

THINKING SKILLS FOR KNOWLEDGE WORKERS

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ABSTRACT

This paper deals with issues related to teaching and learning of thinking skills. Well-known frameworks from Cognitive Psychology are referred to explain the structure and process of how adults learn. It has relevance for improving the quality and productivity of thinking in the context of education and work place as well. The content and nature of Knowledge worker is mentioned (Peter Drucker) to highlight the importance of thinking skills to enhance industrial productivity. Managers and students of management can derive useful guidelines from the well-known models of productive thinking, learning and instructional design.

Keywords: Cognitive process; critical thinking; problem solving; learning skills; meta-cognition; self-knowledge; knowledge worker

INTRODUCTION

Hundred years ago, **Frederick Taylor** laid out principles of scientific management to improve the efficiency of manual workers. In fact the manifold increase in industrial productivity of the last century was possible because of scientific methods of doing manual- industrial work. For Taylor, methods were equivalent to skills. Thinking was separated from doing, so was planning from execution. Ironically, some decades later, a retired worker told **Jack Welsh**, CEO of General Electric “You paid me for working with my hands, when my brain was freely available.”

Peter Drucker (1999) mentions economic growth in 21st century would depend more on productivity of knowledge workers and less on manual workers. It is important to note that mechanical procedures of doing things in a right way would be less relevant. Productivity of Knowledge workers depends on their **skill to learn continuously and think critically**. Along with intellectual ability, they need emotional and Meta cognitive skills as well.

Who are knowledge workers? They have domain knowledge; factual, conceptual, and procedural knowledge of the field. More importantly, they use thinking skills for decision making and problem solving. They work as professionals in fields as diverse as technology, finance, operations, media, medicine and education and so on. Since the rate of development in Knowledge fields has accelerated; learning, thinking and teaching have been essential abilities for knowledge workers. They are educated in professional institutes of management, engineering, medicine, law.

Ability to think critically is a much desired skill: In the context of management education in India, most of the students learn from received information since they do not have work experience.

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Therefore, a systematic method of teaching-learning thinking is needed so that a student moves up the levels of cognitive development.

The levels include: remembering terminology of the subject, understanding, and applying, analysing, creating and evaluating information. Development of thinking abilities is the only way to convert information into knowledge. When students do not have adequate work-life experience, particularly in management, there is a tendency to confuse information with knowledge. Focus on critical thinking skills would enable students and faculty to overcome the limitations of inexperience. More importantly, it would help them in confront the one sided discourse and propaganda on TV, print and social media.

The strength of democratic processes depends on individuals' ability to take control and responsibility of their own thinking. The goal of secondary, college and professional education should encourage critical thinking and a self-driven learning system. This would provide industry and society get employees/citizens who can think independently rather than depend on their teachers, bosses and leaders for solving problems and take decisions. This would lead to sustainable economic growth and strengthen democratic systems.

Traditionally, the habit of serious (deep rather than superficial) reading helped adults develop cognitive and intellectual skills. In the contemporary word of TV, social media, internet surfing, there is more dependence on surface reading. Higher order skills of **critical thinking of analysing, critiquing, judging, evaluating, comparing, contrasting, assessing** are underutilised. In fact, there is a tendency to express opinions without thought process. Emotions are confused with thinking. Also, independent thinking is discouraged in families and in social, as well as political institutions in India. Higher order thinking skills are incompatible to conformity and group-think. In a society that is based on anti-learning feudal values and political structures, critical thinking and continuous learning suffer. This has serious consequences for social and work life. Underdeveloped thinking and learning ability is a risky thing for political democracy and decision making at work place in a developing country like India.

Some of the **critical thinking skills** recommended by *Halpern (1997)* are given below to substantiate the point made above.

A) **Thought and language skill** (verbal reasoning). Skills that are needed to comprehend and defend against the persuasive techniques are embedded in everyday language. The skill involves recognising and defending against the use of emotional and misleading language, detecting the misuse of definition and understanding the use of framing leading questions.

B) **Deductive reasoning skills**: The skills used to determine if a conclusion is valid, i.e. it must be true if premises are true.

C) **Argument analysis skill**: Skills needed to judge how well reasons and evidence support a conclusion, including considering counter evidence, stated and unstated assumptions. Judging the credibility of information source and making difference between expertise and non-expertise in factual matter and in value matters.

D) **Skills in thinking as hypotheses testing**: Scientific thinking; accumulation of observations, formulation of beliefs or hypothesis and then using the information collected to decide if it

confirms or disconfirms hypothesis, checking for adequate sample size and possible bias in sampling when generalisation is made, being able to describe the relationship between any two variables as positive, negative or unrelated, understanding the limits of correlation reasoning.

F) Memory skills: Skills that are needed while learning, during retention, and at the retrieval.

The skill involves monitoring attention, developing awareness of the influence of stereotypes and other beliefs on what we remember, using advanced organisers to anticipate new information, generating retrieval cues at both acquisition and retrieval.

In other words, critical thinking is ‘mindful and thoughtful’ thinking. *Halpern* mentions six critical thinking qualities for teachers and students. They are; **willingness to plan, flexibility, (open mindedness), persistence, willingness to self-correct, being mindful (Meta cognitive monitoring), and consensus seeking.**

It is apparent that critical thinking requires a socio-cultural ambience where independent thinking is supported and at least tolerated. If there is an absence of democratic values in social and political and industrial institutions there is likelihood that critical and reflective thinkers would not be trusted. In other words, application of productive and critical thinking is a skill which goes beyond the mental processes of the individual and is affected by cultural context of the organisations and institutions.

Thinking – learning skills in formal education:

Before we present theory of thinking-learning applicable in classroom setting and work places, let us focus on the term ‘cognition’.

It is a thinking process of attending, receiving, retaining and retrieving information and knowledge. It implies that cognition uses knowledge learned in the past that is stored in memory.

In other words it consists to two types of thinking: **reproductive thinking and productive thinking**. For instance, writing a grammatically correct sentence or solving a routine problem of calculation is based on reproductive thinking since it uses knowledge of rules of grammar, arithmetic stored in memory. Writing an essay or a piece of poetry, solving new problems, inventing products are outcomes of productive thinking.

Reproductive thinking is based on lower order learning and **Productive thinking** requires higher order thinking. **Skills that require little planning and show little variation in execution from one instance to another are described as ‘Reproductive’ while those that require strategic planning and show substantial variation in execution are termed as ‘Productive’.** In the contexts of education and work place we need both kinds of thinking skills. Also we need appropriate theories to teach, learn and assess them.

In the context of industry and work place, reproductive thinking is required for manual workers and productive thinking for knowledge workers. Rapid industrial growth was possible due to skills of manual labour. **Frederick Taylor’s** scientific methods defined and specified their jobs as the worker has to only remember and recall the work procedure already set by industrial engineers. Remembering, recalling and applying to routine work situation are lower order

thinking and these skills or methods were adequate in Taylorian context. (*It is interesting to note that Taylor used the word method rather than skill.*)

Economic growth of 21 century would depend on thinking skills of knowledge workers. Productive thinking in terms of **problem solving, decision making, interacting and innovating** is an **essential** feature of these jobs. More importantly they do not have readymade template of methods as it was devised by industrial engineers based Taylor' principles of scientific management. **Learning to learn, reflect, analyse, and create** are the cognitive abilities KW need to deploy.

Frameworks for thinking:

Benjamin Blooms and Anderson's taxonomy of learning objectives can be used by those who are involved in developing thinking skills. It mentions lower order and higher order learning (learning and thinking are used here interchangeably)

Lower order learning includes: **knowledge, comprehension and application**. **Higher order learning** consists of: **Analysis, synthesis and evaluation**.

Explanation: intellectual ability or skill depend on availability of content in the form of knowledge. In the context of information explosion such content is readily available for teachers and students. However, **information needs to be understood to get a status of knowledge**. **Recalling and recognising** the key terms in a subject are initial steps that needs further thinking process. It involves, **interpreting, inferring, comparing, classifying, summarising** of contents of knowledge and a basis of understanding. When it is applied to a situation, executed or implemented it reinforces your understandings. Thus **knowledge, comprehension and application** are basic building blocks of lower order thinking skills.

Bloom expected that teaching in colleges should be more than simple transmission of facts (Power point presentations) but should involve higher order thinking and problem solving. Let us differentiate the features of higher and lower order thinking.

Lower order thinking (*it does not mean less important level but implies day to day, routine tasks*) focuses on: attending to perceived data and interpreting it with the help of relevant concepts and principles (*content knowledge*) stored in memory. It uses the data processing capacity of working memory and retrieves the procedures to process new information. As a result learner comprehends new information. Then he is ready to apply it to a context to test its validity. *In the past, a major part of education in schools, colleges and work places in industry began and ended with lower order thinking skills of recall, understanding, and application. It was adequate then.*

Thinking skills for knowledge workers in 21 century need higher order thinking that includes

- i. **analysing;** ability **to restructure problem situation**, reasoning, differentiating, and organising, attributing
- ii. **Synthesising;** **ability to generate alternative** solutions, imagining, understanding causal relationship, generating problem solution and
- iii. **Evaluation;** **judging, assessing ability to think through alternatives and implications,**

It is important to note that higher order thinking (cognitive) skills are initiated, sustained and monitored by Self, Meta cognitive system, Cognitive system and Knowledge. (**Marzano's** (2005) taxonomy of educational objectives)

- 1 **Self system** that decides to engage with situation, reflective thinking
- 2 **The meta cognitive system** that sets goals, strategies and management of thinking
- 3 The **cognitive system** that processes relevant information, builds understanding and meaning, productive thinking
- 4 **Knowledge domain** that consists information of fact structures, concepts, principles, and procedures

Self-system controls Meta cognitive system which in turn controls cognitive systems. The knowledge system provides resources of information and procedures.

The **self and Meta** cognitive systems bring significant elements of **higher order thinking**.

Self-system deals with reactive and interactive skills in real life situations. These skills are applicable in classroom and real-life context as well.

Knowledge system is the foundation on which other systems depend upon. Knowledge has following components:

Factual knowledge: information of specifics, facts structure

Conceptual knowledge: knowledge of universals and abstractions

Procedural knowledge: knowledge of ways and means

Meta cognitive knowledge: Value grounded thinking, involving will and/ or emotion

Since thinking skills in real life are deployed in the context of human interaction and task situations, thinking is connected with human interactions as well.

Reactive skills are about dealing with oneself, attitudes, feelings, habits, and self-control. It includes conditional habits, approaches, value system.

Interactive skills are about dealing with others. It includes social etiquettes and skills in persuasion, discussion, dialogue.

Higher order Meta cognitive skills deal with thinking ability to restructure a problem situation, generate alternative solutions, evaluate in terms of implications in the context. It also includes ability to act on a decision, see through action to the end and self-correct one's action automatically. In other words Meta cognition is more of a process rather than distinct type of knowledge.

Romiszovaski (2001) recognises that real life learning and thinking is not easy to analyse since a lot of mental activity is unconscious and teachers, trainers, facilitators have little influence on many aspects of learning-thinking, particularly attitudes and abilities. In this sense higher-order thinking relies largely on self-system of the individual.

In the context of work place it would be useful to refer to Peter *Ducker's* concept of Knowledge worker and his/ her main features, so that we can appreciate the relevance of thinking skills to worker productivity.

Knowledge workers' job requirements

Drucker (1999) mentions a few features of **knowledge worker (KW)** which are critical for productivity. They refer to responsibility of the individual and the organisation/society to maintain a climate of learning and teaching of thinking skills. The factors that would determine knowledge worker productivity are:

- 1. KW needs to define his/her own task**
- 2 They have to manage themselves and are responsible for their productivity, and hence need autonomy**
- 3. Continuous innovation is a day to day responsibility of KW**
- 4. KW requires continuous learning and continuous teaching as well**
- 5. Quality is a critical requirement of KW's productivity**
- 6. KW is seen as an asset by the organisation to make him/her productive**

One cannot miss the farsightedness of Ducker's emphasis on 'continuous innovations' which is an essential part of KW. In the VUCA world, all businesses (profit and non-profit) are facing competition from unexpected corners. Indian bankers in India are thinking of aligning with e-commerce- is the recent example of an attempt to innovate new services.

Challenge

But real challenge of developing meta- cognitive faculties of knowledge worker has organisational and institutional contexts. Self- management and continuous learning would necessitate **KW** to question the assumption, beliefs and values of peers, subordinates and bosses. In the personal experience of the author, independent thinking is not tolerated in educational and industrial context. We believe that innovation and problem solving would be carried out by technology rather than by people who practice reflective and strategic thinking.

Development of critical thinking skills would require change in attitudes and values of people who manage our institutions. The real question is; **Do we value and nurture meta-cognitive system of our students and knowledge workers?**

CONCLUSION

The factors mentioned by Drucker highlight the relevance of self-system and Meta cognitive system in the discussion of learning/thinking skills. Moreover it requires an institutional climate of innovation, continuous learning and teaching to sustain productivity. The responsibility is of the individual but it would be supported by the organisational and institutional values. These observations would give useful insights into the teachers, faculty of professional courses, HR managers, top management of corporate sector and HRD ministry engaged with/ in skill

development .Investment in thinking skills would benefit individual, work organisation and society at large. Since stakes and institutional resistance are high, educationists and captains of industry and policy makers should give it a priority.

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