allegiance and team cohesion is fundamental to high performance teams but what is the thinking related to achieving this outcome by students? What is the baseline of thinking and behaviour from whence change

will come? Student's behaviour in a team will be affected by the way they think they are expected to behave, or need to perform as a team member. Students perceive themselves to have a defined role – that of the student as established by institutions. When placed in teams, this familiar role is challenged, leaving them unsure how to behave so as to maximize outcomes for the team and develop an 'egoless' team (Weinberg 1971). To realise the potential of teams, academics need to articulate and maintain a strong performance ethic within the university context, such as providing for flexible learning, being available for consultation through various means, providing flexible consultation perhaps through online programs, reviewing timetables, providing meeting rooms or spaces and facilities as well as developing a mind set of teams (Figure 1).

McClelland (1961) cited in Maehr & McInerney (2004) suggested that achievement behaviour was comprised of four distinct but related elements:

- competition with a standard of excellence,
- affective concern for goal attainment,
- an evaluation of performance, and
- some standard for the attainment of a long-term goal.

It is assumed these same four elements also apply to teams, because it is the team who is now motivated to function and work as one. Functioning in this way would also appear to challenge notions of the self, and the self as student who aspires to passing the unit/course. It is further assumed, as noted by Katzenbach & Smith (1993), that if companies with strong performance standards spawned real teams (Table 1), then team members must think about standards, leading to the following questions:

- How do students determine themselves to be self-competent and valuable contributors in team work assessments?
- What is their criteria, and how do they measure and monitor their personal performance?
- Do students think about their behaviour and its impact on the success or failure of the group to achieve shared goals? If so, what questions or attributions do they make?

When we know more about students' thinking, we can take positive steps to assist them acquire self-competence. Davidson, Jaccard, Triandis, Morales, & Diaz-Guerrero (1976), with their etic-emic personal investment model, cited in McInerney & Van Etten (2004), highlighted the conflict an individual has between behaving through habit (adaptive behaviour) and behaving through conscious intent. Teams take the risks associated with conflict and team members deal with the conflict – but how? Intent is affected by larger macro-environment of the institution, lecturer expectations, team member expectations and perceived value of these to the behaviour. The student's normative beliefs affect their intent to behave in the group environment, but again, how are these applied and when?

Goal theory (Schunk 2000), identifies why students want to be successful and translates to why and how students intend to be successful in team work. Identifying metacognitive strategies associated with ability orientations, task orientations or social orientations will assist in developing a taxonomy of competencies for each of the team levels (Table 1). That is, if students metacognitive thoughts focus on gaining social approval, respect or recognition from their team peers, then they are making an effort to conform with social norms. Alternatively a lack of effort may be felt by disapproval and rejection from other team members. Identification of these normed behaviours and how they are established will assist in focussing teaching on students' acquisition of team competencies associated with group dynamics and successful interaction behaviour. In contrast, if students' metacognition reflects attention to demonstrating competence in the team, this may be at the expense of contributing quality work to achieve team outcomes, further contributing to the competences required for each level of the taxonomy. This is also supported by the self-worth theory of Covington (2004) and human motivation theory of Maslow (1954), cited in Schunk (2000), which state the need and focus on approval and acceptance by others is dependent on how competent one is perceived in the eyes of others.

The sociocultural framework of motivation espoused by McCaslin (2004), provides insight into investigating and interpreting the metacognitive thoughts by students engaged in tasks reflecting the levels of team performance. McCaslin contends that, as tasks become more difficult (higher team levels), they *require and challenge the integration and enhancement of the affective and the intellectual in the mediation of goal-directed behaviour',* (p9). Further, *'a focus on peers, shifts*

attention from the social origins of emergent identity…to a notion of continuous coregulation of activity and consciousness', (p9). Obtaining metacognitive thinking about how team member's function in groups or teams should provide insight into understanding the nature of the skills or competencies that concern students.

PEDAGOGICAL IMPLICATIONS

In addition to motivational theories, a teaching model which enables learning in teams, should be selected. Maker & Nielson's (1995) teaching model appears philosophically aligned with the principle of team competencies described by Gilson, Pratt, Roberts, & Weymes 2000; Katzenbach & Smith, 1993; Senge, 1992, providing the initial structure for acknowledging the implicit and intangible features of teams. This model is characterised by four broad non-mutually exclusive categories:

- content,
- learning environment,
- product, and
- process.

The model has numerous specific features, such as complexity, abstractness, mobility, openness and variety which suggest that learning opportunities should be created by centering on complex and abstract content so as to deepen students' understanding of ideas/concepts. This lends itself readily to the management of knowledge where learning is continuous, knowledge is generated and the tolerance and encouragement of initiative is considered significant in students' development of team competency skills. The development of a team-centred approach through this model has the potential to mobilise the efforts of each member to share knowledge, develop shared goals and operate as an effective team.

The model also highlights the impact of an open rather than closed approach to learning, necessary when teams search for solutions to problems. The use of acceptance and evaluation in preference to judgement alone further aligns this model to one suitable for the development of team competencies where responding to ideas critically and constructively is essential. The diversity and differences of team members are accepted as the team sharpens its focus on shared purposeful activities, and opportunities for students to learn with non-traditional classroom pedagogies and spaces is nothing short of essential to the development of team competencies for future managers of knowledge. An emphasis on real-audience and real product is central to the new propounded team-centred approach as this culminates the team's synergy, shared knowledge and aspirations for success.

It appears that Maker & Nielson's teaching model complements both the teaching of team competencies and team competency values. We offer it as a framework for educators to create opportunities to teach team competencies within specific curriculum.

A model proposed by Jewels & Albon (2007), (Table 1) highlights three key factors:

- Mindset of teams – real and high performance teams & individual, team and organisation competency,
- Modelling of team behaviour,
- Assessment drives the learning: complex, challenging assessment tasks.

Figure 1. Multi dimensional team competency teaching model
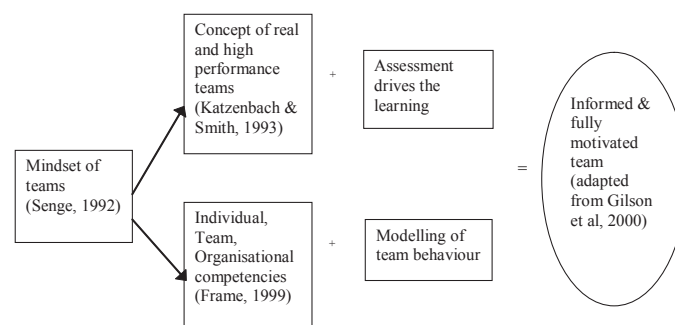
Optimal function of the taxonomy, that is, its eventual use in teaching team competencies at each of the identified levels, is dependent on its expansion, which we argue is obtained through an investigation using metacognition. An analysis of skills will enable categories to be identified and aligned with each level of team.

Although the authors are cognisant of explicit teaching, they value implicit and powerful approaches such as modelling. Following the identification of the social and interpersonal cues, and interpersonal effectiveness to make effective team interactions academics can assist in sensitising all members to achieving and contributing to high performance teams. Of note is the need for students to see the team as accountable for success and equally, failure. It is no longer relevant to be accountable as individuals, but at the same time individuals cannot be loafers. Identifying, through an analysis of student's metacognition, how students monitor their own and others behaviour to arrive at their behaviour in team accountability is important in the development of the team competency taxonomy.

SUMMARY

Traditionally, higher education has predominantly focused at the individual level, even though inroads have been made into student-centred learning and its related group approach. We propose that in order to align more with real-world environments it is also necessary to take into account team competencies in which those individuals operate and to explicitly teach how these team competencies can be realised.

By employing deliberate strategies and making students aware of their conscious behaviour and intent, team competencies may be more readily and consistently acquired. The concept of subordination of the individual goal to that of the team encapsulates the ethos which must underpin the teaching of teams in the higher education contexts, aptly termed team-centred learning as distinguished from teacher-directed or student-centred learning.

University students require more than being physically placed into teams to complete team assessments; they need to learn how to share knowledge. Complex, rich and meaningful assessments force students to draw on the knowledge, attitudes, beliefs of each of its members, and in turn, engage them in the process of learning to be team members and acquire specific team competencies. Performance is the primary objective and the team becomes the means to the end (Katzenbach & Smith, 1993). The discomfort students might feel when they recognise they do not work well in groups is described by Takeuchi & Nonaka (2004):

"New knowledge can also pose a threat to self-image. In order to accommodate new knowledge, people must make changes in themselves – existential changes (Polanyi, 1958) ..... He or she may have to accommodate new routines and technical requirements associated with another line of work. For most of us such a change in work and profession involves a major shift in who we are. Indeed, what we know – and how that affects what we do – is often at the root of personal identity. Because knowledge is so intimately tied to self-image, people often resist anything new. Breaking away from known habits can feel very risky", (p129).

Katzenbach & Smith (1993) state that, *'A demanding performance challenge tends to create a team',* (p3). They note that the drive and need to perform and take up this challenge outweighs other rewards and incentives, and that often potential teams fail to become a team due to the lack of challenge. Academics should therefore set a complex and challenging task beyond the ability of one person to complete if the value of working in teams is to be truly recognised by students.

There are compelling reasons why students need to be equipped to be multi-contributors in the kind of teams required in the future world of work. The research supporting the increased performance when students are explicitly taught how to think using comparisons and reflections paves the way for teaching team competencies in order for students to aspire to and become high performance teams. It is anticipated that problem solving and decision making behaviour would become transparent in addition to instilling a degree of confidence in students. Understanding the metacognitive strategies students use when in any role, particularly those identified by Belbin (1981) will further the development of the competencies for the taxonomy and lay the foundations for a theory on team learning.

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