



A scoping review to identify organizational and education theories relevant for interprofessional practice and education

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Introduction

This report presents the findings from a scoping review of theories¹ in the organizational² and educational literature. The report has three main aims. Firstly, to summarize the theories that have been used within the context of interprofessional education and interprofessional practice. Secondly, to provide an ‘inventory’ of additional theories which could help the design and implementation of interprofessional education and interprofessional practice initiatives. Thirdly, to provide a set of theoretical lenses that could inform empirical findings from studies of interprofessional education and interprofessional practice.

Rationale

Despite a growth in the number of interprofessional education and interprofessional practice initiatives, most have not been informed or guided by the use of theory (Barr et al. 2005). Theory can play a key role in such stages as planning, implementation, and evaluation, and contribute to more rigorous interventions and research. This gap has begun to be addressed in recent efforts, but further use of theory in interprofessional education and interprofessional practice would strongly benefit from the identification and categorization of theories from the organizational and educational fields, which has not yet been conducted.

Report structure

The report is presented in the following four sections:

1. An overview of the nature of theories, their development and the different ways they can be employed.
2. A description of the different theories that have been applied to interprofessional education and interprofessional practice.
3. Presentation of theories that have not yet been employed in an interprofessional context, but which have potential to inform interprofessional education and interprofessional practice.
4. A series of implications for the use of theory within interprofessional education and interprofessional practice contexts.

The nature of theory

Before presenting and discussing particular theories, this section offers an overview of the nature of theory and its possible uses.

A theory is an organized, coherent and systematic articulation of a set of issues that are communicated as a meaningful whole (Meleis 1997). The aim of theory is to provide a generalizable form of reality. Theory can therefore be employed to describe observations, illuminate, explain or predict phenomena, summarize evidence, propose explanations and yield testable hypotheses (Meleis 1997, ICEBeRG 2006).

¹ The term ‘theory’ includes frameworks, models and conceptual approaches.

² The term ‘organizational theory’ includes both business and management theories. It is employed as the sole term for simplicity in this report.

Merton (1968) proposed that theories can be described in terms of their scope, and provided the following three types of theories:

5. A grand or macro theory is non-specific and constructed from relatively abstract concepts which are difficult to operationalize and therefore to empirically test.
6. A mid-range theory is more limited in scope, as it addresses specific phenomena and has a limited number of concepts relating to a restricted range of contexts.
7. A micro or practice theory has the narrowest range of interest, as it is focused on specific phenomena and contexts.

Theories can be explicit or implicit. Explicit theories belong to Merton's categories described above, whereas implicit theories are generated from personal constructions about particular phenomena. As a result, implicit theories have been termed 'armchair' or 'guru' theories. For Eccles and colleagues, explicit theories are easier to implement as they can be compared to cooking, with step-by-step instructions. In contrast, implicit theories are "more akin to an experienced cook who knows the basic components, how they interact, and how many pinches or handfuls of ingredients are required to produce the desired product" (ICEBEeRG 2006:4).

Theories currently applied to interprofessional education and interprofessional practice

This section presents a description of different theoretical perspectives and their contribution to understanding the nature of interprofessional education and interprofessional practice activities.

Search process

Materials for this section were generated from searches of electronic databases (Medline, Cinahl, ASSIA) using a range of terms such as ‘interprofessional’, ‘interdisciplinary’, ‘mutliprofessional’, ‘multidisciplinary’, ‘collaboration’, ‘education’, ‘training’, ‘practice’. Hand searches of health and social care journals that publish interprofessional initiatives (e.g. Journal of Interprofessional Care, Nurse Education Today, Medical Education, International Journal of Rehabilitation and Therapy, Social Work Education, Learning in Health and Social Care and Sociology of Health and Illness) were also undertaken.

Overview

Box 1 provides an overview of theories that have been employed to inform interprofessional education and interprofessional practice. Each of these theories is discussed in detail below.

Perspective	Theories/theorists
Social psychology	Contact theory (Allport) Groupthink (Janis) Group development (Tuckman & Jensen) Social exchange theory (Challis et al) Cooperation theory (Axelrod) Relational awareness theory (Drinka et al) Team reflexivity (West) Realistic conflict theory (Brown et al) Social identity theory (Ellemers et al) Social learning theory (Bandura & Cervone) Self-categorisation theory (Turner) Transformation/transactional leadership (Bass)
Sociology	Discourse theory (Foucault) Surveillance theory (Foucault) Self presentation theory (Goffman) Negotiated order perspective (Strauss) Professionalisation theory (Freidson) Practice theory (Almas) Power and influence theory (French & Raven)

Adult learning	Reflective learning (Schön) Problem-based learning (Barrows & Tamblyn) Experiential learning (Kolb) Situated learning (Lave & Wenger)
Systems	Systems theory (Von Bertalanffy) Presage-process-product (Biggs) Chaos (Krippner) Complexity (Cooper) Activity theory (Engestrom)
Psychodynamic	Loss and change (Marris) Social defence (Menzies) Work-group mentality (Bion)
Organizational	Organizational learning (Argyris & Schön) Punctuated equilibrium (Gersick) Institutional theory (DiMaggio & Powell)

Box 1: Theories used in the interprofessional literature

Social psychology theories

A number of social psychology theories have been used in the interprofessional literature, most notably contact theory, now well established in this literature (e.g. Carpenter 1995, Carpenter & Hewstone 1996, Barnes et al. 2000). Developed by Allport (1954), this theory proposes that the most effective way to reduce tension between groups is to bring them together. Allport maintained, however, that simply placing people together is insufficient to effect positive change, and the following three conditions need to be met if prejudice between groups is to be reduced: equality of status between groups, groups that work on common goals, and groups that co-operate during their contact. Building upon Allport's work, Hewstone & Brown (1986) provided a more detailed range of requirements needed for positive contact, including positive expectations, groups that are successful in their joint work, and groups that focus on understanding differences and similarities between themselves.

Janis' (1982) theory of groupthink and Tuckman & Jensen's (1977) group development theory have also been employed in the interprofessional literature. Groupthink offers an explanation of how groups can 'lose' their ability for critical analysis in decision making. Janis identified seven antecedents that contribute to groupthink, including high group cohesion, the fear of failure, a lack of impartial leadership and insulation from outside expertise. Group development theory explains the developmental process of group work, claiming that groups pass through five stages when working together: forming, characterised by ambiguity and confusion within a group; storming, where friction occurs due to beginning to negotiate how group members can work together; norming, where members begin to find some consensus on their division of labour; performing, in which members work together in a well co-ordinated fashion; and adjourning, in which a group completes its joint work. Groupthink theory was drawn upon by Reeves (2005) to help understand the nature of enthusiasm connected to the development and delivery of an interprofessional initiative for pre-licensure health students. In addition, Reeves employed group development

theory to illuminate how a lack of shared time for professional development within the planning group for this initiative undermined their ability to perform together in an effective manner.

Barr et al (2005) identified social exchange theory (Challis et al. 1988), cooperation theory (Axelrod 1984), relational awareness theory (Drinka et al. 1996) and team reflexivity (West 1996) as highly relevant approaches for informing the interprofessional literature. Social exchange theory states that there is reciprocity in social interactions and that the success of an exchange is dependent upon benefit to all parties involved. There is often an element of self-interest, but also a sense of obligation. Cooperation theory maintains the need for cooperative behaviour by all parties engaged in collaboration, and a lack of such behaviour results in a loss to the overall enterprise and to the parties themselves. Relational awareness theory explains when and how the behaviour of members changes under different conditions. The predominant motivational style of members is 'altruistic-nurturing' under normal conditions, but changes to 'analytic-autonomizing' under conditions of conflict. Team reflexivity occurs when a team spends time together reflecting upon collaborative work. In doing so, it is argued, a team becomes reflexive and functions together in a more integrated and co-ordinated fashion. A reflexive approach within an interprofessional team also supports members' abilities to adapt and respond to changes in their collaborative work.

Hind et al (2003) have drawn on three social psychology theories, realistic conflict theory (Brown et al. 1986), social identity theory (Ellemers et al. 1999) and self-categorisation theory (Turner, 1999), to inform the development of their interprofessional initiative for pre-qualification students from five different professional groups. Furthermore, Ginsburg & Tregunno (2005) drew upon social learning theory (Bandura & Cervone 1983) to help inform their analysis of the role of interprofessional education and collaboration within an organizational change context.

The leadership of interprofessional teams was explored by Onyett (2003) who drew upon Bass' (1997) theory of 'transactional' and 'transformational' leadership. The former type of leaders adopt an authoritative approach to their work with team members, tend to work in isolation from the team, and make decisions without including other team members. In contrast, the latter type of leader adopts a democratic approach to their work, work flexibly with team members, and promote creative problem solving. For Bass, an important element underpinning transactional and transformational forms of leadership is that of charisma – leaders are charismatic individuals who use this trait effectively in their work.

Sociological theories

Foucault's theories of social power, discourse (Foucault 1972) and surveillance (Foucault 1979) have been employed in the interprofessional literature. Discourse theory provides an understanding of a particular culture, its language, and the behaviour of individuals who belong to that culture. Discourses provide the overall shape to a culture and define what becomes accepted as 'truth' and 'fact'. Surveillance is another dimension of social power. For Foucault, the use of self-surveillance and surveillance by others is crucial to ensuring that individuals remain compliant to a particular discourse. Koppel (2003) drew on both discourse and surveillance theories to explore how the growing influence of health service management affected the education of health care professionals. Regan de Bere (2003) also drew upon discourse theory in her evaluation of an interprofessional intervention for doctors, nurses, social workers and service users based in mental health settings.

Goffman's (1963) theory of self presentation and Strauss' (1978) negotiated order perspective have also been employed in the interprofessional literature. Goffman's (1963) theory proposes that individuals engage in a process called 'impression management', whereby impressions of self are actively managed by individuals during their social interactions. For Goffman, the presentation process was regarded as a 'performance' undertaken in two distinct areas: public front region performances such as meetings between work colleagues or professional-patient

consultations, and private back region performances such as interactions between friends and family members. The negotiated order perspective developed by Strauss (1978) explains how social order operates within organizations. Through on-going negotiations, individuals essentially create and shape organizational rules and structures, which contribute to the maintenance of social order within an organization. Reeves (2005) drew upon both Goffman's and Strauss' theories to illuminate the uses of formal and informal collaborative practices and understand the central role of negotiations in achieving success during the development and delivery of an interprofessional initiative for students from four professional groups.

Power and influence theory (French & Raven 1959) focus on the degree and nature of power that leaders hold and how this power can be used to influence individuals inside or outside an organization, in subordinate or superior position, or peers. French & Raven proposed five types of power that influence the effectiveness of leaders: reward, coercive, legitimate, expert and referent. The five types of power represent a spectrum of what is considered traditional authority based forms of power to less formal leadership based on respect and influence. Hugman (1991) employed French & Raven's conceptualisation of power to understand the nature of interprofessional relations between health and social care practitioners.

Freidson's (1970) professionalisation theory is another theory used to inform interprofessional education and interprofessional practice. Professionalisation is a process undertaken by occupational groups to secure exclusive ownership of specific areas of knowledge and expertise. Both Skovholt et al. (1994) and Connolly (1995) have drawn on this perspective in their interprofessional education studies.

Barr et al (2005) identified practice theory developed by Almas as another sociological perspective that could inform our understanding of interprofessional education and interprofessional practice. Practice theory illuminates the processes by which entrants to the health professions come to hold a collective professional identity through their 'common learning' experiences. By entering a health professional education system, cultural capital is obtained by those individuals. This capital includes a set of profession-specific values, traditions and competences.

Adult learning theories

In general, there is limited use of explicit adult learning theory within the interprofessional education literature; more typically, authors have tended to implicitly draw upon the principles of adult learning theory in the design of their interprofessional initiative. The studies that do explicitly incorporate an adult learning perspective have largely drawn upon the work of Knowles (1975), Schön (1983), Barrows & Tamblyn (1980), Kolb (1984) and Lave & Wenger (1991). Useful examples of the explicit use of adult learning include:

- Mann et al. (1996) drew upon Barrows & Tamblyn's (1980) theory of problem-based learning to develop an interprofessional course to improve understanding of health promotion issues for doctors, nurses, dieticians, pharmacists and social workers.
- Lia-Hoagberg et al. (1997) employed Knowles' theory to develop an interprofessional course to understand teamwork for nurses, social workers, nutritionists and medical assistants.
- Freeth & Nicol (1998) employed Kolb's (1984) theory of experiential learning to develop an interprofessional initiative to improve the clinical and communication skills of final year medical students and newly qualified nurses.

Barr et al (2005) also provide helpful descriptions of problem-based learning, Knowles' theory of adult learning, Kolb's theory of experiential learning, Schön's theory of reflective practice and Lave & Wenger's theory of situated learning, as well as narrative based learning, action based learning, practice-based learning, e-learning and blended learning approaches.

Systems theories

Von Bertalanffy (1971) developed the concept of 'system' as an antidote to the limitations of individual disciplines in addressing complex social problems. In contrast, systems theory could be applied across the natural sciences and social sciences. This approach regards organizational systems as wholes (therefore more than the sum of their parts). Interactions between parties are seen as purposeful, boundaries as permeable, and cause and effect as an interdependent not linear process. Discussing the uses of this approach, Barr et al (2005) argue that interventions by one profession at one point in a system will affect the whole in ways that will be experienced from multiple professional perspectives.

More recently, systems approaches have been introduced into the interprofessional field in the form of complexity theory, activity theory and the presage-process-product model. Cooper et al. (2004) discuss the use of complexity theory within an interprofessional education context, arguing that in understanding the complex nature of developing an interprofessional education, an evaluator must employ multi-methods designs to investigate cognitive, emotional and social-environmental issues attached to this form of education.

Another systems approach, chaos theory (Krippner 1999) was employed by Velde et al. (2002) in their paper exploring the development and implementation of an interprofessional course for health sciences students. As a branch of mathematical sciences, chaos theory attempts to understand the underlying order in processes that seem not to have any guidelines or principles.

Velde and colleagues argue that this theory can provide interprofessional education developers with an understanding of the flux between order and chaos when working within complex educational systems.

Freeth & Reeves (2004) draw upon the presage-process-product (3P) model originally devised by Biggs (1993) from his analysis of systems thinking to describe how it could be applied to the development of interprofessional education. In doing so they identify a number of relevant interprofessional presage factors (government policies, negative stereotypes), process factors (facilitation approaches) and products (interprofessional learning outcomes). More recently, Reeves & Freeth (2006) employed this model to inform the analysis of a study of an interprofessional intervention for community mental health teams.

Activity theory, developed by Engestrom et al.(1999), provides a means to understand relations at micro and macro levels and their effect in changing interpersonal, interprofessional and inter-agency relations,. Engestrom developed Vigotsky's concept of mediation into a triangle of individual relationships: 'subject', 'object' and 'mediating artefact' to examine systems of activity. Reeves & Lewin (2004) recently applied one of the concepts of activity theory, 'knotworking' (whereby individuals tie, untie and re-tie separate threads of activity during interactions), to a health care setting to help understand the nature of teamwork in relation to temporal-spatial pressures.

Psychodynamic theories

Another approach used in the evaluation of interprofessional education is Marris' (1986) psychodynamic theory of loss and change that posits that individuals often experience a number of losses when change occurs. Marris maintains that fear of such changes contributes to unconscious feelings of anxiety, which can create resistance to change. Holman & Jackson (2001) drew upon Marris' theory in their evaluation of seven interprofessional workshops for staff caring for older adults.

Barr et al (2005) also identified social defence theory (Menzies 1970) and work-group mentality theory (Bion 1961) as two theories with potential to inform interprofessional education and interprofessional practice. In developing social defence theory, Menzies found that nurses, who normally collaborated well with other professions, became

defensive when they were working under stress, and tended to become less collaborative in their work. Work-group mentality theory explains the unconscious processes involved in a group unable to deal with its 'primary task' – the central task the group has consciously agreed to undertake. According to this approach, groups will often waste time and avoid making decisions in order to prevent members from tackling potentially difficult group issues.

Organizational theories

Another key approach employed in the interprofessional literature is organizational theory (Argyris & Schön 1978). A key concept of this approach is the learning organization in which individuals work and learn together to collectively improve the quality of their work environment and the products or services they provide. Through ongoing learning (termed as 'double-loop learning'), which is often linked to continuous quality improvement (CQI) or total quality management (TQM) initiatives, a learning organization can improve its performance by developing high staff morale, improving interprofessional collaboration, effectively using resources and enhancing user/consumer satisfaction. A growing number of interprofessional education and interprofessional practice studies are beginning to explicitly draw upon organizational learning theory as a way to enhance collaboration and improve the quality of care delivered to patients (e.g. Hickey et al. 1996, Heckman et al. 1998, Wilcock et al. 2002). Barr et al (2005) also provide detailed descriptions of the learning organization, CQI and TQM, and their potential contribution to interprofessional education and interprofessional practice.

In addition, Ginsburg & Tregunno (2005) made further use of organizational theories by incorporating both institutional theory (DiMaggio & Powell 1983) and Gersick's (1991) punctuated equilibrium model – approaches which stress the need to examine contextual influences – to inform their analysis of the role of interprofessional education and interprofessional practice

Theories with potential to inform interprofessional education and interprofessional practice

This section presents a description of theories which have not yet been used in interprofessional education and interprofessional practice, but which have potential to inform such initiatives.

Search process: organizational theories

This section outlines the search process employed to identify relevant organizational theories.

In collaboration with University of Toronto business librarians from the Business Information Centre and the Industrial Relations and Human Resources Library, it was decided to use these sources to identify key business theories, models and frameworks: Business: The Ultimate Resource. Cambridge MA: Bloomsbury Publishing (2006),³ the Dictionary of Business and Management (online resource) and the Oxford Reference Online Premium. (2006, 4th Edition).⁴

This initial search produced a list of potential theories (see Appendix 1), each of which was then reviewed using organizational websites, to identify those with relevance to interprofessional practice. Theories which exclusively focused on finances, economics, markets, profit-making, etc were excluded. The resulting subset of theories was then searched on the electronic database Proquest (an electronic database that contains key organization, business and management literature) to locate papers that have employed them. To ensure a manageable amount of generated citations given the large amount of theories identified, searches for the terms offering results of more than 100 citations were further refined by date (only papers published in the last 10 years were included) and by journal type (only papers from peer reviewed journals were included)⁵ (See Appendix 2).

Findings from the searches were re-examined to establish whether the theories they have employed ‘fitted’ the focus of this review (i.e. had potential to illuminate and enhance our understanding of interprofessional practice) (Appendix 3 contains a list of all those theories which were excluded with reasons for their exclusion).

A final ‘filter’ was applied to this search process. If the organizational theory was previously discussed in the interprofessional literature (see above) it was excluded from this section of the report.

Search process: educational theories

This section outlines the search process employed to identify relevant theoretical and conceptual work.

The following sources were consulted in the search for a comprehensive listing of educational theories: the University of Toronto library catalogue, education librarians, the Internet (Google, Google Scholar) and a library reference listserv (LIBREF-L). These consultations resulted in the identification of two websites: ‘emerging technologies’ which contained over 15,000 educational resources organized by topics for teachers and students⁶

³ In particular, the sections entitled ‘Business Thinkers’, ‘Dictionary’ and ‘Management Library’ were reviewed.

⁴ Keywords entered were ‘theory(ies)’, ‘model(s)’, ‘framework(s)’

⁵ Proquest contains the a number of key databases including: ABI/Inform Global; AMA Titles: Abstracts and Indexing; Banking Information Source; Business Dateline; Canadian Newsstand - Major Dailies; Canadian Research Index; Dissertations and Theses; Pharmaceutical News Index; Proquest Asian Business and Reference; Proquest Computing; Proquest European Business; Proquest Telecommunications; Research Library)

⁶ Available at: http://www.emtech.net/learning_theories.htm (accessed April 2007)

and ‘theory into practice’ contained a detailed list of key educational theories. In addition, an educational theory textbook (Leonard 2002) that offered a comprehensive categorisation of educational theories was finally employed. This search produced a list of potential theories⁷ (see Appendix 4).

Each of these provisionally identified theories was then searched in ERIC (Education Resources Information Center) and the BEI (British Education Index). The search strategy and total number of articles found for each theory are listed in Appendix 4. Results exceeding 100 were further refined by date (only papers published in the last 10 years were included) and by journal type (only papers from peer reviewed journals were included) (see Appendix 5).

Findings from the searches were re-examined to establish whether the theories they have employed ‘fitted’ the focus of this review (i.e. had potential to illuminate and enhance our understanding of interprofessional education) (Appendix 6 contains a list of all those theories which were excluded with reasons for their exclusion).

A final ‘filter’ was applied to this search process. If the educational theory was previously discussed in the interprofessional literature (see above) it was excluded from this section of the report.

Included theories

The theories with potential to inform interprofessional education and interprofessional practice have been organized and presented in the following categories: ‘theories with an individual focus’, ‘theories with a team/group focus’ and ‘theories with an organizational/systems focus’⁸ (Box 2). Each theory is discussed in detail below, including a brief description of its applicability to interprofessional education and/or interprofessional practice.

Focus	Theories
Individual	Action centred leadership Active learning Attribution theory of leadership Discovery learning Leadership grid Mind mapping Situational leadership theory Valence-instrumentality-expectancy theory Vroom-Yetton leadership model
Team/group	Abilene paradox Action learning Autonomous work groups Case based learning Collaborative/cooperative learning

⁷ Available at: <http://tip.psychology.org/theories.html> (accessed April 2007)

⁸ These categories are not mutually exclusive, as theories will often span more than one of the three foci. The aim of employing this organizing system was rhetorical – to offer an accessible approach to categorizing contrasting theoretical and conceptual work.

	Collective effort model Existence relatedness growth theory Field theory Inquiry-based learning Sensitivity training Synchronous learning T-groups Team learning
Organization/system	Behavioural theory of the firm Contingency theory Differentiation-integration theory Diffusion of innovation theory Implementation theory Leavitt's diamond Organizational theory Stakeholder theory Socio-technical theory Unfreeze-change-refreeze Virtual learning community

BOX 2: THEORIES WITH POTENTIAL TO INFORM INTERPROFESSIONAL PRACTICE/EDUCATION

Theories with an individual focus

Nine organization and education theories (action centred leadership, active learning, attribution theory of leadership, discovery learning, leadership/management grid, mind mapping, situational leadership theory, valence-instrumentality-expectancy theory and vroom-yetton leadership model) are discussed in this section. These theories provide an individual focus on understanding issues linked to interprofessional education and interprofessional practice.

Action centred leadership

Developed by Adair (1973, 1988), action centred leadership focuses on leaders' functions, rather than on any personal qualities they may possess. There are three complementary functions that the leader, to be effective, must attend to: achieving the task, building and maintaining the team, and developing the individuals in the team. Leaders, according to Adair, are most effective when they address all three functions simultaneously.

Adair details a range of activities for each of these three functions. For 'achieving the task', leaders need to: identify aims, purpose, and direction; identify resources, people and processes, create a plan to achieve the task; establish responsibilities, accountabilities and measures; and set standards, quality, time and reporting parameters. In relation to 'managing the team', leaders need to: establish, agree and communicate standards of performance; establish the culture and approach of the group; monitor and maintain integrity and focus on objectives; anticipate and resolve group conflict, struggles or disagreements; and give feedback to the group on overall progress. In relation to

‘managing individuals’, leaders need to: understand the team members (i.e. skills, needs); identify/agree upon appropriate individual responsibilities and objectives; and train/develop individual team members. Adair also outlines a five-stage problem-solving process within this model, arguing that it is the leader’s responsibility to systematically guide an individual or a team through this process. The five stages are: define the objective; collect information and opinions; develop options; evaluate and decide; and implement and monitor.

The action centred approach to leadership has been employed to structure leadership training programs (Despres 1982, Firman 1987). It has also been used as a theoretical lens to understand the nature of leadership in a context of organizational change within a higher education setting (Rutherford 1992).

This approach to leadership is applicable to an interprofessional practice context as it emphasizes teamwork. At its core, this approach to leadership aims at promoting effective teamwork, developing shared values, purposes and goals, and building and maintaining the dynamics of the team.

Active learning

Active learning encompasses several types of activities that encourage active and autonomous learning. This approach to learning draws upon a range of techniques where learners are not merely listening to instruction, but are engaged in activities aimed at discovering, processing and applying knowledge. According to Meyers & Jones (1993) active learning rests on two assumptions: learning is by nature an active endeavour and different learners learn differently. Elements of active learning, state these authors, are talking, listening, writing, reading, and reflecting. Bonwell and Eison (1991:2) describe key elements of active learning as “students [who] are involved in more than listening, less emphasis is placed on transmitting information and more on developing students’ skills, students are involved in higher-order thinking (analysis, synthesis, evaluation), students are engaged in activities (e.g. reading, discussing, writing) and greater emphasis is placed on students’ exploration of their own attitudes and values”.

Research has indicated that active learning can be an effective approach for developing and retaining subject knowledge and enhancing critical and problem-solving abilities. Huxham (2005), for example, examined the effects of short ‘interactive windows’ (discussions and problem-solving exercises) for university students and found that this active learning method was a very popular feature of the students’ learning. In addition, work by Cortright et al (2005) indicated that pausing two to three times during a lecture to engage in active learning (i.e. problem solving discussion) helped improve student learning and problem solving skills.

Active learning is highly applicable to IPE, as a range of active learning methods such as discussion, debate and role play can promote interprofessional interaction among participants in the development of their collaborative competencies.

Attribution theory of leadership

The attribution theory of leadership, developed by Weiner et al. (1972), has its foundation in psychology, and was originally devised to explain how individuals interpret events and how their interpretations relate to their thinking and behaviour. The theory is based on the assumption that individuals have an inherent need to explain the events around them; the cognitive process of assigning causes to events is regarded as the attribution process.

The theory proposes that leadership is an attribution that individuals ascribe to others. Individuals judge ‘effective’ leaders as those who have high levels of task achievement and of interpersonal relationship. Effective leaders are perceived to be consistent and unwavering in their decisions.

Research has focused on describing a leader's behaviour and/or exploring the effect of attributions made by people about their leaders (e.g. Yagil 1998, Nye 2002, Gibson & Schroeder 2003).

This theoretical approach provides a useful way to broaden our understanding of interprofessional education and interprofessional practice. In particular, it provides a lens to understand how individual professionals construct notions of leadership within the interprofessional teams in which they are situated.

Discovery learning

Discovery Learning is a learner-centred inquiry-based method (Jacobs 2005). This approach is based on the notion that discovery learning takes place most notably in problem solving situations where the learner draws on his own experience and prior knowledge to discover the truths that are to be learned. This type of learning therefore takes place within a personal, internal, constructivist learning environment. For Bruner (1961), discovery learning "teaches one to acquire information in a way that makes that information more readily viable in problem solving" (p26), and as such, individuals 'learn by doing'. Discovery learning is a method of instruction through which learners can interact with their environment and each other by, for example, exploring issues and questions through group discussion.

While there is some evidence of the positive effects of discovery learning (e.g. Saab et al 2005, Veermans et al 2006), a literature review by Kirschner et al (2006) found that there was not a great deal of empirical data which supported the use of a discovery approach. Despite some uncertainty in its evidence-base, this approach provides a potentially useful way forward for IPE. A discovery approach can provide learners from different professions opportunities for interaction by using group discussions of pertinent professional/clinical problems/issues.

Leadership/management grid

The leadership/management grid, developed by Blake & Mouton (1968), was based on a model of interrelations among styles of management (rooted in the social-psychology and group theory). This approach specifies five styles of management, described as avoiding, accommodating, compromising, competing, and collaborating. Blake & Mouton proposed that these styles vary on two dimensions: 'concern for people' and 'concern for production', and they developed a nine point scale in which a score of '1' represents minimum concern and a score of '9' represents maximum concern. People are classified into the five management/leadership styles on the basis of which of the two dimensions in the grid they occupy. Another element of this approach is the recognition of a process of converting available team/group resources (i.e. skills, experience, enthusiasm, education, training) into maximum results (i.e. new services, process improvements). For Blake & Mouton, achieving success in this process relies entirely on the quality of relationships between managers and their employees.

An early criticism of this theory was that its evidence was primarily based on 'testimonial' accounts rather than on empirical studies (e.g. Huse et al. 1975). Nevertheless, a small number of studies have recently employed this approach in their work. Von Lubitz & Wickramasinghe (2006), for instance, drew upon this theory to understand the nature of effective leadership in complex organizational environments. In addition, Wright (1996) drew upon this approach, as a key management/leadership theory, in his work that explored effective leadership across a number of organizations.

This theory provides a potentially helpful approach to enhance understanding of leadership and management issues linked to interprofessional teams/groups. For example, it could provide a useful illumination of the leadership process related to transferring a team's resources into collaborative outcomes.

Mind Mapping

Mind mapping is an approach which allows the graphic reconstruction of knowledge. It has been argued that the increasingly complex task environment in education and work settings combined with high density information requires new learning and knowledge retention strategies (Tergan et al. 2006). Mind mapping helps organize information via hierarchies and branches. At the centre is an image displaying the key topic to be explored. Branches labeled with key words indicating major topics associated with the central topic radiate from the central image. According to Pollitt (2003), mind maps help integrate many of the brain's learning skills and principles and thus enhance creativity, memory and cooperation.

Mind mapping has been widely used in education. Budd (2004), for example, argues that mind maps is an active and collaborative learning tool that is responsive to different learning styles as it provides the learner with visual and tactile experiences. Eppler (2006) has compared mind maps to three other visualization tools (i.e. concept maps, conceptual diagrams and metaphors) and highlighted the strengths and weaknesses of each tool. He suggested that these tools should be used in complementary ways to enhance motivation, attention, understanding and recall in the learning process.

Mind mapping can be effectively used by interprofessional learners to introduce new concepts (such as collaborative patient-centred practice, interprofessional competencies) or explore important areas related interprofessional collaboration. The availability of software packages are increasingly helping to support this process (e.g. Eppler 2006).

Situation leadership theory

Situational leadership theory presumes that different leadership styles are better in different situations, and that leaders must be flexible to adapt their style to a particular situation. This approach is not only applicable to individual leadership positions, but also to the contexts in which this leadership occurs.

Hersey & Blanchard (1969) developed this theory to allow individuals to analyze the needs of a situation, and then to adopt the most appropriate leadership style. The approach rests on two fundamental concepts – leadership style and development style. They characterized leadership style in terms of the amount of direction and support that the leader provides to their followers. They argue that all leadership styles fall into four behaviour categories, S1 (directing), S2 (coaching), S3 (supporting) and S4 (delegating), which can be described on a continuum from tight to loose guidance and supervision.

An appropriate leadership approach, Hersey & Blanchard maintained, did not only depend on the situation but also on the needs of the individuals being led. Blanchard & Hersey therefore included the notion of development level of the follower. This was categorized as the degree of competence and commitment followers have in relation to a given task. They categorized the possible development of followers into four levels D1 (low competence, high commitment), D2 (some competence, low commitment), D3 (high competence, variable commitment) and D4 (high competence, high commitment). According to Blanchard & Hersey, a leader's style (S1-S4) should correspond to the development level (D1-D4) of the follower. It is the responsibility of the leader to adapt to the situation and the follower's needs.

This theory has been employed across a number of organizational settings. For example, Lockwood-Rayermann (2003) used this approach to identify leadership traits in nursing preceptors. In addition, Meyer (2002) found that situational leadership can be implemented by clinical instructors while teaching and supervising students in the clinical setting to improve the education process.

This particular approach to leadership can be usefully applied to an interprofessional setting, as it provides a complex account of the different situational factors that may affect how leaders work within interprofessional teams. In particular, this approach can be used to explore how to motivate team members, how to improve team productivity and effectiveness, or how to interpret problematic team dynamics.

Valence-instrumentality-expectancy theory

Introduced by Vroom (1964), valence-instrumentality-expectancy (VIE) theory aims to provide an explanation of key factors that motivate individuals in their work. The theory assumes that the work behaviour of an individual is the product of conscious choices that are made in achieving certain goals or outcomes. Three key elements linked to this theory are valence, instrumentality and expectancy. Valence is defined as the emotional orientations that individuals hold towards goals. These emotional orientations allow individuals to rank available choices. Instrumentality is linked to effort. If an individual believes that there is a high probability that a good performance will be instrumental to achieving their goals, then it is likely that they will place a high value on performing well. Expectancy refers to an individual's belief that a particular performance is attainable. Factors that contribute to an individual's expectancy perceptions include their level of confidence that they have the skills necessary for the task, the amount of support that they may expect, and the availability of pertinent information.

VIE theory has been employed by a number of authors to explain the nature of motivation within organizational life in order to provide management with an approach to improve productivity (e.g. Lawrence et al 1977, Eden 1988, Woodard et al 1994).

This theoretical approach may be used to reflect on individuals' motivations concerning a task that requires an interprofessional approach. It may also prove useful in conceptualizing approaches to increase motivation of team members.

Vroom-Yetton leadership model

This model focuses on leadership and decision-making. It is linked to the notion of situational leadership, which aim to explore the complexity of situational factors that influence decision-making. According to this model, effective leadership is a product of deciding on a particular course of action after taking into consideration a variety of contextual and situational factors.

The model outlines five types of decision making styles: autocratic 1 (problem is solved using information already available); autocratic 2 (additional information is obtained from group before leader makes decision); consultative 1 (the leader discusses problem with the group before making a decision); consultative 2 (the problem is discussed with the group before deciding) and group 2 (the group decides upon problem, with leader acting in a facilitative manner). Situational factors that may affect decision making include motivation and capability of group members, the relationship between the leader and the group, and the leader's perception of the group's ability in reaching a decision and problem-solving.

More recently, an expanded version of this model, the Vroom-Yetton-Jago model (Vroom & Jago 1988) was produced. This version of the model provides a more comprehensive outline of key factors affecting the quality of decision making, which include: quality requirement (importance of the technical quality of the decision); commitment requirement (importance of group commitment to the decision); problem structure (clarity, organization, possibility for solution) and goal congruence (shared nature of organizational goals between leader and group).

A number of authors have employed the expanded model in their work. Tjosvold et al (1986), for instance, tested this model with 58 managers enrolled in an executive-level MBA program and found that it was useful at the preplanning stage for choosing a decision style. More recently, Yukl (2001) discussed this model and argued that it remained a key approach for decision making among organizational leaders.

This approach to understanding the nature of organizational decision making could be effectively employed in an interprofessional practice setting. Specifically, it could provide a more comprehensive understanding of the interplay between leadership, team dynamics and decision making processes that occur within interprofessional groups.

Theories with a group/team focus

Thirteen organizational and education theories (Abilene paradox, action learning, autonomous work groups, case based learning, collaborative/cooperative learning, collective effort model, existence relatedness growth theory, field theory, inquiry-based learning, sensitivity training, synchronous learning, T-groups, team learning) are presented and discussed in this section. These theories provide a group/team focus on understanding issues linked to interprofessional education and practice.

Abilene paradox

The Abilene paradox is a conceptual approach developed by Harvey (1988) which helps explain problematic decision-making. The actual paradox occurs when a group of people collectively decide on a course of action that is counter to the preferences of any of the individuals in the group. It involves a common breakdown of group communication in which each member mistakenly believes that their own preferences are counter to those of the group and does not raise objections.⁹

Harvey outlined six specific symptoms that reflect the existence of the paradox within a group. Firstly, individuals in a group agree about the nature of the problem they need to resolve. Secondly, these individuals agree, privately, about the steps that would be required to deal with the problem. Thirdly, members do not communicate their own ideas to one another, but publicly support an opposing idea. Fourthly, with inaccurate information about individuals' ideas, group members make collective decisions that lead them to take actions contrary to what they want to do, and thereby arrive at outcomes that are counterproductive to the goals of their group or organization. In addition, as a result of taking counterproductive actions, members experience frustration and dissatisfaction with their group or organization. Consequently, they form subgroups with close colleagues and blame other subgroups and management for the resulting problems. Finally, if group members do not deal with the problematic issue, the inability to manage agreement, the cycle repeats itself with greater intensity.

Studies applying the Abilene paradox have been used to examine such wide ranging issues as interpersonal friction within organizations (Hede, 2007), the loss of ethics and integrity within different task groups across a range of organizations (Byrd, 1992) and problematic group dynamics within organizational learning groups (Holmer, 2001).

The Abilene Paradox offers a useful approach to understanding the nature of interactions within interprofessional teams based in a range of health care settings. Its focus on explaining internal group dynamics provides a helpful lens to illuminating key collaboration processes in which friction can be hidden from view.

⁹ As such, this theory resonates with Janis' Groupthink theory – see above.

Action learning

Action learning was developed to promote local group-orientated action and learning focused on encouraging organizational change (Revans 1997). In essence, action learning is a process that aims to bring together a group of learners with varied levels of skills and experience to work together to analyze an actual problem and collectively develop an action plan for implementation. The learning group continues to meet as actions are implemented, and learning occurs from the implementation process. Action learning is therefore a form of learning by doing. Typically, this approach comprises of a range of learning activities, including experiential learning, creative complex problem solving, and co-learning group support. Revans argues that while each of these learning activities is a necessary component of action learning, they are insufficient individually, to be considered action learning.

Research into the nature of learning in action continues to employ a conceptual analysis of how adult learning theories are incorporated into the practice of learning through experience by doing. Action learning (projects, learning groups) concepts versus conventional courses (lectures, tutorials) are explored to engage students in the learning design. Other studies present students' empirical experience on working with critical action learning in management development and its use in modern organizations (e.g. Skehill 2003, Smith & O'Neil 2003, O'Brien & Hart 1999).

This learning approach has good applicability to interprofessional education, and could be employed to explore complex clinical/service problems and issues, find collaborative solutions for underlying challenges, and determine new directions for interprofessional teamwork and collaboration.

Autonomous work groups

This approach assumes that a certain level of autonomy within groups can be effective for their collective work (Gulowsen, 1972, Baines 1993). The degree of group autonomy can be assessed according to group influence over the formulation of goals, authority over work, hours of work, the degree of choice about how to proceed following the completion of a given task, influence over the selection of methods for completing the task and the distribution of task responsibilities, and influence over group membership and leadership (Gulowsen, 1972). West (2002) more recently argued that autonomous work groups can provide a structure through which the demands of the social (quality of work) and technical (task completion processes) systems of an organization can be optimized. For West, given a range of tasks, an autonomous work group can introduce new and improved methods of working in order to balance the demands of the technical and social systems.

According to Ulich & Weber (1996) the social and technical systems are more likely to be optimized if the autonomous group has the following characteristics: the team is a relatively independent organizational unit which has responsibility for whole tasks, and the tasks which individual team members undertake are related in content so that interdependence is fostered and team members form and maintain a sense of a common purpose for the group.

There is a broad range of literature linked to autonomous work groups. For example, Mundivewella & Olfan (1994) explored the available software technologies to optimize group interactivity and performance. Sexton (1994) explored the experiences of one organization with autonomous work groups, describing what may happen when managers fail to acknowledge the fundamental change aspects inherent in self-managed work teams. In addition, West (2002) provided a comprehensive review of research on group interactivity and task performance to elucidate a clearer understanding of how group autonomy can impact on creativity and innovation.

This approach can be easily applied to an interprofessional practice context. The framework allows for self-regulation of the team in relation to specific tasks for which the group is jointly accountable. The implication is

that group motivation is increased with greater autonomy allowing for more efficient task completion and greater group satisfaction.

Case-based learning

Case-based learning is a learner-centered approach whereby learners engage in a discussion and analysis of specific relevant situations, often taken from the real-world. This approach to learning involves a high degree of interaction between learners and focuses on the building of knowledge as the group works together to examine the case. Sessions are facilitated to ensure that learners work collaboratively to address each of the cases. There are a number of principles underpinning this learning approach, including the need for the case to tell some form of coherent 'story'; a focus on an 'interest-arousing' issue; relevance to the learner; an element of conflict/friction within; and a degree of generalizability to real life (Queens University 2007).

The use of case-based learning involves learning with real life data or provides learners with opportunities to empathize with the case. Cases can also add meaning by providing learners with the opportunity to see theory in practice. In addition, cases can help expose learners to viewpoints from multiple sources and different perspectives. Typically, this approach involves learners' analyzing data (the case) in order to reach a conclusion. In their effort to find solutions and reach decisions through discussion, students sort out factual data, apply analytic tools, articulate issues, reflect on their relevant experiences, and draw conclusions that they can relate to new situations. In the process, they acquire substantive knowledge and develop analytic and communication skills.

A number of papers discuss the benefits of case-based learning by exploring the methods of case-based teaching and learning (use of written cases in a seminar, use of standardized patients in an assessment course), and comparing each of these methods in terms of their relative effectiveness in achieving each of the benefits (e.g. Williams 2005). In general, the use of this approach has been found to provide valuable shared learning experiences for learners, who often reported that they preferred working in a group and felt that they had learned more working collaboratively than they would have learned working alone (e.g. Weiss & Levison 2000, Flynn & Klein 2001).

Case-based learning can be used to promote interaction between different health care professionals in discussions of relevant work-based situations. In particular, it can be employed to engage learners in discussions of a range of relevant clinical, team-related and/or service delivery-oriented cases that promote interprofessional interaction.

Collaborative/cooperative learning

Collaborative and cooperative learning are approaches to learning in which learners work together to explore a range of issues, answer questions, or create a shared project (Leonard 2002). In general, these approaches allow learners to collaborate/cooperate together in small groups on a structured activity. Learners are accountable for both their own individual work and the collective work of the learning group. A key element of collaborative/cooperative learning is that through their group interactions, learners can develop their interpersonal knowledge/skills. This approach is also helpful to help learners deal with inter-group friction when it occurs. It is recommended that facilitators need to take into consideration a number of elements that will help create an environment in which cooperative/collaborative learning can take place. For example, learners need to feel psychologically safe to collaborate in groups where they can be challenged over their individual and collective work. Learning groups also need to be small enough that all members can/will contribute. In addition, the shared learning tasks need to be clear and explicit for all learning group members. Furthermore, respect should be given to every learning group member, group diversity should be noted and celebrated, and all learner contributions should be valued (Johnson & Johnson 1997).

A number of studies have been undertaken on these two interlinked learning approaches, which have indicated that they provide an effective means to developing individual skills/knowledge as well as more shared understanding (Puntambekar 2006, Prichard et al. 2006). Ghaith (2002), for example examined the relationship between cooperative learning, perceptions of classroom social support and academic achievement. The results suggested that cooperative learning and the degree of academic support were both important elements that linked with good academic achievement. In addition, Baumberger-Henry (2005) explored the effectiveness of cooperative learning on students' perceptions of problem-solving and decision-making skills in comparison with other didactic methods (i.e. lecture-based teaching). The results revealed learners' scores for problem-solving and decision-making skills were higher in groups that had participated in cooperative learning activities than those which received didactic teaching.

Both learning approaches are highly relevant for IPE, and could be employed to promote the creation of effective interprofessional learning groups and foster collaborative knowledge/skills building.

Collective effort model

The collective effort model explains loss of group motivation. Karau & Williams (1993) argue that two factors determine the level of group motivation: the shared expectations group members have about reaching a collective goal and the value that the group places on that particular goal. Motivation is strongest, it is argued, when the group feels that the goal is both within its reach and is valuable. As these authors go on to state, "people will be willing to exert effort on a collective task only to the degree that they expect their efforts to be instrumental in obtaining valued outcomes" (Karau & Williams 1993:684). The approach has also been used to highlight how individuals within groups contribute to goal expectations and the achievement (or not) of desired tasks and goals. For example, as less emphasis is placed on evaluation and comparison of individual performances, individual outcomes tend to be combined to form a collective group outcome. As a result the emergence of 'social loafing' can occur – a phenomenon whereby individuals exert less effort in a group context than independently, as their individual input becomes difficult to assess.

This model is regularly employed as a framework for understanding group behaviour in a variety of contexts and settings. Tata (2002), for example, has employed the collective effort approach to understand how to reduce the phenomenon of social loafing, while Sodenkamp et al (2005) have employed it to improve the self-management of management teams. The model has also been used in research focused on enhancing contributions to online communities (Ling et. al. 2005).

The collective effort model may help make visible the challenges associated with interprofessional goal setting. It could also help explain variability in team member 'satisfaction' with their collective outputs and achievements.

Existence relatedness growth theory

Alderfer's (1969) existence relatedness growth theory was developed to extend thinking about Maslow's ideas on motivation encapsulated in his hierarchy of needs model. Alderfer collapsed the five step hierarchy of needs model (self-actualization, self-esteem, belongingness, safety, and physiological needs) to three clusters: existence (the basic requirements for material existence such as physiological and safety needs, met through work earnings); relatedness (the desires to establish and maintain interpersonal relationships, met in part by co-workers); and growth (the desires to be creative, productive and to complete meaningful tasks, generally met through personal development). Unlike Maslow, Alderfer does not see these needs as being a hierarchy which individuals ascend, but rather more of a continuum. Existence relatedness growth theory states that more than one need may be influential at the same

time. If the gratification of a higher-level need is not met, the desire to satisfy a lower-level need will increase, which can impact workplace motivation.

The studies that have employed this theory fall into three broad categories: those that explore how specific groups develop context specific expectations related to their work which affect their motivation (Jindal-Snape & Snape 2006); those that propose or evaluate a framework to apply in a particular work setting to improve motivation and productivity (Wentland 2003), and those that look at how specific forms of leadership may affect worker motivation and productivity (Choi 2006).

This model is readily applicable to an interprofessional practice setting. The model could elucidate ways to enhance group motivation and productivity. It can also be combined with leadership frameworks to develop a better understanding of how leadership approaches affect group motivation and productivity.

Field theory

Developed by Kurt Lewin (1951), field theory maintains that behaviour is a function of the field that exists at the time behaviour occurs. Analysis begins with the situation as a whole from which are differentiated the component parts and the concrete person in a concrete situation can be represented mathematically. Key ideas that have emerged out of field theory considered interdependence of 'fate' and 'task' interdependence as crucial to understanding of group process.

For Lewin, groups come into being not because their members necessarily are similar (although they may be), rather a group exists when people realize their individual fate depends on the fate of the group as a whole (interdependence of fate). Yet this form of interdependence can be fairly weak. More significant is task interdependence. Thus if a group's task are dependent on each other for achievement then a powerful dynamic is created. Lewin studies the nature of group task to understand the uniformity of group behaviour. He argued that people may come to a group with very different dispositions, but if they share a common objective, they are likely to act together to achieve it. Consequently, interdependence of fate and task results in the group being a "dynamic whole."

A number of authors have drawn on field theory in their work. Nonaka (1994), for example, drew on field theory in developing when exploring the interactive management processes in the creation of organizational knowledge. In addition, Martin (2003) explored the contribution of field theory to social science and argued that this theory can offer a useful combination of analytical insight and attention to the concrete in relation to social action.

Field theory has a good deal of relevance for interprofessional practice. In particular, the notions of both fate and task interdependence provides a useful approach to understand the nature of the collaborative processes that occur during interprofessional practice and education.

Inquiry-based learning

Inquiry-based learning is a form of self-directed learning in which learners work collaboratively together in groups.¹⁰ Inquiry-based learning is question driven, rather than topic or thesis driven. It begins with a general theme which acts as a starting point or trigger for learning. This approach to learning also emphasizes the need to ask researchable questions. It encourages learner to do this by building a range of skill sets, including interview and web search skills. An important aspect of inquiry-based learning is that it encourages critical thinking skills necessary for thoughtful review of the information. Typically, learners report on their learning in oral and/or

¹⁰ As such inquiry-based learning has a number of similarities to problem-based learning (PBL) described above.

written form. In addition, this approach also provides some mechanism (i.e. interviews, drafts, minutes of group meetings, bench mark activities) to help learner monitor their progress and record their collaborative processes. Learners draw on the expertise and knowledge of their teacher to model effective inquiry and to promote reflection (McMaster University 2007).

A key element of inquiry-based learning is the self-directed learning that occurs. There are four key elements of self-directed learning which learners take more responsibility for: determining what they need to learn; identifying resources and how best to learn from them; using resources to report their learning; assessing their progress in learning.

Much of the literature concerns the use of inquiry-based learning in science education and the integration of technology and inquiry-based learning. For example, Oliver (2007) describes the use of an inquiry-based learning approach with first year students in a large undergraduate class and de Jesus et al. (2005) examine how university chemistry students' questions shape inquiry-based group work. In addition, Lim (2004) addresses major issues in designing on-line inquiry experiences for learners.

Inquiry based learning can be used within interprofessional education settings to help encourage learners to work together in a collaborative fashion while defining questions and identifying resources and seeking answers during the interprofessional inquiry process.

Sensitivity training

Sensitivity training is a small group learning approach in which individuals interact with each other to develop awareness and understanding of themselves and their relationships with others (Back 1987). The goal of sensitivity training is to learn how certain ways of knowing and of doing can inadvertently have a negative impact on others. Sensitivity training is thus an educational approach that is focused on making individuals more aware of their own prejudices and more sensitive to others. It is often used to counter racialized, gendered and sexist attitudes. The approach is linked to a psychological technique in which group discussion and interaction are used to increase individual awareness of self and others. The format taken can vary but generally includes a group that is usually small and unstructured and chooses its own goals.

A number of authors have studied the nature and impact of sensitivity training, especially in the health care sector. Azad et al (2002), for example, report on a survey they carried out to determine the status of cultural sensitivity training in Canadian medical schools. The study grew out of a concern that in culturally diverse societies, medical education had failed to keep pace with the changing composition of the patient population. The authors found that while progress has been made, lack of adequate resources and a number of obstacles to inclusion of multicultural health content in curricula appear to remain ongoing problems. In addition, Majumdar et al. (2004) assessed the effectiveness of a specific cultural sensitivity training program on the knowledge and attitudes of health care providers, and the satisfaction and health outcomes of patients from different minority groups with health care providers who received training. The authors found that the cultural sensitivity training program not only improved knowledge and attitudes among health care providers, but it also yielded positive health outcomes for their patients.

Sensitivity training provides a useful tool within interprofessional education. Given its overall goals of improving relationship, this type of training could be helpfully employed to improve interprofessional team relations by making team members more aware on how their beliefs and actions impact on their colleagues.

Synchronous learning

Synchronous learning, often referred to as 'live' learning, is used in conjunction with online learning. In this type of learning, communication occurs at the same time between individuals and information is accessed instantly. Learner can use their computers to communicate with each other via text chat. In addition, presentations can be made using electronic whiteboards and electronic slides. This type of interaction is referred to as a 'virtual classroom'. As Chen et al. (2004) state “with the improvement in technology and increasing bandwidth, synchronous solutions for instruction are becoming popular. They do not only provide savings in terms of time and cost, but also outperform asynchronous on-line instruction and even traditional face-to-face education in many circumstances”.

There are a number of papers that described the key issues linked to the use of synchronous learning, such as communication patterns, learner participation and computer-mediated learning. Ligorio (2001), for example, describes a virtual learning environment that was generated for a project between the Netherlands and Italy which aimed at the facilitation of cross-cultural communication and collaborative knowledge building between schools using a variety of electronic communication formats and synchronous learning processes. In addition, authors have offered studies on the use of various computer applications such as compressed video, collaborative groupware, streaming media and web-based instruction (e.g. Pival & Tunon 2001). In general, studies of synchronous learning suggest that it provides a useful basis for interactive on-line learning.

This particular type of learning provides a useful approach for interprofessional education. In particular, it can be employed amongst professionals who are based in different and/or remote geographic locations to enable them to engage, for example, in a series of on-line discussions linked clinical cases or service delivery issues.

T-Groups

T-Groups are an interactive approach associated with Kurt Lewin (1948). Its basic underlying premise is that when learning group participants contribute observations to discussions based on reflections of their own behaviour, their learning and their satisfaction increases (Bradford et al 1964). Specifically, a T-Group approach is intended to increase understanding of group development and dynamics, gain a better understanding of the underlying social processes at work within a group, increase interpersonal skills, increase understanding of the impact of individual behaviour; and increase ability to give and receive feedback.¹¹With a T-Group approach individuals are led by a facilitator and encouraged to reflect on their interactions and reactions with others in order to develop themselves.

The T-Group approach has increasingly been used within organizational training programs. Often organizations focused on implementing quality improvement processes draw on T-Groups and use small groups of employees to analyze their work and suggest improvements to their quality and productivity (Mohram et al. 1989). In addition, this approach has been successfully employed to underpin a variety of small group learning activities from classroom setting to work groups (e.g. Billson 1986, Gosling & Miller 1999).

The T-Group approach provides a useful tool within interprofessional education. Given its focus on group interactivity, conflict resolution and feedback, this approach could be used to increase awareness and understanding of key interprofessional teamwork issues.

¹¹ As indicated in these aims, T-Group training shares some commonality with Sensitivity training, see above.

Team learning

Team learning is an approach designed to support the development of high performance learning teams and provide opportunities for them to engage in collective tasks (Fink 2007). In relation to this approach, a learning team differs from a learning group, as the latter do not necessarily trust one another and share collective goals, unlike the former. A learning group can become a learning team when they begin to trust each other, develop a shared commitment, have mutually agreed goals and share a concern for the welfare of the team and its members. It is argued that a learning team can achieve a range of outcomes that an individual or newly formed group cannot, as the collaborative approach of a learning team makes them particularly effective.

Michaelsen (2007) argues that a learning program needs to be structured in certain ways to provide the conditions necessary to enable the movement from group learning to team learning. He notes that such programs need to ensure that learning teams have the resources needed to work together and complete assignments, that an appropriate assessment system (which provides incentives for expending time and effort on behalf of their team) is used and that learning methods are employed which help build cohesiveness between learners.

There are a number of studies describing the use of this approach to learning. Edmondson (2001), for example, discusses the factors needed in creating a learning team. These include the selection of mix of skills and expertise, the framing of an approach team challenge and the creation of psychologically safe learning environment. Gardner (1997) discusses how team learning can be used to maximize students' transfer of their formal training to the workplace. In addition, Nissila (2005) examines how collective reflection fosters the ability to learn and work together in a team. The consensus from these papers is that team learning provides a helpful approach for developing collaborative learning experiences, which are valued by learners.

Team learning provides a particularly effective approach for interprofessional education. It could be employed to help transform a loosely affiliated work 'group' of health care professionals into a more effective interprofessional 'team' in which member trust one another and share a commitment to collective goals and welfare of their colleagues.

Theories with an organizational/systems focus

Eleven organizational and education theories (behavioural theory of the firm, contingency theory, differentiation-integration theory, diffusion of innovation theory, implementation theory, Leavitt's diamond, organisational theory, stakeholder theory, socio-technical theory, unfreeze-change-refreeze, virtual learning community) are presented and discussed in this section. These theories provide an organizational/systems focus on understanding issues linked to interprofessional education and practice.

Behavioural theory of the firm

The behavioural theory of the firm was developed by Cyert & March (1963) and represented a departure from conservative notions of organisational function that stressed rationality and maximization of economic gain. In contrast, these authors stressed sociological and psychological dimension of organizational behaviour and argued that the goals of a firm are formed from a series of constraints imposed on the organization through a process of bargaining among its members. In their analysis of this theory, Bartlett & Ghoshal (1993) argued that a firm should be viewed as an adaptive political coalition that can experience friction and conflict when the different goals and aspirations of its individuals (i.e. managers, administrators, professionals) oppose one another.

A number of authors have drawn upon this theory in their work. Wezel & Saka-Helmhout (2006), for instance, employed this theory to examine the driving forces of organizational change and found that despite the complex

nature of the organization, as long as its environment was stable, leaders could effectively work with their staff in the management of change to achieve mutually agreeable outcomes. However, in times of uncertainty leaders encountered more difficulties in their organizational change activities. In addition, Rehbein & Schuler (1999) employed this theory to help explore the nature of corporate political action and authors found that specific internal constraints, such as structures and resources, affected an organization's ability to take decision about engaging in political action while the external political and economical environment had little influence.

This theory provides a useful insight into the complex nature of working within an organisational environment. Its focus on the bargaining process between organizational members provides some insight into the complex nature related to working together in a collaborative fashion in the face of competing ideas, views and perspectives.

Contingency theory

Contingency theory refers to a number of management approaches that were developed in the late 1960s, most notably linked to the work of Woodward (1965) Lawrence & Lorsch (1967). Contingency theory suggested that previous organizational and management approaches had neglected that organizational life was influenced by various aspects of the environment which were termed 'contingency factors'. It was argued that to understand organizations one had to examine the interplay between contingency factors and the organizational structures in which they were situated. Contingency theory helps understand the range of different contextual factors that affect the functioning of an organization. For example, how information technologies directly determine differences in organizational attributes such as span of control, centralization of authority and the formalization of organizational procedures (Carroll, 1993).

A number of authors have employed contingency theory in their work. Birkinshaw et al (2002), for instance, examined knowledge as a potential contingency factor. They argued that given the increasing recognition of knowledge as an organizational asset, this might be a dimension that could significantly influence organizational function. Drawing on data from over 100 managers they found that a managers' understanding of 'system embeddedness' (the process through which knowledge is produced and shared within a particular organization) was strongly associated with effective organizational function. In addition, Huo & Steers (1993) explored how organizational culture, as a contingency factor, affected worker motivation. They found that organizational and management stability and shared language will determine cultural characteristics such as a strong team spirit and a sense of organizational egalitarianism, which in turn affected worker motivation. In general, the higher the team spirit and sense of egalitarianism, the higher the level of motivation and productivity.

Contingency theory provides a useful approach for understanding interprofessional practice issues. In particular, it provides a helpful theoretical tool for exploring and illuminating how a range of contingency factors such as information flow, communication processes and leadership approaches impact on the creation and on-going management of interprofessional practice within different organizational contexts.

Differentiation-integration theory

Differentiation-integration theory aims to understand the functioning of complex organizations (Lawrence & Lorsch 1967). According to this theory one needs to not only consider the state of differentiation (complexity) but its relationship with integration and how these two related factors affect organizational performance. Specifically, this theory focuses on examining the levels of complexity within organizations that lead to segmentation into subsystems. According to this theory, each of these subsystems tends to develop particular attributes (including behavioural attributes of its members) in relation to the demands posed by the external environment. Integration

refers to the process of achieving unity of effort among the various subsystems in the accomplishment of organizational goals.

Drawing upon this theory Adler (1983) suggests that as organizations are complex, they represent multiple and fluctuating social groups continually contesting identity as well as their rights and privileges. Such competing viewpoints need to be understood and effectively managed to ensure they can be successfully integrated by organizational leaders. Other authors such as Berry & Annis (1974) and Sackmann (1992) have used differentiation-integration theory to help identify the importance of understanding the organizational context and its meanings for different groups working within these complex environments.

This theory provides a helpful framework for informing interprofessional practice. By employing this theory, for example, complicated organizational systems such as hospitals composed a range of different health professions (who historically share complex interprofessional relations) can be understood in a more comprehensive manner.

Diffusion of innovation theory

Diffusion of innovation theory (Rogers 1962) aims to provide an explanation of the mechanisms and rate by which new ideas and technologies are spread through cultures. The theory draws upon previous work on communication that explored how an innovation is communicated through certain channels over time to members of a social system (Moulding et al. 1999).

According to Roger's theory, a new idea or technology will pass through three key stages of adoption. Firstly, an individual is introduced to the innovation in which s/he must become convinced of the value of the innovation. This is usually achieved via a 'change agent' (a champion for the innovation). Secondly, individuals need to commit to the innovation idea and begin to put it to use. Finally, individuals ultimately accept or reject the innovation on the basis of their implementation experience. Rogers created a typology of five adopters of an innovation – 'innovators' (adventurous, risk takers); 'early adopters' (social leaders); 'early majority' (connected with social leaders); 'late majority' (sceptical, traditional) and 'laggards' (sceptical of change).

As this theory assumes rational behaviour, where knowledge and attitude change are considered to lead to practice change, it has been criticized for an oversimplified representation of a complex reality (Moulding et al. 1999). In addition, the theory does not account for other phenomenon that can influence innovation adoption rates such as individuals adopting an innovation for a purpose other than what it was intended.

A variety of authors have drawn upon this approach in their work. Recently Kamal (2006) used it to understand how information technologies was adopted into private sector organizations, in an effort to discern what factors would impact its further adoption. In addition, McMaster & Wastell (2005) employed this theory in the context of information systems research and found no evidence of a process of diffusion taking place.

Roger's theory appears to have a good applicability for interprofessional practice and education. It could be employed to understand the complex range of issues related to introducing a new collaborative approach within a health care team. Furthermore, the theory could be employed to examine the processes related to introducing new interprofessional curricula within the university sector.

Implementation theory

This theoretical approach focuses on the implementation of innovations within organizations.

Implementation issues operate at a number of different levels (Montjoy & O'Toole 1979). At the individual level they include insufficient communication, failure to integrate a new system into daily practice, poor perceptions of

the innovation, lack of time for implementation and failure to use new knowledge effectively. At the organizational/structural level implementation issues include dynamics of political coalitions, legal barriers and loss of internal and external institutional support (Alavi & Leidner 2001).

It is argued that organizations have a natural resistance to change. However, such resistance can be overcome when the change is carefully planned and the implementation controlled. In addition, this theory stresses that implementation problems should be considered when organizational policies and programs are developed as better policies would result if policymakers considered issues related to implementation before choosing a course of action.

A number of authors have drawn on this theory in their work. Hannan & Freeman (1984) found that the most effective way to avoid implementation problems is to establish a specific organizational mandate and provide sufficient resources for the implementation process. Other authors have used implementation theory to understand the nature of motivation and commitment on individuals who are implementing new approaches in their work (e.g. Malhotra & Galletta 2003).

Implementation theory can inform the nature of interprofessional practice and education in a number of ways. For example, this theory can offer a useful perspective for the implementation of any new interprofessional activity/program. In particular, questions of individual, professional and organizational motivation and commitment for an interprofessional project can be posed and explored by the use of this theory. In addition, it can provide a useful theoretical lens to understand the nature of organizational resistance, should it occur, when introducing a new interprofessional project.

Leavitt's diamond

Leavitt's diamond is a conceptual approach that helps to show the relationship between various aspects of the organization (Leavitt 1965). The diamond (involving the four elements of task, technology, people, structure) depicts how every element of organizational life affects every other with implications for change and restructuring. For example, if an organization changes the technology, the task as previously performed will also change, when the task is changed, then the organizational structure and the people to sustain the structure should also be changed. If an organization changes the people, then inevitably the task will be performed differently, and technology and organizational structure must be adjusted accordingly.

Leavitt's model has been used as a way to frame a number of studies. Specifically, it has been used in the context of trying to understand the effects of a particular type of change in a specific organizational context (Radnor & Boaden 2004, Smith et al. 1992) or to conceptualize a more effective planning design for organizational change (Fortune 2003, Carr 1992).

This model has a number of potential uses for informing interprofessional practice. In particular, its value in framing organizational processes as inter-related could usefully alert interprofessional planners and academics to possible unintended effects of conceptualizing change too narrowly. For example, it may not be realized that the acquisition of a new technology which could make treatment more efficient may in fact impact the motivation and productivity of members of the team, requiring thus some thought as to a more optimal configuration of an interprofessional team.

Organizational theory

This approach encapsulates a range of perspectives from economics, psychology, sociology and systems theory (Hatch 1997). In essence, organizational theory focuses on the holistic examination of organizations (i.e. the study

of organizations from multiple viewpoints, using multiple methods and levels of analysis). As a result, organizational theory investigates ‘micro’ organizational behaviours – individual and group dynamics – as well as ‘macro’ organizational issues such as structural power relations. More recently, interest emerged in the ‘meso’ organizational level which has a focus on local cultures and information networks.

A number of studies employed this theoretical approach to explore a range of micro, meso and macro level issues related to the functioning of organizational life. Koufteros et al. (2007), for example, examined the interrelationship between a number of organizational factors such as culture and structure and how they relate to organizational performance. They found that organizational structures that include employees in decision making, have a horizontal management structure, open communication systems and procedures that encourage autonomous work are related to better organizational performance. In addition, Hung et al. (2006) investigated the association between staff participation in decision-making, productivity and turnover. These authors found that staff involvement in organizational decisions were positively associated with productivity.

This approach has a direct relevance for informing interprofessional practice. In particular, it can help illuminate how complex interactions between organizational structures, cultures and communication processes can facilitate or impede the introduction of an interprofessional practice project such as a move towards embedding collaborative teamwork within a clinical organization.

Stakeholder theory

Stakeholder theory maintains that when making organizational decisions, managers and leaders should consider all of the stakeholders of the organization. According to this approach, stakeholders can be regarded as any group or individual who can affect or is affected by the achievement of the organization’s objectives (Jawahar & McLaughlin 2001). In general, there are numerous stakeholders within an organization, including, employees, managers, stockholders, creditors, customers, suppliers, interest groups, policymakers, local and national government bodies. Stakeholder theory is a popular method of management as it encourages collective input and shared responsibility. However, in deciding between choices, stakeholder theory does not inform management which choice is ‘better’ or which ‘worse’, its focus is upon identifying and including an organization’s key stakeholders (Jensen 2001).

In general, studies that employ stakeholder theory to examine the processes of how different stakeholder groups interact together to negotiate and reach consensus (e.g. Roberts 1992, Kelner et al. 2004).

Stakeholder theory provides a useful approach for informing interprofessional practice and education, as it could be used to examine how stakeholders (i.e. professionals, managers, patients/carers, students) could participate in the implementation of an interprofessional program either at pre or post-licensure level. Indeed this theory could also be used to examine the short and longer-term impacts of such projects from different stakeholder perspectives.

Socio-technical theory

Socio-technical theory emerged as an approach aimed at addressing problems associated with the introduction of new technologies in an organization (Trist & Bamforth 1951). It has a focus on ensuring that people and technology work together to optimal effect within an organization. It was originally developed to examine the effect of mechanized mass-production systems in the early 1950s. At this time it was argued that there needed to be a fit between the technical sub-systems and the social sub-systems that together made up an organization. The former was defined as the devices, tools and techniques needed to transform inputs into outputs. The latter was regarded as all level of employees – their knowledge, skills, attitudes as well as the reward system and authority structures that exist in the organization.

Two main principles define socio-technical theory. Firstly, the interaction of social and technical sub-systems creates the conditions for successful (or unsuccessful) organizational performance. According to this theory, there is an expectation that both types of interaction will occur when activated through work activity. Secondly, if optimization of only one sub-system occurs then there is a likelihood of unpredictable organizational performance. As the theory was advanced, its definitions were broadened to include, customers, suppliers, and the rules and regulations (formal and informal) that govern the organization (Cherns 1976).

A variety of authors have drawn upon socio-technical theory in their work. Most use this theory to examine the interplay of the technical and social sub-systems across a range of organizations and how they affect productivity (e.g. Heller 1997, Hummels 2000).

Socio-technical theory has a direct relevance for informing interprofessional practice. Through its focus on social and technical factors, it can provide illuminating insights into the nature of interprofessional collaboration and teamwork related to interprofessional interactions as well as organizational reward systems and management structures.

Unfreeze-Change-Refreeze

Developed by Lewin (1952), the unfreeze-change-refreeze model aims to improve and promote change within organizations. Lewin outlined three stages in this model. The first, ‘unfreezing’ involves creation of motivation and preparation to organizational change. The overall goal of this stage is to help an organization become more amenable to making changes in its practices. The second, ‘change’ involves the development of new attitudes, beliefs and behaviour as new ideas or practices are implemented within the organization. The third, ‘refreezing’ involves a stabilization and integration of new beliefs, attitudes and behaviour once the change has been embedded into the organizational system. The aim of this final stage is to make the change a permanent and routine part of an organization’s culture.

A number of authors have employed this model in their work. Woodall (1996), for instance, employed this model and found it was an effective approach for managing the process of organizational change. More recently, Kent (2001) argued that the strength of the unfreeze-change-refreeze approach is its simplicity, as the model provides a clear and concise process for implementing, embedding and sustaining organizational change. The model also offers a useful tool for understanding the emergence of challenges with organizational change.

The model has a direct applicability for interprofessional practice and education, as it outlines how the introduction of these interprofessional approaches can be implemented and embedded within an organizational context.

Virtual learning community

Virtual learning communities are environments that provide learning materials and a shared medium for communication and collaboration for a group of learners. These learning communities are based on a shared purpose rather than on actual geography. Communication is facilitated through technology, such as private conversations, public discussion forums and chat-rooms or shared workspaces. Learners have access to multimedia instructional materials, communicate with teachers and each other, can contribute new materials, collaborate with other learners, help others, and learn by teaching or explaining (University of Saskatchewan, 2007)

The education literature provides a range of papers which describe how individuals have built web-based virtual learning communities (Oren et al. 2005, Ramsay et al. 2005), as well as issues such as online identities and group interaction (Kelly et al. 2004), and the impact of membership of a virtual learning community on individual

learning careers and professional identity (Lewis & Allan 2006). Collectively this work also offers some insight into the benefits of employing a virtual approach to learning. Learners generally enjoy working within a virtual community and find it provides a degree of cost-effectiveness.

Virtual learning communities may be a valuable learning approach for pre-licensure and post-licensure learners based in different settings or locations. Indeed, virtual learning may provide an opportunity for bridging time-space limitations usually associated with delivering in IPE.

Implications

As indicated in this report, there are a growing number of theories that currently inform interprofessional practice and education. Through searching the organizational and educational theoretical literature, this review located 33 theories that are well established in these fields but have not been previously employed to inform the nature of interprofessional practice and education. Specifically, this work located:

- Nine individual level theories (action centred leadership, active learning, attribution theory of leadership, discovery learning, leadership/management grid, mind mapping, situational leadership theory, valence-instrumentality-expectancy theory and vroom-yetton leadership model).
- Thirteen group/team level theories (Abilene paradox, action learning, autonomous work groups, case based learning, collaborative/cooperative learning, collective effort model, existence relatedness growth theory, field theory, inquiry-based learning, sensitivity training, synchronous learning, T-groups, team learning).
- Eleven organizational/systems level theories (behavioural theory of the firm, contingency theory, differentiation-integration theory, diffusion of innovation theory, implementation theory, Leavitt's diamond, organisational theory, stakeholder theory, socio-technical theory, unfreeze-change-refreeze, virtual learning community).

In relation to these theories, it is noteworthy that the organizational literature has provided a number of leadership approaches that provide some helpful ways of illuminating and understanding leadership issues in the context of interprofessional teams. In addition, the review identified a range of group/team and organizational/systems level theories that appear to provide some compelling perspectives to inform future interprofessional practice and education activities.

Given the richness of the theories discussed in this review and their potential for understanding a range of interprofessional practice and education issues, arguably that the future development and implementation of interprofessional activities could certainly be informed by one of these diverse theoretical perspectives. The use of such theories to underpin interprofessional practice and education activities would certainly enhance their status and credibility for health care professionals, health service managers, regulatory bodies, educationalists as well as health policy makers. Furthermore, the use of theory would strengthen the growing evidence base for both interprofessional practice and education – a common need for its varied stakeholders.

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Appendix I: Provisionally identified organizational theories

Theory	Focus	Key individuals
5-S Concept	Quality Culture	
Action-Centered Leadership	Leadership in organizations	Adair
Theory of Turbulence	Strategy formation	Ansoff
Ansoff Matrix	Risk component of growth strategies	Ansoff
Ansoff Model of Strategic Planning	Strategic Planning	Ansoff
Gap Analysis	Decisions	Ansoff
Single & double-Loop learning	Organizational learning (importance of human reasoning as basis for decisions & actions)	Argyris, Schön
Progression Helix Theory	Groups move forward on basis of excellence	Belbin
Workset System	System for defining jobs	Belbin
Price System	Framework for 'one-minute manager' series	Blanchard
Behavioural Theory of the Firm	Decision making	Cyert, March
Blur Theory	Three forces (connectivity, speed, intangibles) redefining business	Davis, Myer
Theory X , Theory Y	Management of human resources determines character of organization	McGregor
Total Quality Management	Company-wide quality	Deming
Emotional Intelligence	Behavioural responses	Goleman
Hofstede's Dimensions	Understanding cultural difference w/n business	Hofstede
Balanced Scorecard	Organizational strategic view	Kaplan, Norton
Model of Change: Unfreeze-Change-Refreeze	Behaviour change	Lewin
Force Field Analysis	Behaviour	Lewin
T-Groups	Behaviour	Lewin
Group Decision Making	Behaviour change	Lewin
Field Theory	Underlying forces and behaviour	Lewin
Just-in-Time	Workplace management	Ohno
7-S Framework	Company organization	Pascale
Taguchi Method	Product quality	Taguchi

Theory	Focus	Key individuals
Expectancy Theory	Motivation	Vroom
Implementation	Introducing change into organizations	Gustafson, Olsson
Vroom-Yetton Model of Leadership	Leadership & problem solving, Decision making	Vroom, Yetton
Abilene Paradox	Decision making in organizations	Harvey
Groupthink	Decision making in groups	Janis
Attribution Theory of Leadership	Behaviour	Ashkanasy
Bayesian Theory	Decision Making	Bayes
Boston Box	Valuation assessment	Boston Consult Grp
Differentiation-integration	Understanding nature of organization environment	Lawrence, Lorsch
Transactional Theory of Leadership	Leadership	Burns
Transformational Theory of Leadership	Leadership	Burns
Fishbone Chart	Identification of problems	
Chaos Theory	Unpredictability and rapid change	Peters
Command & Control Approach	Style of leadership	Taylor
Complexity Theory	Unpredictability and rapid change	
Contingency Theory	Organization	Woodward
Critical Path Method	Planning technique	
Decision Theory	Decision Making	
Game Theory	Strategies, Outcomes	
Doughnut Principle	Description of Organization	Handy
Stakeholder Theory	Relationship of organization to externals	
EFQM Excellence Model	Achievement	
Institution theory	Institutional change	Scott, DiMaggio
Failure Mode Effects Analysis	Failure analysis / Contingency Planning	
Flow Production	Operations & Production	
Flow Theory	Change Management	
Theory of Constraints	Planning and Control	Goldratt
Shamrock Organization	Organizational Structure	Handy

Theory	Focus	Key individuals
Johari Window	Communication	Luft, Ingram
Kaizen	Continuous Improvement	
Leavitt's Diamond	Analyzing Change	Leavitt
Team Management Wheel	Team Roles and Work Preferences	McCann, Margerison
Methods-Time Measurement	Work Measurement	
Rogers' model of Innovation		Rogers
Monte Carlo Method	Decision Making	
Organizational development		Burke, Alon
Power and Influence Theory of Leadership	Leadership	
Quality Circle	Problem Solving Decision Making	
Quality Function Deployment	Designing quality into a product	Taguchi
Queuing Theory	Decision Making cost Effectiveness	
Root Cause Analysis	Problem Solving	
Scanlon Plan	Employee Improvement Teamwork	Scanlon
Punctuated equilibrium	Change management	Gersick
Learning Organization Theory	Adaptive Organizations	Senge
Shareholder Value Analysis	Decision making	
Six Sigma	Quality	Juran
Strategic Analysis	Organization	
Systems Analysis	Evaluation of Operations	
Systems Approach	Decision Making, Problem Solving	
Socio-technology	Organization of working groups	Chems
Theory E, Theory O	Change In Organizations	
Theory J	Management	Ouchi
Theory of Constraints	Planning and Control	
Three-Dimensional Management	Management Styles	Reddin, Blake
Valence-instrumentality-expectancy theory	Motivation	Vroom
Path-Goal Theory of Leadership	Leadership	Vroom
Utility Theory	Decision Making	

Theory	Focus	Key individuals
Portfolio Theory	Risk	Markowitz
Prospect Theory	Decision Making	Kahneman, Tversky
Organizational Theory	Organization	
ERG Theory	Human Motivation	Alderfer
Equity Theory	Motivation	Adams
Situational Leadership Theory	Leadership	
Job Characteristics Theory	Motivation	
Achievement Motivation Theory	Motivation	
Tannenbaum-Schmidt Continuum	Leadership	
Vitamin Model	Employee Job Satisfaction	
Attraction-Selection-Attrition Model	Organizational Culture	
Collective Effort Model	Motivation	
Fayol's Principle	Leadership/management	Fayol
Autonomous Work Group		
Managerial Grid	tool for leaders to understand their behaviour patterns	Blak, Mouton
T-Groups	leadership theory around group dynamics	Bennis
Negotiated order perspective	Understanding social order	Strauss
Social exchange	Interaction between organizational members	Challis
Activity	Examines micro/macro activities	Engestrom
Work-group mentality	Psychodynamic analysis of work groups	Bion

Appendix 2: Organizational theory searches

Theory	Search strategy	Citations
5-S Concept	“5-S Concept”	14
7-S Framework	7-S Framework	85
Action Centred Leadership	“action centred leadership” OR “action-centered leadership” OR “action centered leadership” OR “action-centered leadership”	13
Ansoff Gap Analysis	Gap analysis AND Ansoff NOTE: ‘gap analysis’ searched on it’s own = 1713 Citations	7
Ansoff Matrix	Ansoff Matrix	42
Ansoff Model of Strategic Planning	"Ansoff Model of Strategic Planning" / "Model of Strategic Planning" AND Ansoff	0
Attribution Theory of Leadership	“Attribution Theory of Leadership”	50
Balanced Scorecard	balanced scorecard AND Kaplan AND Norton[Citation and Abstract ONLY]	73
Bayesian Theory	Bayesian Theory [Citation and Abstract ONLY]	31
Behavioural Theory of the Firm	“Behavioural Theory of the Firm” OR “Behavioral Theory of the Firm” [Citation and Abstract ONLY]	37
Blur Theory	blur theory	1
Boston Box	Boston Box	9
Business Excellence Model	“Business Excellence Model” [Citation and Abstract ONLY]	89
Cause and Effect Diagram	“Cause and Effect Diagram” [Citation and Abstract ONLY]	46
Chaos Theory	Chaos Theory AND Peters	102
Collective Effort Model	"collective effort model"	8
Command and Control Approach	“Command and Control Approach”	40
Complexity Theory	Complexity Theory [Citation and Abstract ONLY]	51
Contingency Theory	Contingency Theory AND Woodward	69
Critical Path Method	"Critical Path Method" [Citation and Abstract ONLY][Last 20 Years ONLY: 01/01/1987]	121
Critical-Path Analysis	“Critical-Path Analysis” OR “Critical Path Analysis” [Citation and Abstract	31

Theory	Search strategy	Citations
	ONLY] [Last 10 Years ONLY: 01/01/1997]	
Decision Analysis	Decision Analysis AND model OR theory[Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	130
Decision Theory	Decision Theory [Citation and Abstract ONLY] [Last 6 Months ONLY: 06/01/2006]	92
Differentiation-Integration	Differentiation-Integration OR Differentiation Integration [Citation and Abstract ONLY]	119
Doughnut Principle	Doughnut Principle or Donut Principle	3
ERG Theory	ERG Theory OR “Existence Relatedness and Growth Theory”	29
EFQM Excellence Model	“EFQM Excellence Model” [Citation and Abstract ONLY]	65
Emotional Intelligence	emotional intelligence AND Goleman [Citation and Abstract ONLY]	41
Equity Theory	Equity Theory [Citation and Abstract ONLY] [Last 20 Years ONLY: 01/01/1987]	128
Expectancy Theory	Expectancy Theory AND Vroom[Citation and Abstract ONLY]	23
Fayol's Principles in Management	"Fayol's principles in management" OR "Fayols principles in management" / “Principles in Management” AND Fayol	1
Failure Mode Effects Analysis	“Failure Mode Effects Analysis” OR FMEA [Citation and Abstract ONLY]	61
Field Theory	field theory [Citation and Abstract]	15
Fishbone Chart	Fishbone Chart	25
Flow Line Production	“Flow Line Production”	22
Flow Lines	Flow Lines [Citation and Abstract ONLY]	126
Flow Production	Flow Production [Citation and Abstract ONLY]	27
Flow Theory	Flow Theory [Citation and Abstract ONLY]	97
Force Field Analysis	“force field analysis” AND Lewin	92
Game Theory	Game Theory AND review [Citation and Abstract ONLY] [Last 6 Months ONLY: 06/01/2006]	40
Group Decision Making	“group decision making” AND Lewin	22
Hofstede's Dimensions	Hofstede's Dimensions OR Hofstedes Dimensions OR Hofstede Dimensions [Citation and Abstract ONLY]	38
Industrial Housekeeping	Industrial Housekeeping	8
Implementation	Implementation AND Gustafson AND Olsson	1

Theory	Search strategy	Citations
Institution Theory	Institution Theory [Citation and Abstract ONLY]	10
Ishikawa Diagram	Ishikawa Diagram [Citation and Abstract ONLY]	11
Johari Window	Johari Window	93
Just-in-Time	“just in time” OR “just-in-time” [Citation and Abstract ONLY]	6
Kaizen	Kaizen [Citation and Abstract ONLY]	147
Learning Organization	“Learning Organization”	41
Leavitt’s Diamond	Leavitt’s Diamond OR Leavitts Diamond OR Leavitt Diamond	8
Managerial Grid	Managerial Grid [Citation and Abstract ONLY]	25
Monte Carlo Method	“Monte Carlo Method” [Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	86
Methods-Time Measurement	"methods-time measurement" OR "methods time measurement"	45
Negotiated Order Perspective	“Negotiated Order Perspective”	34
Path-Goal Leadership	“path-goal leadership” OR “path goal leadership”	46
Optimized Production Technology	"optimized production technology"	101
Organizational Development	Organizational Development AND Burke	86
Organizational Theory	Organizational Theory [Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	31
Path-Goal Theory of Leadership	“path-goal theory” OR “path goal theory” [Citation and Abstract ONLY]	40
Portfolio Theory	Portfolio Theory [Citation and Abstract ONLY] [Last 10 Years ONLY: 01/01/1997]	133
Power and Influence Theory of Leadership	"Power and Influence Theory"	5
Price System	price system AND Blanchard NOTE: ‘price system’ alone = 2631 Citations	3
Product-Mission Matrix	product-mission matrix OR “product mission matrix”	0
Progression Helix Theory	“progression helix theory”	0
Prospect Theory	Prospect Theory [Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	40
Punctuated Equilibrium	Punctuated Equilibrium [Citation and Abstract ONLY]	93

Theory	Search strategy	Citations
Quality Circle	Quality Circle [Citation and Abstract ONLY] [Last 10 Years ONLY: 01/01/1997]	87
Quality Function Deployment	“quality function deployment” AND Taguchi	88
Rogers Model of Innovation	“model of innovation” AND Rogers	36
Root Cause Analysis	“root cause analysis” [Citation and Abstract ONLY]	109
Scanlon Plan	Scanlon Plan [Citation and Abstract ONLY]	34
Sensitivity Training	Sensitivity Training [Citation and Abstract ONLY]	74
Shamrock Organization	Shamrock Organization	63
Shareholder Value Analysis	“Shareholder Value Analysis”	91
Single Minute Exchange of Dies	“Single Minute Exchange of Dies”	84
Situational Leadership Theory	“Situational Leadership Theory” [Citation and Abstract ONLY] [Last 20 Years ONLY: 01/01/1987]	84
Six Sigma	Six Sigma AND theory OR model [Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	31
Social Exchange Theory	1) “Social Exchange Theory” AND Challis = 0 Citations 2) Social Exchange Theory = 1185 Citations	1) 0 2) 1,185
Socio-Technology	Socio-Technology OR sociotechnology	70
Stakeholder Theory	Stakeholder Theory [Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	32
Strategic Analysis	Strategic Analysis [Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	18
Systems Analysis	Systems Analysis AND theory OR model [Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	104
Systems Approach	Systems Approach AND theory OR model [Citation and Abstract ONLY] [Last Year ONLY: 01/01/2006]	77
Systems Method	Systems Method AND theory OR model [Citation and Abstract ONLY] [Last 10 Years ONLY: 01/01/1997]	25
Systems Planning	Systems Planning [Citation and Abstract ONLY] [Last 10 Years ONLY: 01/01/1997]	108
T-Groups	T-Groups OR T-Group OR “T Groups” OR “T Group” AND Lewin	137

Theory	Search strategy	Citations
Taguchi Method	Taguchi Method [Citation and Abstract ONLY] [Last 10 Years ONLY: 01/01/1997]	104
Tannenbaum-Schmidt Continuum	“Tannenbaum-Schmidt Continuum”	0
Team Management Wheel	“team management wheel”	18
Theory E	“Theory E” [Citation and Abstract ONLY]	77
Theory J	“Theory J” [Citation and Abstract ONLY]	13
Theory O	“Theory O” [Citation and Abstract ONLY]	11
Theory W	Theory W [Last 20 Years ONLY: 01/01/1987]	104
Theory X	“Theory X” [Citation and Abstract ONLY]	71
Theory Y	“Theory Y” [Citation and Abstract ONLY]	84
Theory of Constraints	“Theory of Constraints” AND Goldratt [Citation and Abstract ONLY]	34
Theory of Games	“Theory of Games” [Citation and Abstract ONLY]	110
Theory of Horizontal Fast Track	“Theory of Horizontal Fast Track”	2
Theory of Turbulence	“theory of turbulence” NOT (aerodynamic* OR fluid dynamic* OR air quality OR atmospher* OR physic* OR math*)	0
Three-Dimensional Management	“Three-Dimensional Management” OR “Three Dimensional Management” OR “3-D Management” OR “3 D Management”	17
Total Quality Management (TQM)	“Total Quality Management” OR TQM AND Deming [Citation and Abstract ONLY]	109
Unfreeze-Change-Refreeze	Unfreeze-Change-Refreeze OR “Unfreeze Change Refreeze”	25
Utility Theory	Utility Theory [Citation and Abstract ONLY]	46
Valence-Instrumentality-Expectancy theory	“Valence-Instrumentality-Expectancy Theory” OR “Valence Instrumentality Expectancy Theory”	36
Vroom-Yetton-Jago Model	"Vroom-Yetton-Jago Model" OR "Vroom Yetton Jago Model"	2
Vroom-Yetton Model of Leadership	1) Vroom Yetton Model of Leadership Decision Making = 1 Citation 2) “Model of Leadership Decision Making” AND Vroom AND Yetton NOTE: both searches yielded the same citation	1
Work-Group Mentality	"work group mentality" OR "work-group mentality"	5
Workset System	workset system	0

Appendix 3: Approaches not applicable to interprofessional practice

Theory	Reason for exclusion
Achievement motivation model	Simplistic model of enhancing individual motivation within private sector organizations
Prospect theory	Focused on explaining economic decision making in relation to risk in financial markets
Boston Box	Approach which evaluates the products of an organization according to their market share and to their growth prospects
Flow lines	Provides explanation of industrial manufacturing processes
Command and control theory	Management tool for enhancing private sector employee productivity
Hofstede's dimensions	Offers an explanation of impact of national culture traits in relation to individual's behaviour in organizations
5-S Concept	Model advocating a focus on employing health and safety techniques
Theory of horizontal fast track	Approach to arranging administrative promotions which reduces the need for hierarchical structure
Flow theory	Management approach to enhancing an individual's performance at work
Fayol's principles in management	Series of simplistic principles designed for organizational management
Shareholder value analysis	Technique developed for establishing a value creation system
Fishbone chart	Diagram outlining approach taken with total quality management
Quality function deployment	Approach which promotes consumer involvement in produce design
Shamrock organization	Approach linked to promoting financial advantages such as training, taxes and administration costs
Portfolio theory	Economic theory focused on investment in stock markets
Scanlon Plan	Focus on management and labour cooperation to assure productivity and profitability
Single minute exchange	Approach to reducing waste in a manufacturing process
Strategic Planning	Planning approach focused on effective competition for market share and the creation of new markets to meet consumer demand
Theory E, O, J, W	Business approaches focused on advancing organizational productivity
Taguchi method	Statistical method aimed at improving the quality of manufactured goods
Theory of constraints	Approach which focuses on improving organizational performance to increase profitability

Theory	Reason for exclusion
Utility theory	Theory of decision making which assigns a numerical quantity to utility in helping to predict possible outcomes
Game theory	Aims to provide an explanation of economic and strategic 'gaming' behaviour
Queuing theory	Involves a complex mathematical study of waiting lines or queues
Cause and effect	A quality management diagram that shows the causes of a certain event
Systems planning	Not a theory or model, but a term linked to corporation or government programs and used in the context information systems planning
Strategic analysis	Not a theory/model, a concept which set events in an order of priority to choose the most effective course of action
System method	Not a theory or model, but a term used in the context systems planning
7-S framework	Model that identifies key elements needed for success over competitors
Monte Carlo method	Statistical sampling technique that helps examine problems by using random numbers and probability statistics
ASA model	Human resources model designed for the selection of personnel
Kaizen	A quality improvement process which is located within a number of continuous quality improvement (CQI) initiatives
Bayesian theory	Mathematical formula used to predict probability in relation to human choice and maximization of expected utility
Balanced scorecard	Tool for assessing an organization's vision and strategy in relation to performance measures.
Failure mode and effects analysis	Mathematical rating approach for determining risk in auto and airline industries
Expectancy Theory	Management approach focused on enhancing an individual's motivation for performance
Price system	Economic term describing system of price fixing according financial markets
Three-dimensional management	Management approach which focused on improving company performance
Optimized Production Technology	An approach focused on optimizing production of commercial products
Organizational development	An approach focused on general organization change
Root cause analysis	A management tool designed for organizational problem-solving and quality improvement
Flow line	An approach focused on improving the efficiency of the manufacturing process
Flow production	An approach focused on improving the efficiency of the manufacturing process
Method time measurement	Specific concept to workflow and measurement within a manufacturing context
Team management wheel	Management tool for identifying different individual roles in groups/teams
Force field Analysis	A change management tool employed to evaluate impact of organizational forces

Theory	Reason for exclusion
	on change processes
Quality circles	Quality improvement approach developed in the 1970s which has now been replaced by total quality management (TQM) approaches, continuous quality improvement (CQI) and self-directed team approaches
Theory X and Y	Connected contrasting management approaches aimed at maximising behaviour by either stressing control over employees (theory X) or encouraging employee autonomy (theory Y)
Flow line production	Also known as mass production - involves the use of production lines such as used in car manufacturing industry
Emotional intelligence	Cognitive approach that links individual emotions to intelligence to understand how they cope with organizational life
Business excellence model	Business approach which aims to improve the productivity and profits of private sector organizations
Blur theory	Approach which attempts to explain organizational economics in the context of changing financial markets
Doughnut principle	Management tool that helps differentiate core organizational tasks from more discretionary tasks
Systems analysis	Methodology that employs data modelling techniques to analyse organizational systems
Six sigma	Customer-focused approach aimed at improving customer satisfaction and increasing business revenue

Appendix 4: Provisionally identified education theories

Theory
Action learning
Active learning
Barriers to learning
Case-based learning
Cognitive coaching
Collaborative learning
Complex system theory
Connectionism
Cooperative learning
Critical thinking/learning
Decision making
Developmental learning
Differentiation
Discovery learning
Discourse theory
Distributed network system theory
Embedded training
Holistic learning
Knowledge sharing
Inquiry-based learning
Interpersonal intelligence
Lateral thinking
Negotiation
Network model
Parallel thinking
Shared cognition theory
Social and cultural artefact theory
Social development theory

Theory
Social learning theory
Socio-constructivist theory
Socio-cultural theory
Synchronous learning
Team Learning
Virtual Learning Community

Appendix 5: Education theory searches

Theory	ERIC	BEI
Action learning	60	37
Active learning	100 (Total = 649)	51
Barriers to learning	35	0
Case-based learning OR case based learning	18	7
Cognitive coaching	3	0
Collaborative learning	100 (Total = 468)	97
Complex system(s)	30	4
Connectionism	47	2
Cooperative learning	100 (Total = 1237)	100 (Total = 508)
Critical thinking/learning	5	3
Decision making	100 (Total = 2305)	100 (Total = 429)
Developmental learning	4	1
Differentiation	100 (Total = 569)	66
Discovery learning	100 (Total = 174)	68
Discourse theory OR Discourse theories	11	4
Distributed network system(s)	0	0
Embedded training	2	0
Holistic learning	5	0
Knowledge sharing	25	15
Inquiry-based learning OR inquiry based learning	36	3
Interpersonal intelligence	1	0
Lateral thinking	2	2
Negotiation	100 (Total = 281)	40
Network model(s)	26	2
Parallel thinking	1	0
Shared cognition theory OR Shared cognition theories	0	0
Social and cultural artefact(s) OR Social artefact(s) OR cultural artefact(s)	3	2
Social development theory OR Social development theories	13	1

Theory	ERIC	BEI
Social learning theory OR social learning theories	42	1
Socio-constructivist theory OR Socioconstructivist theory OR Socio-constructivist theories OR Socioconstructivist theories	0	0
Socio-cultural theory OR Sociocultural theory OR Socio-cultural theories OR Sociocultural theories	57	7
Synchronous learning	9	2
Team Learning	38	7
Virtual Learning Community OR Virtual Learning Communities	10	11

Appendix 6: Approaches not applicable to interprofessional education

Theory	Reason for exclusion
Barriers to learning	Not a learning theory – a common issue to learning which authors provide a range of solutions
Decision-making	A process focused on identifying and choosing alternatives based on the values and preferences of the decision maker(s)
Complex System	Not a learning theory – social science approach focused on the study of relationships between parts give rise to the collective behaviours of a system and how the system interacts and forms relationships with its environment
Connectionism	Not applicable to IPE - located within cognitive science and is a theory of cognitive information processing.
Cognitive coaching	Not applicable to IPE – an approach for coaching individuals' cognitive abilities.
Critical thinking/learning	Not applicable to IPE – an approach for improving an individual's cognitive processing ability.
Developmental learning	An approach focused on examining the cognitive development of individuals from childhood to adulthood
Discourse theory	Not a specific learning theory – term relating to number of approaches to analyzing written, spoken or signed language use
Decision-making	A cognitive processes that occurs within the activity of learning
Decision theory/analysis	An mathematical approach for calculating outcomes based on conditions of certainty, uncertainty and risk.
Differentiation	Not a specific learning theory – an issue within the educational literature which is focused on understanding differences in learning (i.e. academic streaming of students, use of different learning approaches)
Embedded training	An approach often used by the military to support use of technology/equipment
Lateral thinking	Not a learning theory/approach – method of thinking/reasoning
Holistic learning	An approach which stresses promotion of individual learning through recognition of a peron's emotions as well as their intellect
Knowledge sharing	Not a learning theory/approach – process linked to facilitating sharing and reuse of knowledge bases and knowledge based systems
Interpersonal intelligence	Not a learning theory/approach – an ability to relate and understand others. These learners try to see things from other people's point of view in order to understand how they think and feel

Theory	Reason for exclusion
Negotiation theory	A theory which relates to how individuals negotiate to promote their own personal agendas
Network model	database model conceived as a way of representing objects and their relationships
Parallel thinking	Not a learning theory/approach – method of thinking/reasoning
Social Development Theory	An approach largely focus on children’s social development
Social and Cultural Artefact	Not applicable - use of cultural artifacts to the formation of identity
Sociocultural theory	A theory focused on children’s learning and development at elementary school level