Learner-Centred Approach:

Enhancing Multiple Thinking and Creativity

in Action Learning

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(*Abstract*)

In a complicated context of fast globalization and huge transformation in the new century, continuous action learning is necessary for students, teachers and even schools in educational practices. This article elaborates why and how contextualized multiple thinking (CMT) is needed to re-conceptualize the practices of action learning as the major learner-centred approach to enhancing multiple thinking and creativity in learning.

A typology of CMT (including technological thinking, economic thinking, social thinking, political thinking, cultural thinking and learning thinking) is proposed to provide a new framework for conceptualizing the relationship between CMT and action learning and the nature of creativity in the processes of thinking and learning. Implications are advanced for learner-centred approach to enhancing CMT and creativity of learners in education. This new framework provides a completely new direction to broaden the possibilities and approaches towards education for sustainable development through enhancing multiple intelligence and creativity in action and learning.

Introduction

In facing challenges such as rapid globalization, tremendous impacts of information technology, international transformation towards knowledge-driven economy, strong demands for sustainable societal developments, and international competitions in the new century, numerous educational reforms and changes have been initiated in the different parts of the world. Policy-makers and educators in most countries have to think how to reform their education and prepare next generations for meeting challenges of the future (Cheng, 2003a, b; Hirsch & Weber, 1999; Kogan & Hanney, 2000; Mingle, 2000).

In such a fast changing era, life-long education, continuous action learning, creativity enhancement, and multiple intelligence development are often strongly emphasized in ongoing educational reforms and believed as the key elements for sustainable developments of learners, teachers and even every citizen in a context of globalization, information technology and knowledge-based economy (Education Commission, 2000; Istance, 2003; Jorgensen, 2004). At the institutional level, organizational learning, knowledge management, and institutional intelligence in daily action and practice are considered as necessary for continuing development and improvement in organizations in general and in educational institutions in particular (Boonstra, 2004; Goldsmith, Morgan, Ogg, 2004; Boshyk, 2002; Davenport & Prusak, 2000; Sydänmaanlakka, 2002; Garavan, Johnston & Caldwell, 2001; Leithwood, Leonard & Sharratt, 1998; Leonard, 1998; Poppper & Lipshitz, 1998; Senge, 1990).

At both individual and organizational levels, action learning is believed to be crucial for continuous accumulation of action knowledge and development of creativity and intelligence to cope with the challenges of local and global changes (Wald & Castleberry, 2000; West-Burnham & O'Sullivan, 1998; Argyris, 1982; Argyris & Schon, 1978, 1996; Senge, 1990). In education reform, action learning is also emphasized as one major learner-centred approach to facilitating and enhancing learners' high thinking ability and creativity for their own sustainable development in a fast changing context (National Education Commission, 2000).

Although a lot of efforts have been done to promote action learning in education reform, people are still confused and puzzled about how thinking, creativity and intelligence are related to the process of learners' action learning and how they can be enhanced during the action process particularly in a complicated context involving technological, economic, social, political and cultural aspects (McGill & Brockbank, 2004; Dilworth & Willis, 2003; Boshyk, 2002). There is lack of a framework that can provide a comprehensive understanding of the relationship between thinking and action learning and the nature of creativity in thinking and action and guide the related practices of action learning (Sternberg, 1999, 2000).

This paper aims to address the above issues and propose a theoretical framework for conceptualizing the multiple nature of thinking and creativity in action learning particularly in a complicated context. With this framework, implications are advanced for practices of learner-centred approach towards enhancing multiple thinking and creativity in learners' learning. It is hoped that the framework can provide a new direction to broaden the possibilities and approaches to facilitating multiple thinking and creativity in action and learning in education.

Action Learning Cycle

Action learning generally refers to the kind of learning earned from the process of action either at the individual level, group level or organizational level. At the individual level, action learning represents a type of learning of a learner earned from action activities or a type of professional learning of a practitioner from professional practices or (Stevenson, 2002; Argyris, 1982; Argyris, Putman, & Smith, 1985). At the organizational level or group level, action learning may be a form of organizational learning or group learning earned from the daily operations or the short-term and long-term actions of the this organization or group (Argyris & Schon, 1974; Senge, 1990). In this paper, the discussion will focuses only on action learning at the individual learner level.

Based on the work of Yuen & Cheng (1997, 2000), Argyris & Schön (1974), and Argyris, Putnam, & Smith (1985), Mok & Cheng (2001) conceptualized the process of action learning as a cyclic process in local and global contexts as shown in Figure 1. It subdivides a learning episode into a sequence of three components such as mental condition (mind-set), action, and outcome, linked by four processes including planning, monitoring, feedback to mental condition and feedback to action.

Actor (or action learner) can broadly refer to a learner carrying out the action. Actor's *mind-set* refers to his/her pre-existing conditions of motivation, cognition, and

volition to action and learning. It will determine how the actor plans the action and learning processes and what aims, content and characteristics of action activities the actor wants to pursue. *Action* refers to the intended or planned activities, behaviors, and even projects demonstrated by the actor in the action process. *Monitoring* refers to the process of detecting any mismatch between the intended targets of action and the outcomes of action process. *Outcomes* refer to the results or consequences from the action activities, including positive and negative, overt and subtle results and experiences during the action process.

Two Types of Learning

There are two types of *feedback* from the monitoring process and outcomes to the actor: One to the action and the other one to the mindset. The feedback directly to action will help the actor to adapt performing behaviors in the action process. The learning associated with change in behaviors or action is often referred to as the *first order of learning* or *the low order of learning*. Since this type of learning often has not changed the mental conditions of the actor, it may not produce long lasting learning effects at a higher level. It is often considered a type of superficial learning that results only in some operational changes in action and may not be promising in sustainable developments of the actor.

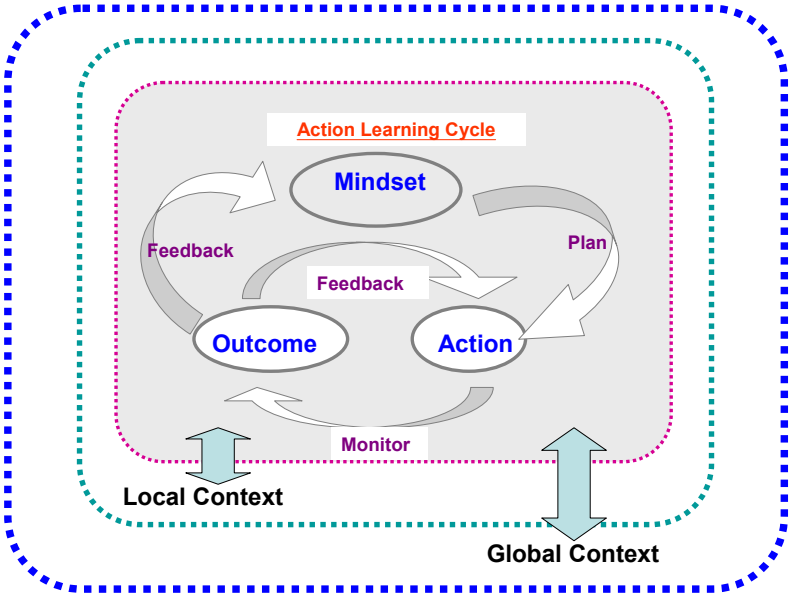

Figure 1. Action learning cycle in local and global contexts

The feedback to mind-set will help the actor or the learner to reflect on and change his/her own mental models including meta-cognition, thinking methods, meta-volition, and knowledge and then to change the planning process as well as the aims and content of the action in the next cycle. The learning associated with change

in mental-set or mental models is often referred as the *second order learning* or *high order learning*. Particularly, the cognitive side of learning with change in mental condition of the action learner is often recognized as change in schemes (Piaget, 1962), schemata (Schmidt, 1975), images (Denis, 1991), repertoires (Schön, 1987), or theories-in-use (Argyris & Schön, 1974).

Issues in Action Learning

The cyclic nature of action learning reflects that learning may go through many such action learning cycles before developing a higher level thinking or mastering a new skill of operation. It is assumed that after completing cycles of action learning, the knowledge level or the intelligence level of the actor will advance to a higher level concerning the task, the strategies as well as the context.

With this conception of action learning cycle, the following issues should be addressed in current efforts of learner-centred approach for enhancing thinking and creativity of learners for sustainable developments in such a fasting complicated context:

1. What should be the relationship between the learners' action learning and the complicated contexts (including technological, economic, social, political, and cultural aspects) such that the action learning is most relevant to sustainable developments?
2. How does the learners' action learning relate to the development of their thinking and creativity in such a complicated context?
3. What kinds of thinking and creativity can be pursued and enhanced in learners' action learning for sustainable developments in the new century?

Action Learning and the Contexts

All activities of action and learning have to happen in contexts. The learners' action and thinking need to interact with the contexts during cycles of their action learning. The discussion of the relationship between learners' action learning and contexts can be in terms of the social system theory and the multiplicity of contexts.

Four Critical Functions in Contexts

With the social system theory of Parsons (1960), the action of an individual or an organization for survival in the environment serves four critical functions including goal achievement, integration, latency, and adaptation. Goal achievement refers to the defining of objectives of action and the mobilization of internal and external resources to obtain them. Integration indicates a social solidarity involving a process of establishing and organizing a set of social relations or networks that consistently support the action. Latency represents the maintenance over time of the motivational patterns and the values and beliefs of the actor. Adaptation means the accommodation of the actor to the reality demands and challenges of the environment, coupled with the active transformation of the external situation by changing the operation and mindset of the actor to meet new conditions.

When adaptation, goals achievement, integration, and latency are necessary functions of action for learner as an actor to survive in changing local and global

contexts, thinking in action is inevitably needed to deal with the problems rising from these functions. In other words, *thinking in action learning should be contextualized* and closely related to the contextual issues such as how the goals of learner's action can be defined and achieved in such a context; how related members and other social constituencies can be well coordinated and networked to support action in the whole process; how the values and beliefs system of learner as actor can be maintained consistent in facing challenges from the contexts; and how the mindset and operations of learner can be adapted to the challenges and new demands from the changing contexts. All these are important and relevant issues to the sustainable developments of learners for the future.

Multiplicity of Contexts and Perspectives

There are complexity and multiplicity of contexts in which action and learning are undertaken by learners as actors in presence or in future. Traditionally, the contexts are often classified as economic, social, political, and cultural aspects and correspondingly the related issues of developments at individual, organizational or societal levels are often discussed and analysed in terms of these key aspects (Bolman & Deal, 1997; Kazamias & Schwartz, 1977).

Given the tremendous impacts of technology on every aspect of the society and the global world (Ohmae, 2000; Gates, 1999; Education and Manpower Bureau, 1998; Holmes, 1999) and the necessity of continuous learning and adaptation to the fast changing internal and external environment (Education Commission, 2000a, b; Burnes, Cooper, & West, 2003; Jorgensen, 2004), it is quite natural to include the technological perspective and the learning perspective into consideration of action and its contexts. In other words, the interactions of learners' action with its related contexts can be considered and analysed from six important perspectives such as *technological, economic, social, political, cultural*, and *learning* perspectives.

Based on the above considerations of context and the traditional assumptions of human nature in contexts (Bolman & Deal, 1997; Schein, 1980), the classification of human nature can be correspondingly contextualized and represented by a typology including *Technological Person, Economic Person, Social Person, Political Person, Cultural Person,* and *Learning Person* in a complicated context of the new century (Cheng, 2000). To different types of person, the interaction with contexts and the rationality of thinking used in the process of action learning may be completely different. Therefore, multiple perspectives should be used to analyse the multiplicity of action learning, thinking and contexts.

Multiple Thinking in Action Learning

The actor's thinking is the key element that deeply influences the aims, nature, process and effects of action learning. From the above discussion, thinking involved in learner's action learning should correspondingly be contextualized and multiple. There may be six types of contextualized multiple thinking (CMT) in action learning, including *technological thinking, economic thinking, social thinking, political thinking, cultural thinking* and *learning thinking*.

CMT and Four Critical Functions

When compared with the four critical functions of action, the technological thinking and economic thinking are closely related to the goal achievement function with focus on how the goals of action can be defined and achieved in an effective and efficient way. The social thinking and political thinking are highly associated with the integration function with focus on how members and other social constituencies can be well networked to produce synergy for action.

The cultural thinking is related to the latency function with major concern about how the values and beliefs system can be maintained consistent in facing challenges. Lastly, the learning thinking contributes to the adaptation function with focus on how the mindset and operations of the actor can be adapted to meet the changing demands and challenges. In sum, this set of contextualized multiple thinking in action serves the four critical functions of actor for sustainable developments in the complex contexts.

Typology of CMT in Action Learning

The major characteristics of each type of contextualized multiple thinking in action learning may be mapped in terms of rationality, beliefs about action, beliefs about outcomes, role of thinking in planning action, nature of thinking process, role of thinking in 1st order learning and 2nd order learning, use of information, use of knowledge, contextualized intelligence, and context of salience. As shown in Table 1, there is a typology of various types of CMT, in which each type of CMT is contrastingly different from each other in their characteristics.

Table 1

Typology of Contextualized Multiple Thinking in Action Learning

Character-istics	Typology of Contextualized Multiple Thinking					
	Technological Thinking	**Economic Thinking**	**Social Thinking**	**Political Thinking**	**Cultural Thinking**	**Learning Thinking**
Rationality	Technological rationality	Economic rationality	Social rationality	Political rationality	Cultural rationality	Adaptive rationality
Ideology	Methodological effectiveness; Goal achievement; Technological engineering; Technical optimization	Efficiency; Cost-benefit; Resources & financial management; Economic optimization	Social relations; Human needs; Social satisfaction	Interest, power and conflict; Participation, negotiation, and democracy	Values, beliefs, ethics and traditions; Integration, coherence and morality	Adaptation to changes; Continuous improvement and development
Key concerns/ questions in thinking	What methods and techniques can be used? How can the aims be achieved more effectively? Why? Can any technical innovation and improvement be made and the process of action be reengineered?	What resources and costs are needed and what benefits can be generated? How can the aims be achieved with minimal cost? Why? How to innovatively maximize the marginal benefits?	Who are stakeholders and actors involved in the action? How can they affect the aims, processes and outcomes of action? How can their human needs be satisfied and the synergy be maximized? Why?	What diversities, interests, and powers are involved in the action? How can the conflicts and struggles be minimized or managed through negotiation, democracy and other? Why? How can "win-win" strategies, alliances, and partnerships be built?	What values, beliefs and ethics are crucial and shared in the action? How do they influence the aims and nature of action? How integration, coherence or morality in values and beliefs can be maximized in action? Why?	What learning styles, thinking modes and knowledge can be used? What are thinking gaps in changing realities? How can the aims and nature of action be conceptualized more adaptive to the changes? How can the thinking gaps be minimized and new thinking modes and understanding be achieved?

Beliefs about action	To use scientific knowledge and technology to solve problems and achieve aims	To procure and use resources to implement plan and achieve outcomes	To establish social network and support to motivate members and implement plan	To negotiate and struggle among parties to manage or solve conflicts	To clarify ambiguities and uncertainties and realize the vision including key values and beliefs shared	To discover new ideas and approaches to achieving aims
Beliefs about outcomes of action	Outcome is a predictable product of good technology and methodology	Outcome is an output from the calculated use of resources	Outcome is a product of social action; Social satisfaction is also an outcome	Outcome is a result of bargaining, compromise, and interplay among interest parties	Outcome is a symbolic product of meaning making or cultural actualization	Outcome is the discovery of new knowledge and approaches and the enhancement of intelligence
Role of thinking in planning action	To find out the right technology and methods to overcome difficulties and problems and get things done; To study technological possibilities, strengths and weaknesses	To find out how minimal resources and efforts can be used to produce outcomes; To calculate any economic value-added or hidden cost	To find out the optimal social conditions for action and satisfying human needs; To identify any social capital to be accumulated	To find out the balance among various political forces for achieving compromise; To search for any possibility for reaching the "win-win" situation and alliance building	To find out cultural meanings behind action alternatives; To derive meanings from possible overt and hidden outcomes	To reflect on the existing modes of thinking and practice and find out new modes; To deepen the level of understanding and thinking
Role of thinking in 1st order learning	To identify and explain technological gaps between action and outcomes; To find out technological solutions in action	To identify and explain emerging gaps between target and reality in cost and benefit in action; To find out economic solutions in action	To identify and explain social gaps between expectations and outcomes; To find out social solutions in action	To identify and explain political gaps in action and outcomes; To find out political solutions in action	To identify and explain cultural gaps in action and outcomes; To find out cultural solutions in action	To identify and explain information gaps in action & feedback; To find out information/ knowledge solutions in action
Role of thinking in 2nd order learning	To identify and explain actor's cognitive gaps about technology and action; To reflect on and change the existing mode of technological thinking for action	To identify and explain actor's cognitive gaps about resources and action; To reflect on and change the existing mode of economic thinking for action	To identify and explain actor's cognitive gaps between social conditions and action; To reflect on and change the existing mode of social thinking for action	To identify and explain actor's cognitive gaps about political forces and action; To reflect on and change the existing mode of political thinking for action	To identify and explain actor's cognitive gaps about shared values and action; To reflect on and change the existing mode of cultural thinking for action	To identify and explain actor's cognitive gaps about learning style and action; To reflect on and change the existing mode of learning thinking for action
Thinking process	Scientific reasoning, technological imagination, and methodological consideration	Economic calculation of cost and benefits	Investigation of social conditions and consequences	Consideration of micro-politics among interests; Calculation of political cost and consequences	Searching, clarifying, and making of meanings in line with values, beliefs, ethics and morality	Generation, accumulation and management of new knowledge about action and outcomes
Information used in thinking	Objective information	Economic information about action and outcomes	Social, emotional, and perceptual information	Information about diversity, interests, and constituencies	Information about ethics, values, beliefs, social norms, and traditions	Information about contextual changes, thinking modes, learning styles, and feedback from action
Knowledge in thinking	Scientific and methodological knowledge	Economic and resources knowledge	Human and social knowledge	Negotiation and conflict management knowledge	Cultural and values knowledge	Learning and action knowledge
Contextual-ized intelligence in thinking	Technological intelligence	Economic intelligence	Social intelligence	Political intelligence	Cultural intelligence	Learning intelligence
The context in which that thinking is salient	When the aims of action are clear and it is very urgent to achieve them	When the resources for action are scarce and limited or the economic values are strongly emphasized	When the success of action heavily depends on human and social factors	When the action involves diverse interests and the resources are so limited to meet expectations	When the environment is so uncertain and the aims and nature of action are not so clear	When the environment is fast changing and adaptation to the changes is crucial

Technological Thinking

Given the tremendous impacts of technology on different aspects of the society and global community, technological thinking is increasingly popular in action and development (Gates, 1999; Education and Manpower Bureau, 1998; Holmes, 1999). It is based on a type of *technological rationality* that emphasizes on the achievement of planned goals and targets through objective and scientific methodology and structure. Technological engineering, methodological effectiveness, and technical optimization are the key ideology and values in thinking during the whole action process. The management traditions such as the F. Taylor's principles of scientific management (Taylor, 1947; Villers, 1960) or the M. Weber's theory of bureaucracy (Weber, 1922) are mainly based on such a technological or structural rationality.

With this technological rationality, the common concerns in thinking during learner's action learning cycles may include the following:

- What methods, procedures, techniques, and structures can be used to achieve the planned goals and targets?
- How can the aims and related tasks be achieved more effectively through changes in structure, methodology or technology? why?
- Can any technical innovations and improvements be made or can the process of action be reengineered to enhance effectiveness?

In the technological thinking, the basic objective of action is to use scientific knowledge and technology to solve the existing problems and achieve the planned aims. Therefore, the outcome is a predictable product of right technology and methodology used in action. If any defect occurs in outcome, it means that there should be some mistakes in structure, procedure, or technology in action.

In planning action, the role of thinking is to find out the right technology and methods to overcome potential difficulties, obstacles and problems and get things done. It often needs to study technological possibilities and alternatives and compare their strengths and weaknesses in considering technical optimization.

In the 1st order learning that aims at operational changes, thinking is needed to identify and explain technological gaps between action and outcomes and to find out technological solutions for the next cycle of action. But in the 2nd order learning that focuses on the changes in mindset, the role of thinking is to investigate the actor's potential cognitive gaps in understanding the relationship between technology and action and to reflect on and change the existing mode of technological thinking for action.

In the learner's action learning cycle, the nature of thinking is mainly scientific reasoning, technological imagination, and methodological consideration. Objective information and scientific and methodological knowledge are crucial and necessary in technological thinking. In order to apply the technological thinking successfully in action learning, learners as actors should be prepared to have some basic technological intelligence in the mindset. It assumes that through the action learning process and the experience of technological thinking in action, learners may accumulate or enhance the related technological intelligence.

To different nature of action and related contexts, the appropriateness of technological thinking may be different. When the aims and objectives of action are clearly defined and commonly accepted by actors and other concerned constituencies and it is very urgent for actors to achieve them, technological thinking seems to be more salient and appropriate than other types of thinking because the major concern in this situation is how to carry out the action to achieve the clearly defined aims and objectives successfully by appropriate technology and methods. But if the aims of action are vague, uncertain, and controversial and the timing for action is not so urgent, it means that methodological consideration and technological effectiveness are not yet at the top priority in thinking.

Economic Thinking

Economic growth is usually considered as the driving force of individual and national developments and as the cutting edge in international competitions particularly in a context of globalization (Ohame, 2000; Burton-Jones, 1999). Inevitably, the importance and necessity of economic thinking are strongly emphasized in all types of action at both individual and organizational levels (Cavalcanti, 2002; Fontana, 2001). Economic thinking is based on *economic rationality* that concerns maximizing benefits and achieving planned aims and targets of action through optimal use of various resources. Efficiency, cost-benefit, cost-effectiveness, resources and financial management, and economic optimization are some key values and ideology of economic thinking in action (Levin, 1994a, b). Numerous studies in the areas of economy and finance of education are examples using economic thinking in analysis of issues in action or reality (Owen, 1998; Weber, 1998; Woodhall, 1992; Wyckoff, 2000; Solmon & Fagnano, 1994). From the economic rationality, some typical questions or concerns can be raised in the thinking process during learners' action learning cycle:

- What resources and costs are needed to implement the action and what benefits can be generated from the process and outcomes of action cycle?
- How can the planned aims be achieved with minimal costs or resources in action? Why?
- In what way the benefits can be innovatively maximized from the action process?

Different from the technological thinking, the role of action in economic thinking is to procure various types of resources from internal and external sources and use these resources to organize and implement the action plan and finally achieve targeted outcomes and other implicit and explicit benefits from the whole process. Thus, the outcomes and benefits are results from the calculated use of various types of resources in action.

From the economic perspective, the role of thinking in planning action is to find out how minimal resources and efforts can be used to produce the targeted outcomes and benefits from the action process, or how the returns of action can be maximized with the given resources. To calculate any potentially added values and hidden cost is inevitably necessary in the planning process.

The 1st order of learning aims at behavioral or operational changes and thus the role of thinking in is to identify and explain emerging gaps between target and reality

in cost and benefit in the action cycle and to find out economic solutions in action. In the 2nd order of learning, mental or cognitive changes are key concerns and therefore economic thinking is to reflect on the learner's own potential cognitive gaps in understanding the relationship between resources and action and to review the existing mode of economic thinking and make changes if necessary for effective action in next cycles.

From the above discussion, we can see that the nature of economic thinking in the whole action learning cycle is mainly a kind of economic calculation of cost and benefits and allocation of resources. The needed information and knowledge for thinking are economic data and information about the input, process, and outcomes of the action as well as the knowledge of economy, finance and resources management. Learners as actors should be prepared to have some basic ability that is economic intelligence in the mindset to conduct economic thinking in the action learning cycle. Same as the technological intelligence, learners can also accumulate and enhance the economic intelligence through the cyclic action learning process and the experience of economic thinking in action.

The economic thinking is salient and powerful in a context where the resources for action are scarce and very limited but the economic values and benefits are strongly emphasized. Given the so limited resources, how resources can be procured, managed and used to achieve the planned aims and produce the expected economic benefits efficiently is inevitably a major concern in such a context. Therefore economic thinking becomes crucial and necessary in action.

Social Thinking

Individual action or organizational action is mainly carried out in a social context, in which human factors such as human needs and development, social relations, and social expectations can deeply influence and shape the nature, aims and outcomes of an action. There is a long tradition of research with focus on the impacts of social relationships and human needs on human behaviour and performance (Maslow, 1970; McGregory, 1960). In education, human development and social relations are often perceived as core values (Henderson & Cunningham, 1994; Hoy, Tarter, & Kottkamp, 1991; Rosenholtz, 1991; Guskey & Huberman, 1995).

Social thinking reflects the concerns and values about human and social factors involved in action. It is based on *social rationality* that emphasizes on the importance and necessity of social relationships and human initiative to the completion of action and achievement of aims. Therefore, social interactions and relations, satisfaction of social needs, human initiative and development are some key values and ideology used in thinking and action learning (Maslow, 1970; McGregor, 1960). In the social thinking, some typical concerns related to action learning may be listed as follows:

- Who are major constituencies and actors involved in the action and what are the social relationships between them?
- How can these constituencies and their relationships with the actors affect the aims, processes and outcomes of action?
- How can the human needs be satisfied and the synergy be maximized among involved constituencies? Why?

From the perspective of social thinking, the major task of action is to establish social network and support to implement the action plan and achieve the aims. The outcomes are products of successful social networking and solidarity in action. Also, enhanced social satisfaction, personal development, working relationships with peers or members are often perceived as important outcomes of action learning.

According to the logic of social thinking, the role of planning is to find out the optimal social conditions for implementing the action and meeting human needs and expectations; and to establish social network and social capital for supporting the action process and achieving outcomes.

In the 1st order learning, social thinking targets at identifying and explaining the gaps between social expectations on action and outcomes and also at finding out the possible social solutions to fill out these gaps in the next cycle of operation. The results of thinking and learning are to adjust social behaviors and operations of the learner. In contrast, the 2nd order learning concerns cognitive or mental changes and therefore social thinking is needed to investigate the learner's own cognitive gaps in understanding how the nature, process and outcomes of action are related to social conditions and then to reflect on and make changes in the existing modes of social thinking in the mindset. It is a type of mental changes.

As a whole, the nature of social thinking in action is mainly an investigation of social conditions and their consequences. The social, emotional, and perceptual information and the knowledge of human development and social relationship are important to social thinking. The learners as actors should be prepared to have some basic social intelligence to conduct social thinking in a complicated context of action. Recently there is a strong emphasis on emotional intelligence (EI) or emotional quotient (EQ) for individuals or organizational leaders to be successful in a so challenging and demanding social or business world (Cherniss & Goleman, 2001; Goleman, 1995, 1998). This adds an evidence to support the importance of social intelligence and social thinking to the success of action.

The appropriateness of social thinking depends on the nature of the context and action. When the success of an action is heavily dependent of human and social factors and the outcomes are closely related to or defined by the social expectations of involved stakeholders or constituencies, the social thinking may be more salient, powerful and relevant in action and learning. Of course, if the nature and success of an action (e.g. a simple mechanical action) do not depend on the social factors and human initiative, the role of social thinking may not be so significant in action.

Political Thinking

The increasing diversities in expectations and demands, competitions for resources, and struggles for power among different parties intensify the political aspects of life at the individual, organizational, community and even international

levels. In such a context, political thinking attracts more and more attention in action and learning (Pfeffer, 1992; Bolman & Deal, 1997; Ball, 1987). Political thinking is based on the *political rationality* that emphasizes on the recognition and significance of diversity in interests and demands of actors and involved constituencies in action. It assumes that the resolution and management of conflicts and struggles through various strategies such as alliances building, negotiation, compromise, participation and democratic process are necessary in formulating and implementing action plan and achieving aims. The major ideology includes competitions for interest, struggles for power, conflicts among members or parties, negotiation and compromise, participation and democracy in decision-making (Pfeffer, 1992; Kotter, 1985; Sarason, 1998; Cloke, 2000). Some typical questions for political thinking in action learning may be as follows:

- What diversities, interests, and powers of actors and other constituencies are involved in the action?
- How can the conflicts and struggles be minimized or managed through alliance building, partnership, negotiation, democratic process and other strategies or tactics? Why?
- How can "win-win" strategies, alliances, and partnerships be built to overcome political obstacles, facilitate the action and maximize the achievement of the aims?

In the political perspective, action in a complicated context involving multiple and diverse constituencies inevitably induces a process of negotiation, struggle, and conflict management among various constituencies or parties. To a great extent, the outcome of such an action is a result of bargaining, compromise, and interplay among constituencies. The planning of an action includes the efforts to find out the balance among various political forces for achieving compromise and to search for any possibilities for reaching the "win-win" situation and building alliance among involved constituencies.

As behavioral or operational change is the focus of the 1st order learning, the learner needs to think how to study what political problems and conflicts are happening in the action and to find out political solutions or strategies to tackle them in the ongoing action or the next cycle of action (Cloke, 2000). But in the 2nd order learning, change in the mindset is the key concern and therefore the learner needs to locate the cognitive gaps in understanding the political forces, struggles and conflicts between constituencies or parties in action and then adapt the existing mode of political thinking for action.

As a whole, the role of political thinking in action is the sophisticated consideration of impacts of micro-politics among constituencies or parties on various aspects of action and outcomes as well as the calculation of political cost and consequences among alternative strategies or tactics for dealing with the political concerns in action. The information about diversities and conflicts among involved constituencies and the knowledge about negotiation and conflict management are necessary to political thinking. In addition to the previously mentioned intelligences, the learner should have some basic political intelligence to conduct political thinking in action learning and also further develop his/her political intelligence through the

continuous action learning and political thinking in the cyclic process of action.

From the above discussion, we can see that the applicability of political thinking is somewhat limited by the context. It becomes salient and significant only if the action is in a context involving diverse interests and competing constituencies and the resources available is so limited to meet the diverse expectations. In other words, if there is strong solidarity among constituencies and the resources are sufficient to fulfill the diverse needs and implement the action, the political thinking may not be so salient in comparison with other types of thinking. In education, political thinking is often perceived not as salient and important as in the business world.

Cultural Thinking

In facing the challenges from ambiguities and uncertainties emerging from the fast changing internal and external environments, how individuals or organizations can remain consistent and confident in their values and beliefs system in action is an important concern that relates to cultural thinking (Bolman & Deal, 1997; Schein, 1999; Hofstede, 1997). It also relates to latency, one of four critical functions of individuals or organizations struggling for survival or sustainable development in a complicated context (Parsons, 1960). Cultural thinking is based on the *cultural rationality* that assumes the nature, aims, and effectiveness of action to be heavily determined by the values, beliefs, ethics and traditions shared among the actor and concerned constituencies (Cheng, 2000; Schein, 1992, 1999). Therefore, sharing of values, beliefs and ethics, integration and coherence among members, and morality in action are often key ideology in thinking and action. In the cultural thinking, some typical questions for action learning may include the following:

- What values, beliefs and ethics are crucial and shared among the action learner and other constituencies in the action?
- How do they influence the aims, nature and outcomes of action?
- How integration, coherence or morality in values and beliefs can be maximized in the action? Why?

The objective of action is to clarify ambiguities and uncertainties in the action contexts and realize the vision (including the key values and beliefs) shared by the action learner and related key constituencies. In a cultural sense, the outcome of an action is a symbolic product of meaning making or cultural actualization by the learner and constituencies in an ambiguous context (Bolman & Deal, 1997).

According to this cultural perspective, the role of thinking in planning action is to find out the cultural meanings behind action alternatives, choose that one consistent most with the values and beliefs strongly shared by the learner and key constituencies, and then derive meanings from possible overt and hidden outcomes.

In the 1st order learning, the learner needs to think how to identify and interpret what cultural gaps (in terms of values, beliefs or ethics) appear in the action and related outcomes and then find out what behavioral or operational changes in action can be cultural solutions to these gaps. But in the 2nd order learning, the learner needs to think how to map out the cognitive gaps in understanding the meanings of action and outcomes and the involved values and beliefs. With these gaps, the learner reflects on the existing mode of cultural thinking and makes changes in the mindset for action (Yuen & Cheng, 2000; Senge, 1990).

In general, the nature of cultural thinking in action learning is a process of searching, clarifying and making of meanings in line with the shared key values, beliefs, ethics and morality. The information and knowledge used in thinking are mainly about the ethics, values, beliefs, social norms, and traditions shared among the actor and constituencies. The learner should have some basic cultural intelligence in the mindset in order to apply the cultural thinking successfully in action learning. It is also quite natural that the learner can accumulate and enhance the cultural intelligence through the experiences of cultural thinking in the continuous action learning process.

When the environment is so ambiguous and uncertain and the aims and nature of action are so vague, the applicability of cultural thinking is salient in such a context because it may help the learner clarify and focus on what vision, values and beliefs to be pursued in action. But if the environment is so certain and the nature of action is so clear, further searching and clarifying of meanings of action in this context may not be at the top priority when compared with other concerns (e.g. technological or economic considerations). In other words, cultural thinking may not be so urgent and salient as other types of thinking.

Learning Thinking

Given tremendous challenges and impacts of the fast changing context on development and survival of individuals and the society, learning and adaptation to the challenges are crucial and necessary. The pursuit of a learning society becomes more and more important (Wain, 2004; Gorard, 2002; Jarvis, 2001; Marsick, Bitterman & van der Veen, 2000; OECD, 2000). This is the major reason why adaptation as one of the four critical functions of actors or social systems is receiving much higher attention in such an era of globalization and transformation. Learning thinking (or *adaptive thinking*) is based on the *adaptive rationality* that emphasizes on the continuous learning and successful adaptation to the changes and challenges in the internal and external environment as the key of action learning. Therefore, continuous improvement and development of actors' operational style and cognitive ability to a higher level is a key ideology in the learning thinking (Jarvis, 2001; Lessem, 2000; Raven & Stephenson, 2001; OECD, 1997; Silins, Mulford & Zarins, 2002). With the adaptive rationality, some typical questions raised for the learning thinking may be listed as follows:

- What learning styles, thinking modes and knowledge can be used in the process of action learning? What are gaps between the modes of thinking and learning and the changing realities?
- How can the aims and nature of action be conceptualized to be more adaptive to the changes and challenges in the context?
- How can the thinking or cognitive gaps in understanding the changing realities be minimized and new thinking modes and new understanding be achieved?

As the values of learning are strongly emphasized, the basic objective of action is to discover new ideas, new knowledge and new approaches to maximizing the achievement of aims in ongoing and next action cycles. Therefore, the outcome of action inevitably includes the discovery of new knowledge and approaches to action

implementation and the enhancement of the learner's intelligence to understand and deal with challenges from the changing environment.

The planning of action involves a process of reflecting on experiences of previous action cycles including the strengths and weaknesses of modes of learning, thinking and practice as well as the characteristics of the context; and investigating new modes of action for more effective learning and deeper understanding in next cycles.

In the 1st order learning with focus on changes in learning behaviour, the role of thinking is to investigate information gaps in action and feedback that are hindering the learner's understanding and learning about the nature and outcomes of action. Thinking is also needed to find out what new learning styles or methods are more appropriate to provide an operational solution to redress these information gaps in action. As the 2nd order learning aims at changes in the mindset, the role of thinking is to identify the cognitive gaps in understanding learning styles, feedback, and action; reflect on the existing modes of learning and thinking in action; and then modify the learner's mindset to a new mode that is believed to be more effective in learning and action.

In the action cycle, the nature of learning thinking is mainly generation, accumulation and management of new knowledge about action, learning and outcomes (Davenport & Prusak, 2000). The major information and knowledge used in thinking are about contextual changes, thinking modes, learning styles and feedback from action. In order to have successful learning thinking, the learner should be prepared to have some learning intelligence as the basic mental ability to perform the 1st order and 2nd order learning in the action cycle. Naturally, the experiences of learning thinking in continuous action learning cycles can also contribute to development of learning intelligence of the actor.

As mentioned above, the learning thinking is salient and relevant particularly when the environment is fast changing and the adaptation to contextual changes is crucial to the development and survival of learners and related constituencies. Therefore it is not a surprise that the type of learning thinking is receiving more and more emphasis particularly in terms of life-long learning and knowledge management in this new century of huge transformations and serious competitions.

Contextualized Multiple Intelligence (CMI)

Intelligence and thinking are traditionally key elements in discussion of human action and learning (Sternberg, 1999; Anderson, 1999; Baron, 2000; Kirby & Goodpaster, 2002). The typology of contextualized multiple thinking (CMT) provides a new framework for re-conceptualizing multiple intelligence. In the above discussion, *thinking* is conceptualized as an internal mental process of the learner in the action learning cycle and correspondingly *intelligence* is conceptualized as the internal or internalized thinking ability of the learner. The experience of thinking in action learning can be internalized as the learner's intelligence in terms of techniques, concepts, knowledge, mindset, schemes (Piaget, 1962), schemata (Schmidt, 1975), images (Denis, 1991), repertoires (Schön, 1987), or theories-in-use (Argyris & Schön, 1974).

Correspondingly associated with the typology of CMT, there may be a typology of contextualized multiple intelligence (CMI) including *Technological Intelligence, Economic Intelligence, Social Intelligence, Political Intelligence, Cultural Intelligence,* and *Learning Intelligence*. Clearly this typology of CMI is different from Howard Gardner's (1993) famous biological framework of multiple intelligence including musical intelligence, bodily-kinaesthetic intelligence, logical-mathematical intelligence, linguistic intelligence, spatial intelligence, interpersonal intelligence, and intrapersonal intelligence. In the Gardner's framework, there is lack of a link between multiple intelligence and the context in which the actor or learner develops and survives. According to Cheng (2000), in order to strengthen the relevance of education to multiple developments of the complicated contexts in the technological, economic, political, social, cultural and learning aspects, the typology of human intelligence can be contextualized as CMI such that we can have a more relevant and comprehensive framework for developing multiple intelligence of new generations in response to developments in these key aspects.

To different persons, they may have different strengths in their CMI because of different reasons such as their previous education, personal innate characteristics, family backgrounds, community culture, etc. Some persons are stronger in technological intelligence or economic intelligence but the other may be stronger in social intelligence or cultural intelligence. Given the societal and global contexts are so complicated, diverse, multiple, fluid, and challenging, it is quite reasonable to expect that the new generations should have at least some of CMI to conduct multiple thinking in action learning in such complicated contexts of the new millennium (Cheng, 2000).

Levels of Thinking

Currently, knowledge management is strongly emphasized in daily operation and professional practice as the key for long-term effectiveness and sustainable development of individuals or organizations. How should the involved data, information, and knowledge be managed and how should they be related to the actor's intelligence in action learning cycles? How can thinking and learning be promoted to a deeper level as "deep thinking" or "deep learning" in the action learning cycle? All these are significant questions in considering the application of this typology of CMT in action learning.

As indicated in the literature of knowledge management (Sydanmaanlakka, 2002; Davenport & Prusak, 2000; Marquardt, 1996; Dierkes, 2001; Al-Hawamdeh & Hart, 2002), data, information, knowledge and intelligence are crucial elements in action learning of individuals and organizations. The level of thinking & learning can be illustrated in terms of the data, information, knowledge and intelligence involved in action learning as shown in Figure 2.

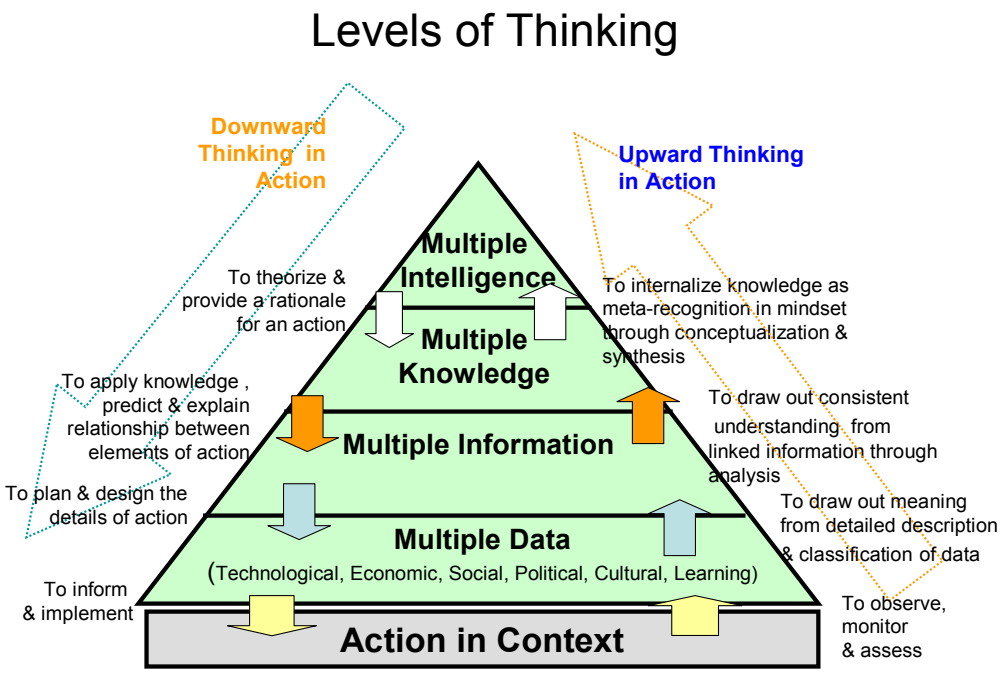

Figure 2. Levels of Thinking in Action Learning

Upward Thinking in Action.

In the action learning cycle, *data* can be gained from the monitoring and assessment of action process and outcomes or directly from the experiences and observations of the actor or even independent observers (as shown in the right side of Figure 2). This data may be multiple including the technological, economic, social, political, cultural and learning data when the contextualized multiple thinking framework is used in action learning. From detailed classification and description of the data, the learner can draw some factual meaning or understanding that becomes the *information* about the action.

Through linking and analyzing various information about input, process, and outcome of the action after a number of action cycles, the learner can achieve more reliable and consistent understanding that becomes the learner's *knowledge* about the action. Through conceptualization and synthesis, the learner can further internalize the knowledge into mega-cognition in the mindset, that becomes the learner's contextualized *intelligence*. Given the multiplicity of data in nature, the related information, knowledge and intelligence are potentially multiple in terms of technological, economic, social, political, cultural and learning aspects.

The above mental process from data to information, to knowledge and to intelligence is a *thinking(or learning) process in action*. Thinking often refers to the internal mental process but learning is a general term including both internal mental and explicit behavioral processes. Since the above thinking process is upward from data to intelligence, it is also called as "*upward thinking in action.*"

Hierarchy of Thinking in Action.

There is a hierarchy of thinking in the action learning cycle, including four levels:
(1) thinking from action to data;
(2) thinking from data to information;
(3) thinking from information to knowledge; and
(4) thinking from knowledge to intelligence.

In general, levels (1) and (2) are often considered as *superficial thinking* or *1st order thinking* that involves only observable data and information; and levels (3) and (4) as *deep thinking or 2nd order thinking* that involves implicit knowledge and intelligence. Correspondingly, learning in action has four levels with levels (1) and (2) as *superficial learning* and levels (3) and (4) as *deep learning*. Only deep learning can cause internal changes in mindset (in terms of knowledge and intelligence) but superficial learning can just result in operational changes with feedback in terms of data and information.

Downward Thinking in Action.

The above thinking process can be downward from intelligence to knowledge, to information, to data and to action as shown in the left side of Figure 2. With the intelligence (or CMI), the learner thinks how to theorize the aim of an action in a context and provide a rationale for conceptualizing such an action. Then the learner thinks how to apply some related knowledge to predict and explain the possible relationships between key elements (e.g. input, process, outcome) of the action. The predicted relationships will become the major information to be tested and checked in the reality. In order to test the information, the learner thinks how to plan and design the action and collect the expected data. Finally, the learner validates and tests the above provided rationale, related knowledge, predicted relationships (information to be tested), and expected data in the reality through implementation of the action in the context. As a whole, this is a *downward thinking in action*.

During the thinking process, contextualized multiple intelligence, multiple knowledge, multiple information, and multiple data may be involved and used. If the provided rationale, related knowledge, predicted relationships, and expected data are found to be consistent and valid in the action process, then the existing CMI and related knowledge are confirmed and reinforced. But if they are found to be inconsistent and invalid in the reality of action, the learner need to think and check if any gaps exist in the design of action or any misconceptions exist in the original mindset. Based on the actual results (data and information) of the action, the learner thinks how to redress the gaps in the design of action (i.e. the 1st order thinking) or modify the existing intelligence and knowledge in the mindset (i.e. 2nd order thinking). Then, the learner starts the upward thinking again in action as discussed above.

As illustrated above, the upward thinking and downward thinking as a whole form a cycle of thinking process for the action learning.

Integrative Multiple Thinking in Action

Matrix of Integrative Multiple Thinking

In the action learning process, the learner's thinking can involve not only the four levels of thinking but also the six types of CMT. As shown in Figure 3, there may be two basic modes of thinking in action learning: *vertical thinking* (y-axis) across the data level to the intelligence level and *horizontal thinking* (x-axis) across the

technological type to the learning type. It means that each type of thinking (e.g. political) may include four levels (from data to intelligence); and each level of thinking (e.g. knowledge) may involve six types of thinking (from technological to learning). These two basic modes form *a matrix of integrative multiple thinking* that can provide a comprehensive framework to consider the complexity of multiple thinking and its application in action.

Integrative Upward Multiple Thinking

According to this matrix, any thinking process in action learning may be an integrative combination of types and levels of thinking. In Figure 3, there are two examples to illustrate the *integrative upward multiple thinking* in action. The first example (indicated by the larger triangle) represents the upward thinking through integration of the economic, social, political and cultural data and information to produce social and political knowledge and develop social intelligence. The second one (indicated by the small triangle) represents the upward thinking with integration of the political, cultural and learning knowledge to develop cultural and learning intelligence.

Integrative Downward Multiple Thinking

In Figure 4, two examples are provided to show the *integrative downward multiple thinking* in action. The large triangle graphically represents the downward thinking that integrates the economic, social, political, cultural and learning intelligences to conceptualize the related multiple knowledge and information and direct data collection for designing the action in the political domain. In other words, this upward multiple thinking covering five types and four levels is used to direct and design a political action. The second example (indicated by the small triangle) represents the thinking that integrates the political, cultural, and learning information to guide data collection for designing action in the cultural domain.

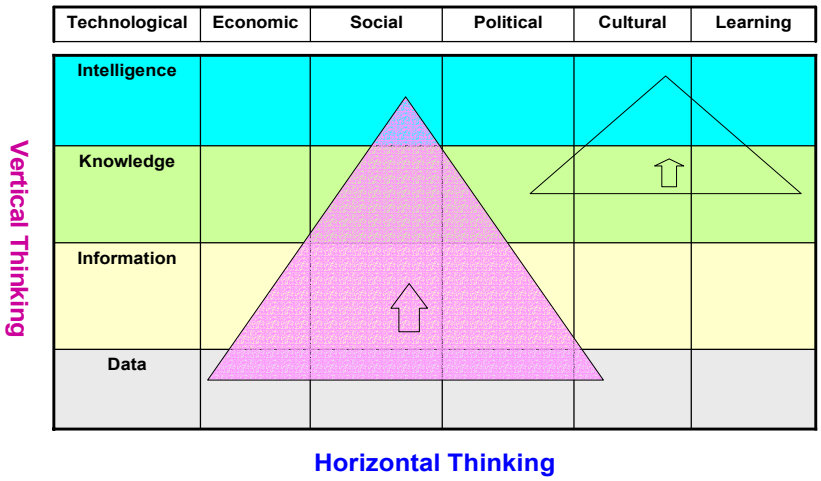

Figure 3. Integrative Upward Multiple Thinking (Examples)

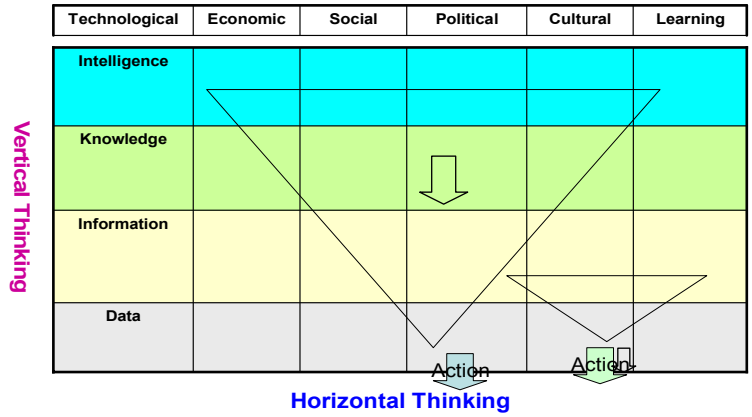

Figure 4. Integrative Downward Multiple Thinking (Examples)

Profiling of Multiple Thinking Style

To different action and to different learner in different context, the characteristics of involved multiple thinking style in action learning may be different. Some learners' multiple thinking style may be mainly at the data and information levels and may rarely go into the knowledge or intelligence levels. Their thinking or learning style bounded by data and information tends to be a style of "*superficial multiple thinking or learning*" that can contribute only to operational adaptation or behavioral change of the learner. Figure 5 gives an example of the profile of a superficial multiple thinking style that involves technological, economic, social, cultural and learning thinking mainly at the data and information levels in the action process. No thinking in the action reaches at the knowledge and intelligence levels.

If the learner's multiple thinking style in an action goes beyond the data and information levels and reaches mainly at the knowledge and intelligence levels, it is a style of "*deep multiple thinking or learning*" that can contribute to the changes in the mindset of the learner. Figure 6 illustrates an example of the profile of deep multiple thinking style with the economic, social, political and learning thinking reaching at the knowledge and intelligence levels and only technological and cultural thinking at the data and information levels.

As a whole, the profiling shown in Figures 5 and 6 provides an illustrative and comprehensive method to demonstrate the profiles of various style of thinking in action learning. With these mapped profiles, the learners and related constituencies (particularly mentors, trainers and consultants) can have a better and comprehensive understanding of the characteristics of multiple thinking styles used in the action cycle and then modify their thinking styles to pursue deeper thinking for effective action and learning. For example, knowing the profile of superficial multiple thinking style as mapped in Figure 5, the learner may need to redress the missing political thinking and enhance the levels of economic, technological, social, cultural and learning

thinking towards the knowledge and intelligence levels.

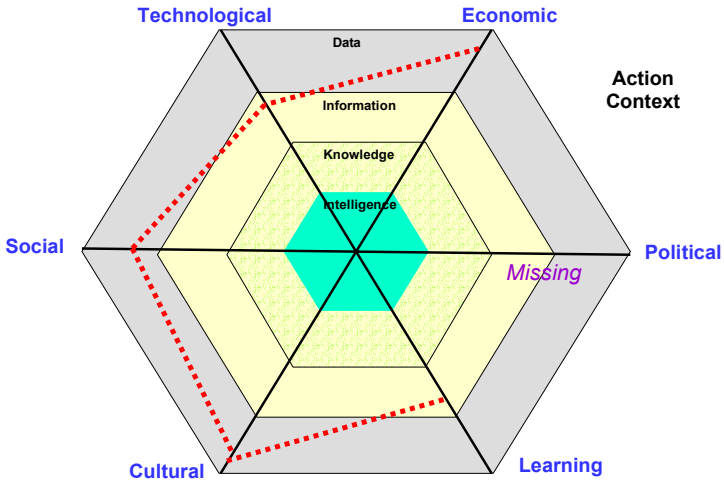

Figure 5. Profile of Superficial Multiple Thinking Style (Example)

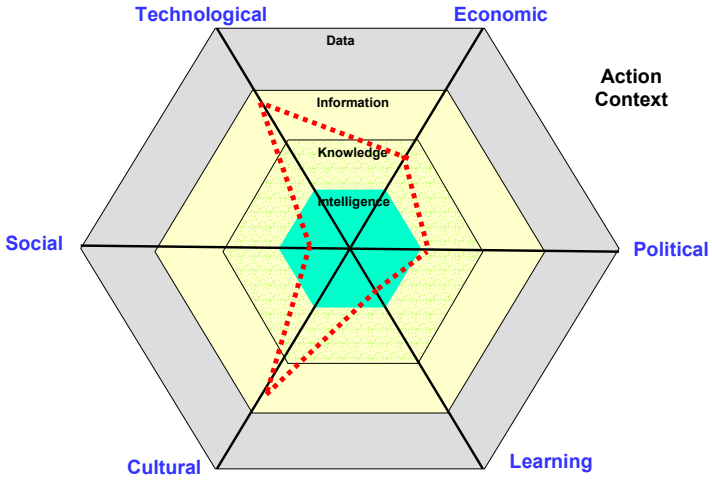

Figure 6. Profile of Deep Multiple Thinking Style (Example)

Multiple Creativity in Thinking & Action

Conception of Creativity

Creativity in thinking and action is increasingly emphasized in nearly every sector of a society in facing the challenges of globalization, knowledge-based economy, and international competitions in the new century (Andriopoulos, 2001; Education Commission, 2000a, b). But unfortunately, the conception of creativity and its relationship with thinking are quite vague and controversial (Sternberg, 2000; Petrowski, 2000). To different scholars and practitioners, the definition of creativity may be different and the approaches to enhancing creativity may also be very diverse without a clear and systematic theoretical framework to guide the practice. Now with the above typology of CMT in action learning, how should creativity be re-defined such that a systematic framework can be provided to guide the practice and enhancement of creativity in action and thinking.

Hierarchy of Creativity

In the framework of CMT, intelligence, knowledge, information, and data are crucial in both thinking and action. Therefore, creativity should be fundamentally related to the creation of intelligence, knowledge, information and data. Similar to the hierarchy of thinking, there is a *hierarchy of creativity* with creation of data at the bottom level (1^{st} order creativity), creation of information and knowledge at the middle levels (2^{nd} order creativity and 3^{rd} order creativity), and creation of intelligence at the top level (4^{th} order creativity), as shown in Figure 7. This hierarchy also represents the extent of cognitive complexity and sophistication of creativity in action and thinking. It means that creation of data and information is not cognitively complex and sophisticated as creation of knowledge and intelligence.

Creativity in Thinking and Creativity in Action

There are two types of creativity: creativity in thinking and creativity in action as shown in Figure 7. *Creativity in thinking* refers to the learner's ability to create new data, new information, new knowledge or/and new intelligence in the thinking process of action learning. Particularly it often occurs in the upward thinking. *Creativity in action* refers to the learner's ability to create new application of data, information, knowledge or/and intelligence to informing or producing new action. It often happens in downward thinking.

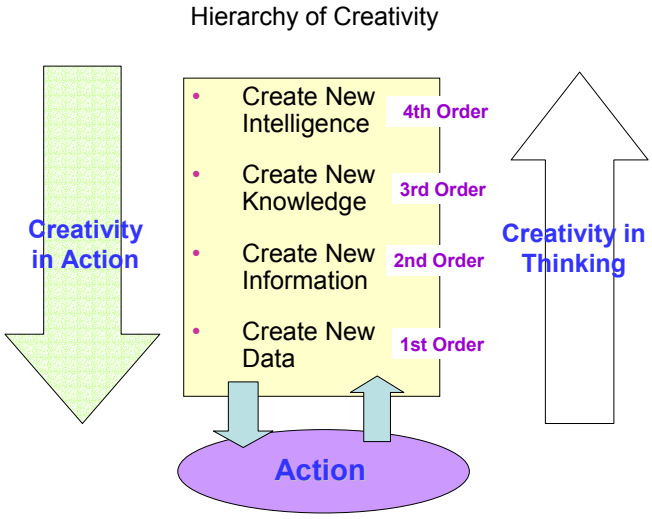

Figure 7. Hierarchy of Creativity

Single Creativity in Action Learning

When the consideration of creativity involves each of the six key domains of thinking, there may be six categories of creativity including *technological creativity, economic creativity, social creativity, political creativity, cultural creativity* and *learning creativity.* The creativity based on one domain may be called as "*single creativity*" or "*Single domain-bounded creativity*". For example, *technological creativity in thinking* is related to the ability of creating new data, new information, new knowledge or new intelligence only within the technological domain (see Figure 8). And, *technological creativity in action* refers to the ability of creating new application of data, information, knowledge, and intelligence to informing and designing new action only within the technological domain.

As shown in Figure 8, within the same domain, high data or new information can be created from the existing datasets. Similarly, high information or new knowledge can be generated from the existing sets of information; high knowledge or new intelligence can be achieved from the existing sets of knowledge; and high intelligence can also be developed from the existing sets of intelligence. All these created are in line with the hierarchy of creativity.

The traditional way to enhancing creativity often focuses on the single creativity through the research and development work in only one discipline or one subject area. For example, through action research in technology, new ideas and new knowledge of technology can be produced and accumulated as enhancement of technological creativity in thinking. This is also the common practice of promoting innovation in the field of new technology industry.

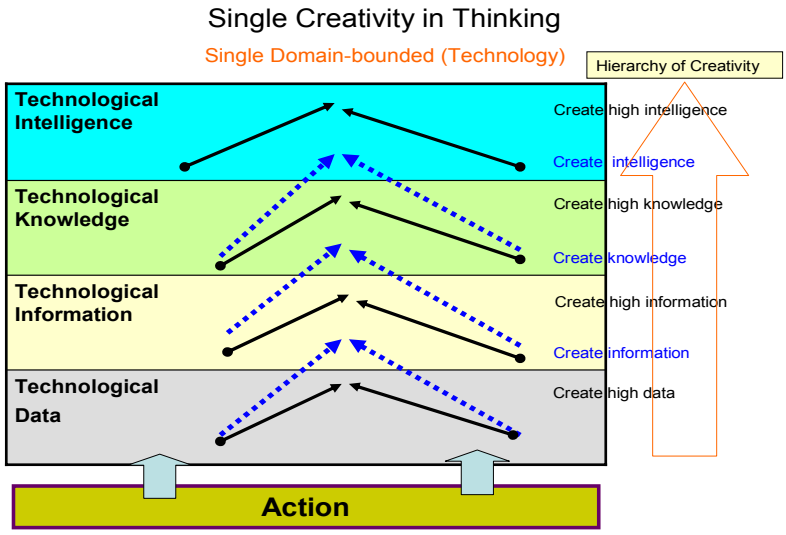

Figure 8. Single Creativity in Thinking (Example)

Dual Creativity in Action Learning

When the consideration of creativity involves two domains of thinking, such creativity may be called as "*dual creativity*" or "*dual domain-bounded creativity*." Similarly, we can define "*dual creativity in thinking*" as the learner's ability of creating new data, new information, new knowledge and new intelligence with integration of two domains (e.g. economic and political domains) (see Figure 9). And, "*dual creativity in action*" is defined as the ability of creating new application of data, information, knowledge and intelligence from the two domains (e.g. economic and political domains) to informing and designing new action.

Clearly, the dual creativity involves the data, information, knowledge and intelligence not only separately from two domains but also their integration between these two domains. With this integration, more opportunities and possibilities can be available to create new data, information, knowledge and intelligence and to inform new action. Therefore, dual creativity may be more powerful, complicated and sophisticated than the single creativity. For example, the dual creativity with the economic and social domains is "economic-social creativity" that may be more powerful and sophisticated than the economic creativity or social creativity alone. Similarly, we can have "economic-cultural" creativity, "economic- political" creativity, "economic- technological" creativity, "economic-learning" creativity and other types of dual creativity through combinations of two domains of thinking.

Along this line, it is not a surprise that inter-disciplinary research and development are strongly emphasized and promoted as one major approach to enhancing the creativity in thinking and action in academic fields or other sectors.

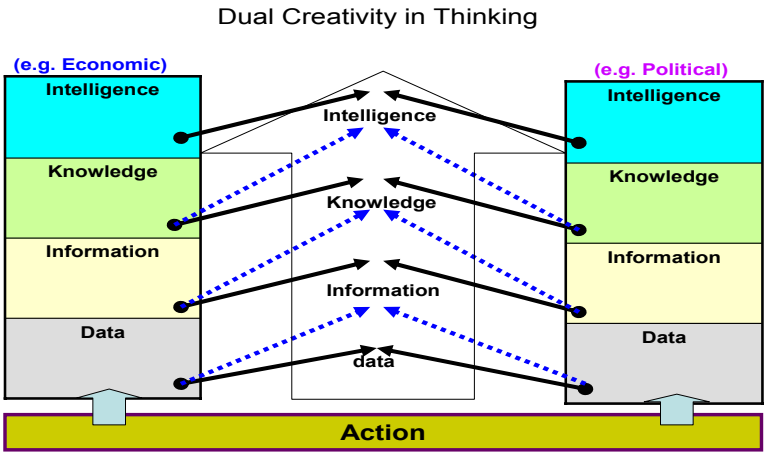

Figure 9. Dual Creativity in Thinking (Example)

Multiple Creativity in Action Learning

The above conception of dual creativity involving two domains can be further expanded to three or above domains as *multiple creativity* in action learning. Similarly, *multiple creativity in thinking* refers to the learner's ability of creating new data, new information, new knowledge and new intelligence with integration of multiple domains (i.e. three or above domains). And, "*multiple creativity in action*" is defined as the learner's ability of creating new application of data, information, knowledge and intelligence from multiple domains (i.e. three or above domains) to informing and designing new action.

Similar to the first example of integrative upward thinking in Figure 3, one example of multiple creativity in thinking can be the integration of the economic, social, political, and cultural datasets together to create new multiple information (mainly economic, social and political) and knowledge (mainly social and political) for development of new social intelligence of the learner. Since this new social intelligence is developed from a comprehensive base of data and information derived from the reality, it may be more socially "wise" and valid in the context in coming cycles of action.

Again similar to the first example of integrative downward thinking in Figure 4, the example of multiple creativity in action can be the application of the economic, social, political, cultural and learning intelligences together to conceptualize new multiple knowledge (mainly economic, social, political, and cultural) and information (mainly social and political) and guide data collection in the political domain for creating new political action. As this new political action is created by a set of multiple intelligences and related knowledge, it may be more comprehensive and effective in the reality or in the complicated context.

Creativity by Thinking Transfer in Action Learning

In the matrix of contextualized multiple thinking, the horizontal thinking across

various types of thinking in fact includes *thinking transfer* from one type to another type in action learning. There are four kinds of thinking transfer, including *intelligence transfer, knowledge transfer, information transfer* and *data transfer* from one type to another type of thinking. Each kind of thinking transfer represents a kind of creativity, from which new data, new information, new knowledge or new intelligence can be created. As the example shown in Figure 10, the data of the technological domain (e.g. technological data of an innovation) can be transferred or converted to create new data and new information for the economic domain (e.g. consumer needs and economic values of this innovation in the market). Similarly, the information, knowledge, and intelligence of the technological domain can be transferred to create new information, new knowledge and new intelligence of the economic domain.

In order to enhance creativity or promote creative thinking in action learning, it is now not so rare that the rationality and ideology of one type of thinking are transferred to another type of thinking. Given the tremendous impacts of technology and economy in the new era of globalization, the technological rationality (in terms of methodological effectiveness, technological engineering, technical optimization, goal achievement) and economic rationality (in terms of efficiency, cost-benefit, economic optimization, and resources management) are often transferred and diffused into the thinking of social, political and even cultural issues and create new knowledge, new perspectives and often new alternatives to tackle these issues.

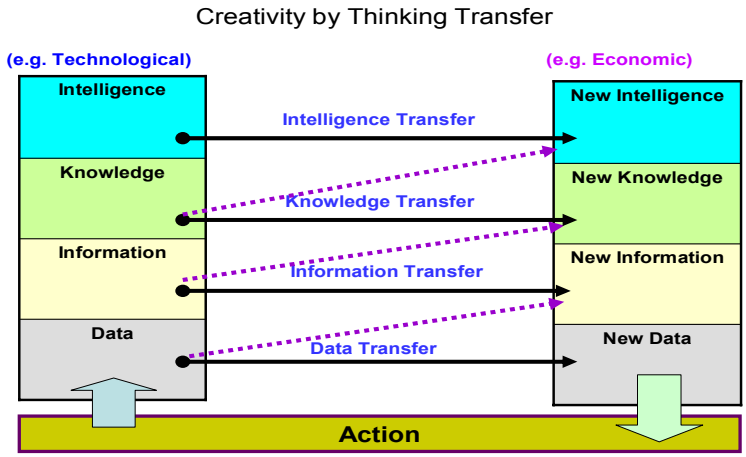

Figure 10. Creativity by Thinking Transfer (Example)

Creativity by thinking transfer is not limited to the transfer between two domains. It is also possible for *creativity by thinking transfer among multiple domains*, for example, thinking transfer from three domains to one domain. To a certain extent, the above mentioned multiple creativity in action learning is a broad type of thinking transfer among multiple domains.

In brief, the above conceptions of multiple creativity and thinking transfer derived from the typology of CMT can provide a systematic theoretical framework for

understanding and development of creativity in action learning at both individual and organizational levels.

Conclusions and Implications

In the new century, learners in a fast changing complex context should have the ability to conduct contextualized multiple thinking (CMT) in action learning such that they can continuously and creatively improve their practices and develop their professional knowledge and contextualized multiple intelligence (CMI) in the action cycles.

The typology of CMT including the technological, economic, social, political, cultural and learning thinking can provide a theoretical framework for facilitating understanding and development of CMT and CMI in action learning and enhancement of effectiveness of action. To different types of thinking, the profiles of thinking are completely different in terms of rationality, key concerns and questions, beliefs about action, beliefs about outcomes, role of thinking in planning action, nature of thinking process, role of thinking in 1st order learning and 2nd order learning, use of information, use of knowledge, contextualized intelligence, and context of salience.

Applying Basic Thinking Strategies with Profiles of CMT

These profiles provide a wide and systematic spectrum of thinking alternatives for learners to consider the purpose, role, nature of thinking for the action in different contexts and then plan the thinking strategies during the action learning process. In general, the basic thinking strategies may include:

1. *Single-type thinking strategy*: As illustrated previously, depending on the context in which concerns of one domain (e.g. concerns of cost-benefits, economic values) are most salient and significant, only one type of thinking (e.g. economic thinking) is adopted during the whole action cycle;
2. *Dual-type thinking strategy*: When the context is a little bit complicated, involving the concerns of two key domains (e.g. diversities and conflicts among constituencies in a context full of ambiguities and uncertainties), two corresponding types of thinking (e.g. political and cultural domains) can be used in the action cycle;
3. *Multiple-type thinking strategy*: When the context is complicated with multiple concerns in different domains or the learner is not sure what concerns are so salient, a combination of multiple types of thinking (e.g. three or more types) may be used to start as exploration in the first cycle of action learning. After the first cycle or a few cycles with more understanding of interactions with the context, the learner may change the combination with more or less types of thinking if necessary.

As illustrated in the typology of multiple thinking, the more types involved the more comprehensive the thinking is for the action process. If all types of thinking are involved in action learning, we may call it "*total thinking*" that can provide a full consideration of technological, economic, social, political, cultural and learning issues and related factors that contribute to the process and effectiveness of action learning.

In general, the more types of thinking involved, the more time, effort, knowledge of the learner required. Therefore, a preliminary review or analysis of the context with multiple perspectives is necessary to see what concerns are particularly salient in the context and then decide what thinking strategies and what combinations should be used to address these concerns in such a context. The change in thinking strategies may be quite natural after receiving more feedback and having more understanding about the process of action learning. It is important that the learner should be trained to have a full understanding of profiles of multiple thinking and know how to apply them in different action contexts.

Applying Upward and Downward Thinking in Action Learning

The hierarchy of thinking including the levels of thinking from data, information, and knowledge to intelligence provides a simple but powerful means to illustrate the nature of thinking process and direct its practice in action learning no matter whether it is one type of thinking or multiple types of thinking.

Both upward thinking (from action, data and information to knowledge and intelligence) and downward thinking (from intelligence and knowledge to data, information and action) are important and necessary to form the whole cycle of action learning for improving action and enhancing intelligence of the learner. It means that the learners need to have the ability to conduct upward thinking that can contribute to the development their intelligence from the analysis and management process of data, information, and knowledge gained from the action. At the same time, the learners also need to have the ability to perform downward thinking that aims at the successful improvement or implementation of the action through application of the learners' intelligence and related knowledge, information and data.

In brief, how the learners at both individual and organizational levels can be developed to have the above ability of upward thinking and downward thinking is a new area for education and training in coming years.

Applying the Matrix of CMT and Profiling CMT Styles

The matrix of CMT, composed of vertical thinking across the four levels from data to intelligence and horizontal thinking across the six types of thinking from technological to learning thinking, further yields a more comprehensive and sophisticated framework of thinking patterns for practice, development and research in action learning.

The concepts of integrative multiple thinking (including upward and downward) can facilitate the application of CMT across levels and types in the complicated reality. With the integrative upward thinking, the learners can enhance their intelligence and knowledge in one or more domains through the integration of multiple data and information across technological, economic, social, political, cultural and learning domains. With the integrative downward thinking, the learners can design or improve their action even in one domain through the integration of their CMT and related multiple knowledge, information and data.

Based on this matrix, the various styles of multiple thinking in action learning can be mapped through profiling in terms of four levels of thinking and six types of thinking. This profiling method can provide an illustrative and powerful way to

diagnose and study the strengths and weaknesses of CMT styles of learners in practice. With the mapped profiles, remedial training or action can be organized to redress the weaknesses and reinforce the strengths in next cycles of action.

With the above typology of CMT, matrix of CMT and frame of profiling, a number of research questions may be proposed for future research and development with aims at promoting multiple thinking in action learning. Some of them may be listed as follows:

1. To what extent, the proposed theoretical typology of CMT is empirically valid and practical in the reality of action learning? Any other missing domains that should be included?
2. How the levels and types of thinking in the matrix of CMT should be measured, classified and studied quantitatively or qualitatively?
3. What profiles of CMT styles can be considered as ineffective, effective or appropriate given the various constraints in action contexts? Are deep thinking and learning across all six domains practically necessary or possible in all circumstances given the limited time frames and resources for thinking?
4. How can the mapped profiles of superficial thinking style of learners be improved and enhanced towards deep thinking style? To improve all weak domains at the same time or to improve them one by one? Would be there any interactions between profiles of thinking style and pre-existing characteristics of learners? If yes, what implications will be for education and training of learners.

Applying the Hierarchy of Creativity in Thinking and Action

With help of the hierarchy of thinking, the creativity in thinking is defined as the ability of creation of new data, new information, new knowledge and new intelligence from action; and the creativity in action as the ability of creation of new application of data, information, knowledge and intelligence to designing new action. These new definitions of creativity together with the typology of CMT can provide a systematic framework to conceptualize various approaches to enhancing creativity, including the single creativity approach, dual creativity approach, multiple creativity approach and thinking transfer approach.

In general, the single creativity approach encourages enhancing the learner's creativity to a higher level within only one domain of thinking through the following two methods: firstly from creation of data and information to creation of knowledge & intelligence; and secondly from new application of data and information to new application of knowledge and intelligence.

The dual creativity approach adopts similar methods but it is based on two domains instead of one domain of thinking. The multiple creativity approach is more comprehensive, involving three or more domains of thinking in creation of new data, information, knowledge and intelligence from action or creation of new applications in action. Enhancing creativity by the thinking transfer between two domains or among multiple domains is also a powerful and practical approach that should be encouraged in action learning.

It is hoped that the above theoretical framework of multiple thinking and creativity in action learning can provide a new direction for conceptualizing research and development in both academic and professional fields and benefit the ongoing efforts of promoting continuous action learning at individual, group and organizational levels in different parts of the world in facing up with challenges in a new era of globalization and transformation.

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