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2.1.1 INTRODUCTION

Education is considered to be the most effectual instrument for the augmentation and expansion of a person as well as the nation. The fortune and enormity of a nation depend principally on its rich resources namely human resources and natural resources. They are the determining factors of a nation’s destiny and pride. The national destiny is achieved through scientific and meticulous manipulation of these resources to the maximum. Human resources are enriched and vitalized through the channel of ever evolving and the ever afresh force called education (Barnabas, 2011). The quality of education depends upon the facilitation modalities followed by the teacher and instructional practices adopted by the instructional system at concerned level of education. Teachers at the threshold as transformative intellectuals and their groundwork is mainly for develops reflective trends among students by facing challenges at the most imperative facets of societal development.

The pressing need of the hour is innovation in curriculum transaction at all levels of educational system. But it has pointed out that in the field of vocational orientation, appropriate lacking has faced in order to fulfill their objectives. This is mainly due to inadequate transaction of curriculum in that respective stream. For these aspects innovative instructional strategies gave solution for these issues. This realm can be substantiated by Srivastava, Sujata (2008) that in this
era where the focus of education is preparing global students, it is unfortunate that our classroom practices are remained as traditional as ever.

In this fast moving technological society where the explosion of information and knowledge around us is a stark reality. In order to cope with this situation, educational curricula and teaching strategies are changing with a focus of instruction from the transmission curriculum to transactional curriculum. In a transactional curriculum, students are actively involved in their learning to reach new understanding. The way we teach young people have to be drastically transformed. There has to be a fundamental shift to student centered instruction where students learn by exploring, predicting, problem-solving, researching and investigating concepts. Students take on an active role in acquisition of knowledge and thus take more ownership. A child constructs his knowledge while engaged in the process of learning; “intelligent guessing” must be encouraged as a valid pedagogic tool (NCF, 2005).

2.1.1.1 CURRICULUM TRANSACTION SCAFFOLDS

A curriculum transaction scaffold indicate the directions in which the educational system has to proceed the various dimensions of curriculum namely instructive goals, learning outcomes, pedagogical strategies, learning environment and evaluation mechanisms in order to achieve the wholesome enrichment of an individual. The impact of this curriculum transaction framework has a positive effect on the global norms of education that hinges on
dynamic nature in responding to a wide variety of cross-cultural settings and scenarios. The aims and learning outcomes of curriculum transaction dimensions need to be developed in order to ensure that the goal of producing competent and creative new generations. This dimension encourages students to develop self directed learning skills and follow through inculcating professional values and competence.

Learning outcomes guide teachers on what is expected of the learners on completion of the set objectives. Learning outcomes also guide students on what they are expected to be able to do in terms of knowledge, skills and attitudes after completing the desired task. Correct interpretation of outcomes will guide both learners and teachers on the choice of relevant learning and teaching methods to achieve the intended learning. Those responsible for setting evaluation mechanism will also need to interpret the outcomes appropriately so that learners’ performance is tested effectively.

An effective strategy equip for the preparation and orientation of teachers with a thorough understanding of their subjects and provide a sound pedagogical base and motivate them for implement the new strategy/instructional approach for the effective accomplishment of the aspects of curriculum transaction. This will strengthening the managerial and technical support system and development of professional capabilities at all levels of educational activity. Constant scrutinizing and opening of corrective, remedial and enrichment appraisals
directs to the successful execution of curriculum transaction through educational management at all levels. The curriculum transaction framework is shown in the following figure 2.1.

![Curriculum Transaction Framework](image)

### 2.1.1.2 CURRICULUM TRANSACTION: A PARADIGM SHIFT

Today’s curriculum is disjointed in its total functions. At the primary stage, we struggle to reconcile a post-plowden, child-centered and a progressive curriculum. In the secondary phase, we teach students in an amalgamation of the subjects of a content-based curriculum and an instrumental/vocational curriculum focused on the world of work. Today’s curriculum and its assessment machinery, protects cultural wealth for the powerful and, though it aims at greater equality, continues to use traditional instruments to calibrate learner’s achievements in preparation for adult life (Newby, Mike 2005).
Our curriculum transaction procedures need to prepare children to take their place as active, responsible and capable members within many frameworks to exercise most power in the world. Young people will need to prepare themselves for professional competence different from those now exists. The era demands vocationally focused, narrowly instrumented curriculum in which secondary students acquires particular skills for specific career will definitely equip young world to hold in a wide variety of occupations.

Children will need to learn how to take decision making at school for they will be decision makers when they go to work. So the curriculum transaction in the coming future will focus on experimental and progressive one, which equip the future generation become initiative, creative, challenge based and look ahead to an uncertain future. Such curriculum transaction attributes shows the possibility of an institution by engage in experiment and enquiry based, asking thought provoking questions and arguments about their pedagogical aspects prompting both teachers and students to think afresh about the ways in which knowledge is gained and described, and doing all this with a view to making progress to the future. If we make it so, such curriculum liberating schools and those who study and teach in them from conventional habits of thought and action, will become a progressive engine as much for driving social change as for personal fulfillment (Champman, 2003).
Curriculum transaction is essentially a road map for learning, as such focuses on knowledge and skills that are judged important to learn. To meet the needs of the 21st century learner and achieve the student outcomes described in its framework, curriculum transaction’s dimensions should focus on:

- To adopt a curriculum that blends thinking and innovation skills; information, media and ICT literacy; and life and career skills in context of core academic subjects and across interdisciplinary themes, and
- To employ methods of instruction that integrate innovative and research-proven teaching strategies, modern learning technologies, and real world resources and contexts.

2.1.1.3 MODES OF CURRICULUM TRANSCATION

Curriculum Transaction is the effective and desired implementation of the curriculum contents on the basis of the set aims and objectives. Curriculum Transaction incorporates effective planning for providing learning experiences and the modes in which the curriculum is transacted. Modes of curriculum transaction pertain to the channels adopted for providing learning experiences to students. These act as the real 'bridge' between the expectations placed on system of education program on the one hand, and the process of enabling students to absorb the essential competencies and skills and actualize these expectations on the other hand.
The mode of transaction of curriculum to be adopted for any educational systems has to be determined on the basis of certain criteria. These include:

- the purpose or goals of the program
- the characteristics of the client
- the nature of the substance to be transacted
- the nature of learning activities to be provided
- the infrastructural arrangements available and
- the organizational inputs required.

At a deeper level, selection of transactional modes involves other factors concerning individuals, community, administrative proposals, professional compulsions, market forces etc. The mode selected has to act as a channel to cater to all these. This is what makes it a crucial act.

In the present education system, transactional modes have essentially been of two categories, viz., the face-to-face mode and the ICT enabled mode. The face-to-face mode refers to instructional interactions in which learners and the teacher transact a curriculum in a face-to-face situation. This mode includes inputs like seminars, debates, discussions, lectures, demonstrations and any activity involving direct interaction between the learners and the teacher. The ICT enabled mode, teachers integrate technology that has the potential to bring about changes in the education process. Teachers become well versed with
educational technology, they have to go beyond more competence with latest tools, and develop in understanding of the complex web of the relationships among users, technologies, practices and tools (Khirwadkhar, Anjali, 2006). It can be depicted in the figure 2.2

![Figure 2.2 Modes of Curriculum Transaction](image)

The face-to-face mode is the traditional and most widely accepted mode. Obviously, at a time when electronic media were not available and even the print medium was unknown, the most easily accessible channel for transmission of knowledge and for communication was through face-to-face interaction with the teacher. The rapid developments of ICT’s during the past two decades have had many points of contact with education and transaction of curriculum. The world is going through a phase of globalization and the success of an education system depends on how quickly their students are able to learn and transmit various skills and competencies required today (Rathore, Rachana 2007).
Face-to-face interaction provides a learner with an opportunity to personally experience how a seasoned mind articulates abstract knowledge, presents it in intelligible forms and clarifies any difficulties that are experienced in comprehension. He/she gains confidence by seeing other learners participate in the same process. All such possibilities help learners to evolve his/her image and recognize his/her strengths and weaknesses as well as interests and inclinations. Perhaps, such a view has developed due to the cultural inheritance of the 'Guru' concept in India. Even elsewhere, there have been indications in support of the teacher's direct involvement with the learner for effective learning.

2.1.2 TREND SETTING CULMINATION OF CURRICULUM TRANSACTION IN COMMERCE EDUCATION

Quality and relevance are the prime concern among policy makers and academicians as the existing system faces new pressures from within as well as from outside the country. The objectives of education can be fulfilled only through qualitative change in the system. Quality depends on many factors, among such, curriculum planning and implementation is the major one. Curriculum can never be stagnant and must always change as the frontiers of knowledge expand with time. Updating and restructuring must continue to enhance the quality and standards of education.
The future growth and stability of our global economy depends on the strength of education systems around the world to prepare all students for career opportunities and help them attain higher levels of achievement. However, despite numerous efforts to improve educational standards, school systems around the world are struggling to meet the demands of 21st century learners and employers. In both developed and developing nations, young people have become increasingly reliant on social networking technologies to connect, collaborate, learn, and create, and employers have began to seek out new skills to increase their competitiveness in a global marketplace. Education, meanwhile, has changed much less. With few exceptions, school systems have yet to revise the way they operate to reflect current trends and technologies.

The complexity of this challenges calls for a global solution that allows to make a paradigm shift of new approaches guided by comprehensive framework of curricular and assessment reforms, novel training strategies, leadership development, and the integration of collaborative technologies. It will be facilitated by exceptional teachers and supported by technologies that allow individuals to create, adapt, and share content. Students will complete project-based, cross-disciplinary tasks that encourage innovation and cross-cultural collaboration, and apply their knowledge and creativity to solving real-world problems. The end goal is the systemic improvement of both the quality and accessibility of education throughout the world.
In the context of the fast developing economy of India, the role of commerce and trade is not only crucial but also consequential for a mixed economy of natural, technological, traditional, cultural and all other potential resources. On the one side of economics and on the other side of management, commerce pervades national development in all its facets. From agricultural economy to industrial economy, there have been marked developments. Business concerned with agricultural products from the age-old barter trade to the recent plastic money catapults itself into the trade of industrial products and again ranging from machinery individual designs to network systems. Therefore there is a need to reorganize and make changes in the commerce curricula and also to develop appropriate curriculum transaction modes.

Business education is described as a structured endeavor to mould the citizens for enterprising and managing business competently and successfully. The prime intention of business education is to endow with skilled manpower required by the business strata in different sections. It aims at improving the quality and productivity of personnel in business. Thus, business education is concerned not only with the development of technical skills in purely economic terms but also with social usefulness. Commerce education not only goes through major five dimensions of human activity viz; industry, trade, insurance, transport and banking but also seeks to comprehend the human behavior in the conduct of each of the five dimensions of business. This is done at the conceptual level in
intellectual understanding and the concrete level of generating operation knowledge.

Commerce is not a positive science. It does not deal with static affair where the cause-effect relationship is fixed and one can predict reactions. The reactions in real life situations of business cannot be appreciated without understanding the interior perception of human being articulated in terms of attitudes, intentions and motivations. Thus, commerce acquires different positions and pursues excellence in business activities through knowledge. It attempts to create a new form of knowledge- knowledge to use, knowledge by way of order, system, method and speed. Commerce becomes a liberal education aiming to make human mind receptive to the meaning of deeper forces to develop analytical power and provide a positive and constructive edge to the thinking. The task of commerce education was seen in three dimensional. Transfer function envisaged acquisition of knowledge generated by various disciplines and adoption of relevant knowledge and techniques. Teaching function revolved round the idea of providing a stimulating learning experiences aiming at creating capabilities and attainments. This can be achieved by training stakeholders in developing curriculum dimensions like learning environments, instructional strategies, learning outcomes, curriculum transaction modes etc. for equipping the new generation in the global standards.
2.1. 3 BRIDGING OF INSTRUCTIONAL STRATEGIES SPIRIT IN CURRICULUM TRANSACTION MODES

In the global perspectives of education system, teachers are constantly being faced with different newly born challenges. In this ever-changing diverse world, all the teachers must change their instructional strategies and adapt their curriculum to work in a number of creative environments. Teachers must be able to transact their curriculum to their specific students but giving the value oriented and competency based approaches to all the students. So, teachers must change their instructional strategies to teach the guys with amusement, thereby achieving the goal of education. Only knowledgeable and educated societies can flourish this world for achieving their highest education possible. The first and foremost step for attaining these goals is to teach the students in effective and simple ways through the interaction of suitable instructional strategies. In order to transact the curriculum effectively, appropriate instructional strategies plays a decisive role. Instructional strategies that engage students and involve them in the learning process are at the heart of what great teachers do.

There are a lot of instructional strategies which teachers can directly or indirectly employ to better understand the approaches and deal appropriately for transacting it. A creative teacher always looks the benefits of apply these strategies to put their students in charge of their own learning. Teachers’ contributions, experiences and innovations in the field of education must be called for the significance of developing innovative instructional strategies by
shaping the curriculum and crafting a conducive learning environment. But all the teachers must be struggled in one or other way for selecting, developing or implementing effective instructional strategies. Effective curriculum must contain creative learning environment, effective teaching strategies, systematic evaluation mechanism, student involvement activities and development of skills and competencies. The modern approach is process oriented and learner centered with different alluring teaching strategies that must be adopted in classroom for achieving the set goals. In this way, a revolution is needed in the various dimensions of curriculum for creating vibrant and creative citizens and enables them to satisfy the demand of the competent world. Thus a change in education system is needed to bring revolution in the whole world. A single method is no longer adequate. Effective teachers select varied instructional strategies that accomplish varied learner outcomes that are behavioral, constructive and cognitive.

2.1.4 DEVELOPMENT OF AN INSTRUCTIONAL STRATEGY: DICK AND CAREY MODEL

Creating an instructional strategy involves taking all of the information we have accumulated to a focal point and generating an effective plan for presenting our instruction to our learners. At this point we must be able to combine our knowledge of learning and design theory with our experience of learners and objectives. This will provide with a clear plan for subsequent development. Several taxonomies have been developed that categorize instructional strategies
based on the strategy's theoretical underpinnings and on the type of learner outcomes that result from using the strategy. Joyce’s taxonomy divided instructional models into four major families: information processing, behavioral, personal, and social.

1. Behavioral strategies are designed to help students acquire basic information and skill

2. Information processing strategies help the learner process and use information and data.

3. Social strategies help develop a sense of community and facilitate the learning of social skills.

4. Personal strategies emphasize the development of personal growth and awareness.

Dick and Carey describe four elements essential for developing an instructional strategy. They are:

Element 1 - Content Sequencing and Clustering

a) Content Sequencing

The first step in developing an instructional strategy is deciding on a teaching sequence and groupings of content. Whether we are developing a lesson, or an entire curriculum, decisions must be made regarding the sequencing of objectives. The best way to determine the sequence is to refer to our instructional analysis.
b) Clustering Instruction

The next important consideration is how we will group our instructional activities. We may decide to present information in one objective at a time, or cluster several related objectives. Dick and Carey recommend taking the following factors into consideration when determining how much or how little instruction to present at any given time:

1. The age level of your learners
2. The complexity of the material
3. The type of learning taking place
4. Whether the activity can be varied, thereby focusing attention on the task
5. The amount of time required to include all the events in the instructional strategy for each cluster of content presented.

Element 2 - Learning Components

The next element in an instructional strategy is a description of the learning components for a set of instructional materials. This element is considered as a key element/foundation upon which a researcher/instructor can able to develop an effective instructional strategy.
Element 3 - Student Groupings

The next element of an instructional strategy is a description of how students will be grouped during instruction. The main thing is to consider whether there are any requirements for social interaction explicit in the statement of our objectives. Groupings can motivate students and keep them interested. Also, keep in mind that our delivery system can affect the amount of social interaction possible.

Element 4 - Selection of Media and Delivery Systems

This is the fourth and final element of an instructional strategy. Once decisions have been made about content sequencing and clustering, and the learning components have been planned, it is time to turn your attention to selecting a delivery system for your overall instructional system, along with the media you will use to present the information in your instruction. The overall delivery system includes everything necessary to allow a particular instructional system to operate as it was intended and where it was intended.

CONCLUSION

Teachers and practitioners in the present millennium have to face the greatest confront of adapting education for stabilizing the rapid shifting of the contemporary society. Our dynamic technology enabled society distress, our
education system leads for acquirement and processing of information in a unique and varied facet. Modern society is becoming more complex, information is becoming available and changing more rapidly prompting users to constantly re-think, switch directions, and change problem solving strategies. In this arena teachers needs to struggle with the mass communication media and modern instructional strategies for rationalize his competence and also to mould the young generation to satisfy the demands of the society through effective curriculum transaction. Our present system of education focus on activity oriented approach aim students as good creator of knowledge through discussion, experimentation and observation by the interaction of student initiated instructional strategies. But prevailing modes of teaching and learning strategies are become less effective in engaging students for constructs knowledge and motivates them to achieve objectives of learning. In this advanced knowledge explosion era demands instructional strategies those are able to develop the acquisition of 21st centuries skills like critical thinking, problem solving, decision making, creative thinking, inter-personal skills, communication, meta cognitive processes etc. Problem Based Learning and Graphic Organizers act powerful pedagogical tools in constructivist and cognitive framework to confront most of the issues associated with effective transaction of curriculum in commerce at higher secondary level. The theoretical dimensions of both strategies are described in the coming two sections.
2.2 THEORETICAL CONSTRUCTS UNDERLYING PROBLEM BASED LEARNING

2.2.1 PROBLEM BASED LEARNING: IT’S ONSET ON EDUCATION SPECTRUM

Problem Based Learning (PBL) is the learning approach that results from the process of working towards the understanding and resolution of a problem in a real context (Barrows & Tamblyn 1980). It is different from traditional instructional approach, in which students are involved with problematic situations that lead them to solve systematically through the process of analyzing the problem, gathering information, generating and evaluating possible solutions to find the best one and then present their conclusions. Frequently, the problems have no single right answer.

PBL was primarily introduced by Barrows and Tamblyn (1980) at McMaster University, Canada for educating medical students to become physicians. The roots of PBL can be traced to the progressive movement, especially to Dewey’s (1944) belief that teaching should appeal to students’ natural instincts to investigate and create. Inspired by Dewey’s maxim, Howard Barrows, a physician and also a medical educator at McMaster University developed PBL for educating physicians to foster their own capabilities for reflection. The new teaching approach also spread to the teaching of non-medical disciplines such as architecture, business, education, construction, engineering, law, and others. PBL has also been implemented at different educational levels- primary, secondary,
technical, university, professional trade bodies, and continuing education.

Problem Based Learning focuses on the challenge of making students’ thinking visible. PBL process embraces the use of meta-cognition and self-regulation. It is recognized as a progressive active learning and learner centered approach where unstructured problems are used as the starting point and anchor for the learning process. PBL is not just about problem-solving processes; it is a pedagogy based on constructivism in which realistic problems are used in conjunction with the design of a learning environment where inquiry activities, self-directed learning, information mining, dialogue, and collaborative problem-solving are incorporated (Tan, 2004). In recent years, PBL has gained new momentum as a result of several developments as:

- increasing demand for bridging the gap between theory and practice
- information accessibility and knowledge explosion
- new possibilities in the use of multidisciplinary problems
- emphasis on real-world competencies, and
- development in learning, psychology and pedagogy

A number of instructional strategies inspired by constructivist philosophy have been developed and researched over the last years. Such strategies have been applied particularly in instructional contexts where the intended learning outcomes are primarily of a higher order/complex nature (such as problem solving and analytical thinking.) This approach to instruction “structures courses and entire
curricula on problems rather than on subject content” (Smith & Ragan 1999). Problem Based Learning is a methodology that situates learning in complex and meaningful problems that are framed in authentic contexts (Hmelo, 1998). Students work in small groups to acquire the conceptual knowledge and procedural skills needed to develop one or more plausible solutions to each of the problems presented to them. New knowledge is ‘constructed’ or created from within individuals in their interaction with the world. The process of creation is a human homeostatic function and may be occurring constantly to varying degrees in our everyday experience.”

2.2.2 PROBLEM BASED LEARNING: PROCESSING WALKWAYS

The specific instructional techniques and procedures used in the design and implementation of a Problem Based Learning curriculum vary from one context to the next. However, the typical learning process followed in a Problem Based Learning environment is as follows:

1. Students begin the problem without any prior experience in dealing with like problems. Each group of students (usually consisting of between five and twelve students) will meet with a facilitator to discuss the problem.

2. The facilitator presents a limited amount of information about the problem, and the group is charged with the task of identifying the different aspects of the problem by asking the facilitator’s questions to elicit information relevant to the problem.
3. Students work with the facilitator to generate and refine hypotheses related to the problem’s potential solution. The facilitator’s role is to model hypothesis driven reasoning skills.

4. Students determine “learning issues” that the group decisions are relevant and that they need to learn more about to find an acceptable solution to the problem.

5. The groups are then asked to assign tasks to each member of the group for researching each of the different “learning issues” they have identified.

6. Group members engage in self-directed learning by gathering information related to the assigned learning issues from a variety of different sources.

7. After each of the group members has conducted the necessary research related to the “learning issue” they were assigned, the group members report their findings to each other. They reconvene and re-examine the problem, applying newly acquired knowledge and skills to generating a formal solution to the problem.

8. Once the formal solution has been presented to the class, students reflect on what they have learned from the problem and on the process used to resolve the problem presented. The Problem Based Learning processing walkways can be depicted in the following figure 2.3.
In addition to this educators seek out or design scenarios that provide rich opportunities for demonstrating learning through projects, presentations, or other means authentic to the situation. This can be summarized by the following visual representation.

\[
\text{Ill-structured} \times \text{Problem} \begin{cases} 
\text{Seeds of interest} \\
\text{Significant concepts} \\
\text{Real-world connections} 
\end{cases} = \text{Powerful opportunities for learning}
\]

The problematic situation has the seeds of interest within which learning
moves. Students are attempting to deal with the unknown problematic situations. These problematic situations are robust, they contain significant concepts worth for reflective thinking process. This process of blending equips the students for generating ideas and concepts that prompts as powerful opportunities for their learning.

PBL is an instructional and learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem. Critical to the success of the approach is the selection of ill-structured problems (often interdisciplinary) and a tutor who guides the learning process and conducts a thorough debriefing at the conclusion of the learning experience. Duch and Allen (2001) described the methods used in PBL and the specific skills developed, including the ability to think critically, analyze and solve real-world problems, to find, evaluate, and use appropriate learning resources; to work cooperatively, to demonstrate effective communication skills, and to use content knowledge and intellectual skills to become continual learners.

Torp and Sage (2002) described PBL as focused, experiential learning organized around the investigation and resolution of messy, real-world problems. They describe students as engaged problem solvers, seeking to identify the root problem and the conditions needed for a good solution and in the process becoming self-directed learners. Hmelo, Silver (2004) noted that students work in collaborative groups to identify what they need to learn in order to solve a
problem, engage in self-directed learning, apply their new knowledge to the problem, and reflect on what they learned and the effectiveness of the strategies employed.

2.2.3 PROBLEM BASED LEARNING AND ITS UNDERPINNING GUIDELINES

The instructional principles/guidelines implemented for Problem Based Learning within the framework can lead to a wide variety of learning environments. A number of environments reflecting these principles are described in Duffy and Jonassen (1992) and Duffy, Lowyck and Jonassen (1993). An effective Problem Based Learning environment can be functioned based on the following guidelines/underlying principles:

- Anchor all learning activities to a larger task or problem
- Support the learner in developing ownership for the overall task
- Design an authentic task
- Design the task and the learning environment to reflect the complexity of the environment they should be able to function in at the end of learning
- Give the learner ownership of the process used to develop a solution
- Design the learning environment to support the learner's thinking
- Encourage testing ideas against alternative views and alternative contexts
- Provide opportunity for and support reflection on both the content learned and the learning process.

Problem Based Learning is based on the theory that views learning as a
process in which the learner actively constructs knowledge (Gijselaers, 1996). Students solve problems that serve as stimulus to learning guided by a tutor whose role is to facilitate the learning process by posing reflective questions and monitoring the process. In order to use Problem Based Learning effectively, it is important to understand how it is grounded in current theories of teaching and learning so that insights from these theories can be applied to refine the practice of Problem Based Learning.

According to Glaser (1991), cognitive processes called meta-cognition affect the use of knowledge; and the aim of teaching was to lead students to store knowledge in memory, and the successful retrieval of information was a function that determines the effectiveness of knowledge processing. However, according to modern cognitive psychology theories, the most important feature of memory is its associative structure (Bruner, 1993; Brunning, Schraw and Ronning 1995). Knowledge is structured as networks of related concepts known as semantic networks. Learning occurs by associating new information with existing networks and depending on how this is done by learners; the new information can be easily retrieved for problem solving, recognition of situations, or recall of factual knowledge. Therefore, when educating students, explicit attention should be paid to their existing knowledge to provide them a framework for learning. A basic requirement of Problem Based Learning is the activation of existing knowledge to facilitate processing of new information.

Second important principle, according to Bruner (1993), is that learning is
quicker when students possess self-monitoring skills known as meta-cognition. Meta-cognition is the student’s ability to analyze, reflect on, and understand his or her own cognitive and learning processes. It involves: goal setting, strategy selection, and goal evaluation. If students are aware of their cognitive strengths and weaknesses, they can adjust and compensate for them by using the appropriate learning strategies in the right context. Problem Based Learning ensures the development of Meta-cognitive skills, which allows students to monitor their own learning. According to Bruning, Schraw, and Ronning (1995), meta-cognitive skills are teachable through such strategies as:

- Focusing on understanding (deep learning) rather than surface memory;
- Promoting elaboration of ideas; and
- Demonstrating the types of questions that students should ask themselves during the problem solving process.

The third important principle for teaching and learning is that learning must be contextualized in order to be effective. Two models that advocate contextualized learning are: *cognitive apprenticeship* (Collins and Newman 1989) and *anchored instruction* (Bransford, Sherwood; Hasselberg, Kinzer and Williams 1990). These models emphasize the fact that teaching should occur within the context of real-world problems or professional practice. Thus, when content is linked with context, knowledge is more accessible when confronted with new problems (Schmidt, 1993).
2.2.4 INTERLOCKING TENETS OF CONSTRUCTIVIST ESSENCE IN PROBLEM BASED LEARNING FOR EFFECTUAL CURRICULUM TRANSACTION

In Problem Based Learning, students use triggers from scenario to define their own learning objectives. Subsequently they do independent, self-directed study before returning to the group to discuss and refine their acquired knowledge. Thus Problem Based Learning is not about problem solving but rather it uses appropriate problem to increase knowledge and understanding. The present activity based classroom environment focuses on group learning that facilitates not only the acquisition of knowledge but also several other desirable attitudes such as communication skills, team work, problem solving, independent responsibility for learning, sharing information and respect for others. Problem Based Learning can be thought of as group teaching strategy that combines the acquisition knowledge with the development of generic skills and attitudes that leads them to transact the curriculum in an effective manner as shown in figure 2.5.

![Diagram](image)

**Figure 2.5 Problem Based Learning and Curriculum Transaction**

- *Team work*
- *Co-operation*
- *Problem solving*
- *Independent Responsibility*
- *Sharing information*
- *Leadership*
- *Critical judgment*
- *Self-directed learning*
- *Presentation Skills*
Problem Based Learning is focused on experiential learning organized around the investigation and resolution of disorganized problems. It is a curriculum organizer and instructional strategy which are the two major complementary process of Problem Based Learning, creates a learning environment in which teachers coach student’s thinking and guide student’s inquiry that facilitates deeper levels of understanding.

Problem Based Learning provides authentic experiences that foster active learning, support knowledge construction, and naturally integrate learning on real life experiences as well as integrating disciplines. The problematic situation is the organizing centre for curriculum. It attracts and sustains student’s interest with its needs for resolution while exposing multiple perspectives. Students are engaged as problem solvers, identifying the problem roots and the conditions needed for a good solution; pursuing meaning and understanding, and becoming self- directed learners. This integrated process can be described and summarized in the following table 2.1
Table 2.1 Integrated Process of Problem Based Learning

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Student</td>
<td>Students must have responsibility for their own learning. As the students in a Problem Based Learning curriculum framework with a problem, they should be able to identify what they need to learn and what resources they are going to use to accomplish that learning.</td>
</tr>
<tr>
<td>2. Teacher</td>
<td>Problem Based Learning is not a teacher-centered instructional strategy; instead the teacher designs and provides the problem situations and experiences that challenge the students to learn what is expected in the curriculum. Using facilitatory teaching skills, teacher guides them in their work with the problem as they develop problem solving skills, identify what they need to learn and develops self-directed learning skills.</td>
</tr>
<tr>
<td>3. Problem Situation</td>
<td>The problem situations used in Problem Based Learning must be ill-structured and allows for free inquiry. As with problems in the real world, must present as ill-structured problem situation stimulating learners to generate multiple hypotheses about their cause and possible solutions.</td>
</tr>
<tr>
<td>4. Information Integration</td>
<td>In Problem Based Learning, students should be able to access, study and integrate information from all disciplines that might be related to understanding and resolving the particular problem that must enable them to recall and apply information integrated from diverse sources.</td>
</tr>
<tr>
<td>5. Analysis</td>
<td>A closing analysis of what has been learned from within the problem and a discussion of what concepts and principles have been learned is essential. This must reflect on how their new learning relates to prior problems and prepares them for future problems.</td>
</tr>
<tr>
<td>6. Assessment</td>
<td>Self and peer assessment should be carried out at the completion of each problem. The students must become proficient in assessing their individual learning progress and that of their peers. Student achievement must measure student’s progress towards the goal of Problem Based Learning.</td>
</tr>
</tbody>
</table>
To develop a PBL unit, teachers decide on a role to frame the students’ involvement in choosing a problem. The learning experience provides students with opportunities to take different perspectives on the subject (Barrel, 1995). The role of students is:

- To assume the role of stakeholders in the problem scenario.
- To immerse in an ill-structured problematic situation.
- To identify what they know and need to know.
- To define the problem to focus further investigation.
- To generate several possible solutions and identify the one that fits best.

In this strategy teachers who worked eloquently about the challenges inherent in rethinking their entire conception of teaching and learning. Students, particularly those who have been successful in a more traditional teaching setting, often struggle with their new role as active thinkers and learners and the higher degree of ambiguity they encounter in ill-structured problems. Students take more responsibility for learning as they develop a set of skills and habits of mind to become more self-directed. Teachers provide different support mechanisms to their student learning, as they act as the role of a coach.
CONCLUSION

This section concludes that, in Problem-Based Instruction students are presented with authentic, meaningful problems as a basis for inquiry and investigation. This strategy is designed to promote problem solving and higher-level thinking skills. This facilitates students involved in driving question or problem, interdisciplinary focus, authentic investigation, production of artifacts or exhibits, and collaboration. This strategy is designed to involve students in the kinds of real-world thinking activities they will encounter outside of school from childhood through adulthood. The primary goal of Problem Based Instruction is learning content through inquiry that can be applied in authentic situations. Students learn to think and behave like adult workers, scholars, and problem solvers and to regulate their own learning. They learn collaboration skills and research and inquiry strategies, and gain an understanding of knowledge as complex, multifaceted, and uncertain. Problem Based Learning is the most students centered instructional strategies in which Students work actively and independently on problems that interest them. This requires an environment that is open and safe for asking questions, forming hypotheses, and sharing ideas. The teacher's role is to pose problems, ask questions, facilitate investigation and dialogue, and provide support for learning.
2.3 FACETS OF GRAPHIC ORGANIZER AS INSTRUCTIONAL STRATEGY

2.3.1 GRAPHIC ORGANIZER: AN INSTRUCTIONAL TOOL FOR EFFECTUAL CURRICULUM TRANSACTION

Graphic Organizers are important and effective pedagogical tools for organizing content and ideas and facilitating learners’ comprehension of newly acquired information. Gardner’s theory of multiple intelligences (2006) posits that students are better able to learn and internalize information when more than one learning modality is employed in an instructional strategy. Because Graphic Organizers present material through visual and spatial modalities and reinforce what is taught in the classroom, the use of Graphic Organizers helps students internalize what they are learning. (Mc Knight, Katherine 2010).

For today’s classroom, nothing is more essential to successful teaching and learning than strategy based instruction. It is through the use specific teaching strategies and learning tools; when they were integrated into classroom experiences; students are better able to understand new materials. Creating a strong visual picture, Graphic Organizers support students by enable them to see connections and relationships between facts, information and terms. Graphic Organizers are effective tool for transacting curriculum that support success, active and effective learning in the classroom. Students are prompt to ask questions and encourage building and applying crucial thinking skills while developing tools for learning. Graphic
Organizers can be used for any subject matter and are easily integrated into core curriculum.

The Graphic Organizers are visualizations of metal storage systems, and serve to support students in remembering and connecting information (Vygotsky, 1962). When students are able to remember and assimilate information, they can deliver into more critical thinking. The visually stimulating nature of Graphic Organizers draws the learner’s attention. As learners we attend to what is novel and visually intriguing because the brain is more equipped to process images than text.

Teachers use Graphic Organizers to reinforce learning, assess learning at multiple checkpoints, and identify misunderstanding of concepts. Teachers constantly revise their teaching strategies to promote effective learning. Graphic Organizers can be used before, during, and after instruction. Learning environment settings for using organizers vary from individual use, to partners, to small groups and to whole class environment. Teachers can use organizers to brainstorm ideas, to activate prior knowledge, to develop a story map while reading a book, to remain focused on content material, to present findings from an investigation, to confirm existing knowledge, and to review at the end of the period or week of study. Therefore, Graphic Organizers appear to be a beneficial instructional strategy to support students to retain learned information longer and to learn more effectively.
The Graphic Organizers, an instructional processing tool for:

- **Modeling**: It is critical to model Graphic Organizer when you present it into the class.

- **Learning Experiences**: Graphic Organizers can be effective used or individual and small group instruction through which they provide a structure for the students.

- **Assessment**: Assessment should be reliable and varied. Graphic Organizers can be easily used for classroom assessment.

- **Special needs**: Students with special needs often have difficulty decoding and comprehending text and developing vocabulary.

- **Variations**: Students may have several variations of the same organizer for a given topic or subject. Further some students are more visually oriented than others.
The following Table 2.2 clearly shows an analysis of instructional processing of Graphic Organizers based on different types.

**Table 2.2 Instructional Processing of Graphic Organizers**

<table>
<thead>
<tr>
<th>Instructional Process</th>
<th>Examples of Graphic Organizers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brain Storm:</strong></td>
<td>Concept Map</td>
</tr>
<tr>
<td>Generate and organize ideas / concepts.</td>
<td></td>
</tr>
<tr>
<td><strong>Sequencing:</strong></td>
<td>Continuum scale, Events chain.</td>
</tr>
<tr>
<td>Arrange ideas/ concepts in a sequential manner.</td>
<td></td>
</tr>
<tr>
<td><strong>Compare and Contrast:</strong></td>
<td>Venn diagram, compare and contrast matrix</td>
</tr>
<tr>
<td>Show the similarities and differences between two or more objects/ concepts/ ideas.</td>
<td></td>
</tr>
<tr>
<td><strong>Analyze:</strong></td>
<td>Fish bone map</td>
</tr>
<tr>
<td>Show the relationship between the parts of a whole and how each part contributes to the whole.</td>
<td>spider map, tree map</td>
</tr>
<tr>
<td><strong>Evaluate:</strong></td>
<td>P-M-I, K-W-L</td>
</tr>
<tr>
<td>Represent the relative merits of an object/ concept/ idea.</td>
<td></td>
</tr>
</tbody>
</table>

Instructional processing of Graphic Organizer enables the learner to

- understand relationships among ideas and concepts systematically
- refines and extends comprehension of information
- analyzes learned information from a new perspective
- equip them with an independent study strategy
- purifies and extends the kind of thinking required to construct the organizer.
2.3.2 ARCHITECTURE FOR SCULPTURING GRAPHIC ORGANIZERS

A graphic organizer is a visual display that is used to depict the relationships between facts, terms and/or ideas within a learning task. They form a powerful visual picture of the information and allow the young mind to discover patterns and relationships it otherwise may have missed. It uses visual symbols to convey meaning. Its purpose is to facilitate learning by presenting the most complete picture of all the available facts and the potential relationships that could develop among them.

Graphic Organizers can be constructed with a number of different structures or designs. They are called by different names such as knowledge maps, concept maps, story maps, cognitive organizers or concept diagrams. Important aspects of Graphic Organizers can make curriculum more supportive of students and teachers as it allows them to actually see rather than have to imagine the possibilities contained within. The following are the structural design for sculpturing Graphic Organizers for integrating concepts and ideas.

Step 1

Orienting students to organize ideas in a Graphic Organizer so that they understand how to proceed. Use material from a recent lesson so that students are familiar with the vocabulary and concepts and can concentrate on seeing the relationships and understanding how to display them graphically.
Example: Comparing and Contrasting Characters with a Venn diagram

The teacher drew the Venn diagram on the board, explained to students where the categories of information would go, and first had students meet in small groups to discuss aspects of two characters from a novel they were reading. Next, groups reported the results of their discussions, and as they mentioned character traits, the teacher put the information in the appropriate places in the diagram.

Step 2

Model for students as to how they should use the information in the organizer for an appropriate learning purpose, such as a study aid or as a way of organizing a response to a test question.

Step 3

After constructing a few Graphic Organizers with students and shows them how to use the completed organizer for a specific purpose, put them in small groups, and give each group a blank organizer to complete the given task. Have them work together to fit the information in to the structure and use the completed organizer for a specific purpose. Have groups share their work and discuss any differences in their completed organizers. Do this several times until students are comfortable using the organizing structures you provide.

Step 4

Students provide practices in constructing their own Graphic Organizers in small groups to accomplish specific learning purposes. For example, the class that learned to use a Venn diagram as the basis for designing a computerized compare-
contrast presentation was given several additional assignments to construct and use a Venn diagram to design similar presentations to compare and contrast characters from other works of literature they had studied as a class.

**Step 5**

After providing students with information, such as a selection to read or a video, have students work in small groups to decide how they could organize the information graphically. Have groups share their organizers and discuss the kinds of thinking that went into their decisions. Do this several times with different texts to give students practice in deciding for themselves, how to organize information graphically.

**Step 6**

Give students opportunities to use Graphic Organizers in different content and contexts so that they have practice using these visual aids in various contexts.

### 2.3.3 EXHIBITION AND DESCRIPTION OF GRAPHIC ORGANIZERS

Graphic Organizers come in many different forms, each one best suited to organizing a particular type of information. The following examples are merely a sampling of the different types and uses of Graphic Organizers.
Figure 2.7 Descriptive Thematic Map

This Graphic Organizer is made up of a series of shapes in several rows. The top row is made up of a diamond in the center with two circles, one on each side, and two vertical rows of rectangles, one on each outer side. The diamond is labeled "Main Idea." The two circles are each labeled "Sub board. Idea" and the top rectangle of each outer row is labeled "Support Detail." Underneath the center diamond is a circle and beneath the circle is horizontal row of three rectangles. The circle is labeled "Sub board. Idea" and the center rectangle is labeled "Support Detail." Lines connect the center rectangle is labeled "Support Detail." Lines connect the shapes of the Graphic Organizer.

Figure 2.8 Network Tree
This Graphic Organizer is entitled "Network Tree" and is made up of a series of ovals of two different sizes. At the top are three large ovals, one above a row of two. They are connected by two black lines. At the bottom are two rows of three smaller ovals. One row of three is connected by black lines to a larger oval above them on the right, and one set of three is connected by black lines to a larger oval above them on the left.

**Spider Map**

This Graphic Organizer is entitled "Spider Map" and is made up of a large, central oval with four sets of black lines extending from it. The central oval is labeled "Topic, Concept, and Theme." Four slanted lines extend from the oval, and each one has two horizontal lines attached. Along the side of the slanted line at the top right of the Graphic Organizer is the label "Main Idea." On one of the horizontal lines at the top left is the label "Detail."
Figure 2.10 Problem and Solution Map

This Graphic Organizer is entitled "Problem and Solution Map" and is made up of a series of boxes. On the left, a vertical row of two boxes have arrows pointing to a larger box in the center of the Graphic Organizer. Each of the two boxes are labeled "Influence." The center box is labeled "Cause." An arrow points from the center box to a diamond on the right. The diamond is labeled "Effect." An arrow points from the bottom of the center box to a rectangle beneath it. The rectangle is labeled "Solution."

Figure 2.11 Problem Solution Outline
This Graphic Organizer is entitled "Problem-Solution Outline" and is made up of a vertical row of three rectangles. To the left of the top rectangle is the label "Problem." The word "Who" appears at the top right corner, and the words "What" and "Why" appear within the rectangle. An arrow points from the top rectangle to the one in the middle. The middle rectangle is larger than the other two. An arrow cuts through the center of the rectangle, pointing down. To the left of the rectangle is the label "Solution." Within the rectangle, on the left, the words “Attempted Solutions" appear, with the numbers one and two beneath. Within the rectangle, on the right, the word "Results" appears, with the numbers one and two beneath. An arrow points from the center rectangle to the one beneath, which is labeled "End Result."

Figure 2.12 Sequential Episodic Map

This Graphic Organizer is entitled "Sequential Episodic Map" and is made up of an oval at the top and three vertical rows of boxes beneath. The oval is labeled "Main Idea." The top box on the left is labeled "Cause..." The top box in the middle is labeled "Effect...Cause..." The top box on the right is labeled...
"Effect..." Lines connect the boxes beneath, and arrows point from the rows to the top boxes. Each box in the second row is labeled "Influence."

![Fishbone Map](image)

**Figure 2.13 Fishbone Map**

This Graphic Organizer is entitled "Fishbone Map" and is made up of a series of horizontal and slanted lines. In the center of the Graphic Organizer, is a thick black line with two sets of two slanted lines extending from it in the shape of two arrows pointing to the left. The arrow's lines on the left are labeled "Cause 1" on the top and "Cause 2" on the bottom. The arrow's lines on the right are labeled "Cause 3" on the top and "Cause 4" on the bottom. A horizontal line extends from the top of each arrow. The horizontal line on the left is labeled "Detail." Two horizontal lines extend from the bottom of each arrow. The bottom line on the left is labeled "Detail."

![Compare-Contrast Matrix](image)

**Figure 2.14 Compare-Contrast Matrix**

This Graphic Organizer is entitled "Compare-Contrast Matrix" and is made up of a table with three columns and three rows. In the column on the left,
the first table cell of each row is labeled "Attribute 1," "Attribute 2," and "Attribute 3," from top to bottom. The rest of the table cells are shaded grey.

2.3.4 GRAPHIC ORGANIZER: ITS HYPOTHETICAL PILLARS FOR STRENGTHENING COGNITIVE PROCESSING

From theoretical perspective, there were distinct points discovered why Graphic Organizers considered as useful teaching strategy for cognitive processing and leads to effective teaching and learning. It can answer by its hypothetical pillars or theoretical scaffolds of Graphic Organizer for strengthening cognitive processing came from the following route.

Useful as a conceptual communicative tool (Frye, 1981).

Aids in relating new information to prior knowledge (Eshleman, 1997, 2000).

Provide an overview of materials to be learned into orderly patterns and it’s also a cue for important information (Merkley & Jeffries, 2000).

Visual stimuli for written and verbal communication (Merkley & Jeffries, 2000).

Computationally more efficient than outlines or texts (Katayama & Robinson, 2000).

Engage students in learning, resulting in encoding benefits (Katayama & Robinson, 2000).

Figure 2.15 Theoretical scaffolds of Graphic Organizers
**Route 1: Conceptual communicative tool.**

It has been discussed by Edward Frye (1981) that it is a must to emphasize graphical literacy in reading and comprehension because it being a communicative tool for students. It allows them to express their ideas of written text or document. An educator can use Graphic Organizers as a useful teaching strategy by having students illustrate ideas and meaning based on any written source. This method allows the instructor to see how students process information and are able to communicate visual information whether assigned material was comprehensive or not.

**Route 2: Aids in relating new information**

The use of Graphic Organizers can be used as a bridge to connect prior knowledge learned to new information. For new information introduced, there’s a connection for further and clear understanding because of prior knowledge. Doing this, will determine to the instructor what type of lesson can be introduced, or of what manner to introduce to students.

**Route 3: Provides an overview of materials to be learned into orderly patterns and it’s a cue for important information**

Organization of information is crucial, especially if it’s information to be covered in a lesson. An instructor can display this information in a Graphic Organizer like a map, for students to follow, but laid-out in an organized way
so its meaningful for student’s learning. As a useful teaching strategy, doing this is helpful for the learner because it’s visually available and it’s readily seen in an organized fashion for students to focus on main topics to be covered.

**Route 4: A visual stimuli for written and verbal communication**

Merkley and Jeffries (2000) supporting the use of Graphic Organizers as part of instruction and to have an instructional strategy should stimulate and motivate learners to express ideas orally or through written word and visually displaying it in systematic and organized patterns. Using visuals to stimulate a learner’s interest is part of the educational experience. To see spoken and written word using Graphic Organizers is an added enhancer to learning.

**Route 5: Computationally more efficient than linear displays**

Katayama and Robinson (2000) revealed that Graphic Organizers were more efficient, because they were spatial displays, rather than linear displays such as, outlines and text. Being computationally efficient, the use of suitable organizers strengthen the amount of intellectual searching and make apt and creative way to compute and process data. As a useful teaching strategy, an instructor can include them when students are engaged to do solve mathematical problems and like enrich their computational skills.
Route 6: Engages students in learning, resulting in encoding benefits

Information learned is meaningful to students when they actively participate in learning. Graphic Organizers can be used by the student in conjunction with studying and reviewing text instead of instructor contributing fully to giving complete notes. As a teaching strategy, Graphic Organizers are useful because it promotes them to be an independent self-regulated learner.

2.3.4.1 COGNITIVE PROCESSING THEORIES AND THEIR IMPLICATIONS IN GRAPHIC ORGANIZER

There are five major theorists and their theories closely related with the development of Graphic Organizers as an effective instructional strategy that leads for cognitive strengthening of an individual. It should be describe as below and how their theories correspond to the usage of Graphic Organizers for cognitive processing of learners at different ability groups.

Ausubel’s subsumption theory (1968) focuses on how an individual learns the amount of meaningful information. This meaningful information includes textual information and verbal information form instructor and peers. The theory asserts that in the learning process, subsumption of new material is related to relevant ideas in the existing cognitive structure. The relevant role that Graphic Organizers play in the theory acts as a subsuming bridge between new material and existing related ideas. Graphic Organizers assists in linking prior information learned and understood by the individual to new information the
individual is currently learning. Ausubel’s theory primarily applies to receptive style of learning and discovery based learning. The learner discovers information through problem solving and takes ownership and engages in learning.

**Wertheimer’s ‘Gestalt theory’ (1910)** is concerned with the individual’s perception and how this perception relates to problem-solving or how the individual views the structure of the problem to be solved. The theory suggests the way of doing this is by “grouping” of like characteristics of stimuli, causing the learner to structure or interpret a visual field or problem in a certain way. The relevance of this theory to Graphic Organizers is “grouping” and its factors. Since Graphic Organizers are visual representations, the basis of organizers is representing a main idea, but structuring main idea in an organized manner. When developing organizers, elements represented should be grouped together according to what the main idea is based on, it should complete an entity to see relation to the main idea, and importantly, an organizer should be visually symmetrical to see main idea clearly.

**Reigeluth’s elaboration theory (late 1970’s)** is based on the organization of instruction. The learner being taught the basic idea to more complex ideas. The way this type of instruction should be taught and shown, is in order of the simple tasks, followed by additional versions based on the original until all versions are understood by review and finally, summarization. The whole idea and goal of the theory is for motivational, retention and transfer
of meaningful information to learner. The relevance of this theory to Graphic Organizers is an instructor presenting organizers in a lesson, starting with a basic model to a more advanced model such as a skeletal model.

**Vygotsky’s zones of proximal development (1978)** or assisted learning theory is a social developmental theory, interested in cognitive development with assistance of individual’s, particularly children. Assistance from various environmental or cultural sources, such as, other peers, adults and teachers, external technological objects or tools like computers, audio-visuals and books. The theory emphasizes mental development of children with aid of others in the environment as children develop and mature into adults. The relevance it has to Graphic Organizers is it is an external technological tool which is used to assist in the organization of mental information displayed visually.

**Atkinson and Schiffrin’s information processing theory (1968)**

The relevance of Graphic Organizers to this theory helpful in assisting the encoding of information by being an organized, visual stimulus. Having an organized and visual stimulus, an individual is able to store meaningful information into long-term memory and retrieve information successfully. The outcomes of using Graphic Organizers as a teaching strategy that an instructor or educator can expect to clearer comprehension of textual information, better organizational abilities in writing, skillful manner of note taking, engagement in abstract thinking, and working independently on organized facts and ideas in
whatever subject area Graphic Organizers are useful. The learner becomes independent in the learning process, leads to questioning, analyzing, and planning which are all meta-cognitive level of thinking.

Graphic Organizers find their origin in the cognitive theories of learning. Cognitive theories of learning attempt to explain how people learn on basis of thought processes. There is a presumption amongst cognitive theorists that the mental processes operate in an organized, predictable fashion. Incorporating use of Graphic Organizers during the learning process will enhance the functionality of these processes and improve memory retention and retrieval. Based on the above theories, Graphic Organizer can be originated from the following cognitive theories.
### Table 2.3 Graphic Organizers for Cognitive Processing

<table>
<thead>
<tr>
<th>Cognitive Origins</th>
<th>Linking with Graphic Organizer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Information Process Theory</strong></td>
<td>Students learn better by chunking information. If they are able to chunk information successfully and meaningfully in their short term memory they will be able to successfully transfer it to their long term memory. Use of Graphic Organizers facilitate chunking of information and help with learning.</td>
</tr>
<tr>
<td>George Miller (1962)</td>
<td></td>
</tr>
<tr>
<td><strong>Subsumption Theory</strong></td>
<td>Learning occurs when new material is related to relevant ideas that are already present in the existing cognitive structure. Graphic Organizers can facilitate this process by provides students a framework for relating existing knowledge to the new information</td>
</tr>
<tr>
<td>Ausubel (1963)</td>
<td></td>
</tr>
<tr>
<td><strong>Schema Theory</strong></td>
<td>Memory is composed of a network of schemas. A schema is a knowledge structure created by the learner based on his existing knowledge. Using Graphic Organizers allows the learner to insert the information in his existing schema.</td>
</tr>
<tr>
<td>Anderson (1977)</td>
<td></td>
</tr>
<tr>
<td><strong>Dual Coding Theory</strong></td>
<td>Memory has two systems for processing information. The verbal system processes and stores linguistic information, while the visual system processes and stores images. Both these systems interconnect to allow dual coding of the information which helps with understanding, comprehension, and retention. Using Graphic Organizers aid the visual process of memory and help in the learning process.</td>
</tr>
<tr>
<td>Allan Paivio (1986)</td>
<td></td>
</tr>
<tr>
<td><strong>Cognitive Load Theory</strong></td>
<td>The working memory can deal with only a limited amount of information at one time and if its capacity is exceeded, the information is likely to be lost. Graphic Organizers can reduce the cognitive load and free the working memory to continue to learn.</td>
</tr>
<tr>
<td>Sweller, (1998)</td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSION

The Section III consolidated that Graphic Organizer acts as visual communication strategy that uses visual symbols to express ideas and concepts, to convey meaning. A Graphic Organizer often depicts the relationships between facts, terms, and or ideas within a learning task. The main purpose of a Graphic Organizer is to provide a visual aid to facilitate learning and instruction. Most Graphic Organizers form a powerful visual picture of information and allow the mind 'to see' undiscovered patterns and relationships. Although they have been applied across a range of curriculum subject areas, reading is by far the most well practiced application. Teachers may use a Graphic Organizer to attempt to provide structure for the presentation of new material while indicating relations between ideas. Graphic Organizers allow students to approach subjects cognitively because they assist thinking. The student must take an active role in learning while processing and reorganizing information. Modifying an organized structure of information gives students an opportunity to learn from their own mistakes. It also allows students to construct maps that are appropriate to their individual learning styles. Students can construct their own organizers using the full text to isolate and organize key concepts. This summarization technique is a tool to see if students can interpret what was being taught and state it in concise, accurate terms. Once students become comfortable with using the organizer,
more independent applications are appropriate. In the end, you should encourage and assist students to create their own organizers.

These basic dimensions of curriculum transaction and its strategies that are being captured through the development of instructional strategies have been detailed in the methodology chapter. Several studies and related literature support of the theoretical constructs underlying the major concepts projected so far have been depicted concisely in the next chapter.