

“The most enjoyment I had was not always winning, (although I hated losing). But what gave me the biggest thrill was the way I reacted when I was beaten- what I thought about when I was beaten & how I came back from defeat. To my mind, the great champions are the ones who react to defeat in a positive way. I'd much rather climb into the head of someone who has lost, and see what made the person come back to be a victor, than to climb into the head of a winner. You can probably learn more from failures” Rafer Johnson, Olympic decathlon champion

In the current research titled: Influence of perceived attributes and perceived emotional climate on academic performance of students - An exploratory study. An attempt is made to understand the underpinning thought patterns that may not just accompany but determine academic performance at various level of achievement. The current research study looks in to the role of select non academic cognitive factors namely – explanatory style, mindset, low frustration tolerance, metacognitive awareness, perceived peer empathy and perceived teacher empathy on academic performance of I pre university students in the urban city of Bangalore. While the previous chapters comprising of the introduction and review of literature have presented the case, for the need for looking into non academic cognitive factors, the selection of these factors for the current study and proposed a model to explain the interconnectedness between them.

The current chapter presents the objectives of the study, the research questions that the study attempts to answer. The chapter delineates the independent, dependent, control, intervening variables and formulated hypotheses for testing the relationships between, the selection of independent and dependent variables. The research design selected to understand the variables has also been outlined.

Research Objectives:

The research objectives stated below presents the direction of the study.

- I. To explore non academic cognitive factors linked to academic performance.
- II. To identify adaptive and maladaptive non academic cognitive profile associated with academic performance.
- III. To develop, execute and test the skill building program based on the model proposed, interrelating the selection of non academic cognitive factors to facilitate adaptive non academic cognitive profile and academic achievement.

Research questions:

Based on the research objectives stated above, the following specific research questions have been framed to be investigated in the course of the study. The current study has been executed in two phases.

The Phase I research questions have been delineated below:

- 1a. Does explanatory style influence academic performance?
- 1b. Does mindset influence academic performance?
- 1c. Does Low frustration tolerance influence academic performance?
- 1d. Does metacognitive awareness influence academic performance?
- 1e. Does perceived peer empathy influence academic performance?
- 1f. Does perceived teacher empathy influence academic performance?
- 1g. What is the non academic cognitive profile associated with high/low academic achievement?

The Phase II research questions have been delineated below:

- 2a. Does the skill building program, effectively help students develop facilitative non academic cognitive factors linked to academic performance?
- 2b. Does expectation of the participating students in the skill building program, enhance academic performance?
- 2c. Does the skill building program improve the participating students' academic achievement?

Hypotheses:

As the Phase I of the current research study is exploratory in nature. Null Hypotheses have been formulated to test the relationship between the selection of independent variables and dependent variable.

Phase I:

- 1. There is no relationship between explanatory style and academic performance.
- 2. There is no relationship between mindset and academic performance.
- 3. There is no relationship between frustration tolerance and academic performance.
- 4. There is no relationship between metacognitive awareness and academic performance.
- 5. There is no relationship between perceived peer empathy and academic performance.
- 6. There is no relationship between perceived teacher empathy and academic performance.

Phase II: After the skill building program:

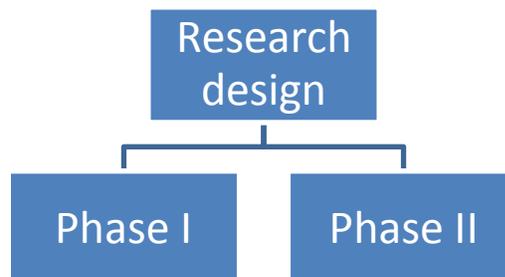
Directional hypotheses have been used mostly in phase II as the objective of phase II is to test the effectiveness of the skill building program, developed on the basis of the model

suggesting the interplay between the non academic cognitive factors. As, the participants were informed about the purpose of the program, a hypothesis is also set to study the relation between expectation of improving from the program, influencing the success of the program.

1. There is a difference in explanatory style after the skill building program.
2. There is a difference in mindset after the skill building program.
3. There is a difference in frustration tolerance after the skill building program.
4. There is a difference in metacognitive awareness after the skill building program.
5. There is a difference in perceived teacher empathy and academic performance.
6. There is a difference in perceived peer empathy and academic performance.
7. There is no relationship between expectation and academic performance

Procedure & Research Design implemented:

The current research study has been designed to unfold in two sequential phases I and II. The phase I is designed to be exploratory in nature. Primarily includes large scale data collection across the participating Pre-University colleges in urban Bangalore. Phase II an experimental in nature, comprising of a skill building program, begins right after the completion of phase I, in one of the participating colleges from phase I.



Phase I:

An exploratory research approach to, explore the relationship between the non academic cognitive factors namely explanatory style, mindset, metacognitive awareness, low frustration tolerance, perceived peer empathy and perceived teacher empathy with academic performance.

A Purposive sampling technique has been used to collect data (n=505) three months into the start of the I. P.U (I pre-university, science stream with the combination of core subjects, PCMB – physics, chemistry, mathematics and biology) and after the completion of the I Internal assessment (September 2012).

This was done with the intention of allowing enough time for I P.U students to settle into their new environments and stabilize their interpersonal relationships with peers and teachers.

The academic achievement scores of the I internal assessment were collected directly from the college authorities. Along the lines of the suggested idea of ‘intervention epidemiology’ by Dr. Malavika Kapur¹.That states that the process of data collection needed to be beneficial to subjects who participate in the research directly and immediately rather than indirectly through research findings.

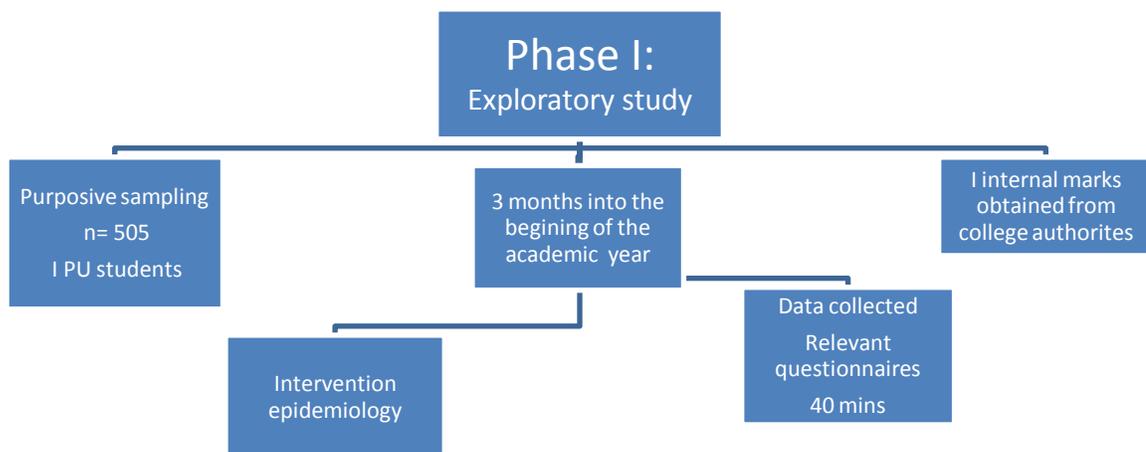
The data collection in phase I was followed by a brief skill building program, conducted in the duration of the academic year, in consenting participating college.

The objectives of, the skill building program offered as part of the intervention epidemiology in phase I is:

- a. Enable students to understand the constructs namely – explanatory style, mindset, metacognitive awareness and low frustration tolerance.

¹ Key note speaker in National conference on child and adolescent psychology 2010 held at CMS institute, Department of psychology, Bangalore, Karnataka, India.

- b. Enable students to assess the influence of the constructs on their own selves.
- c. Providing students with resources for further information on the constructs.
- d. Equipping students with tools to develop adaptive behaviours with relation to the aforementioned constructs.



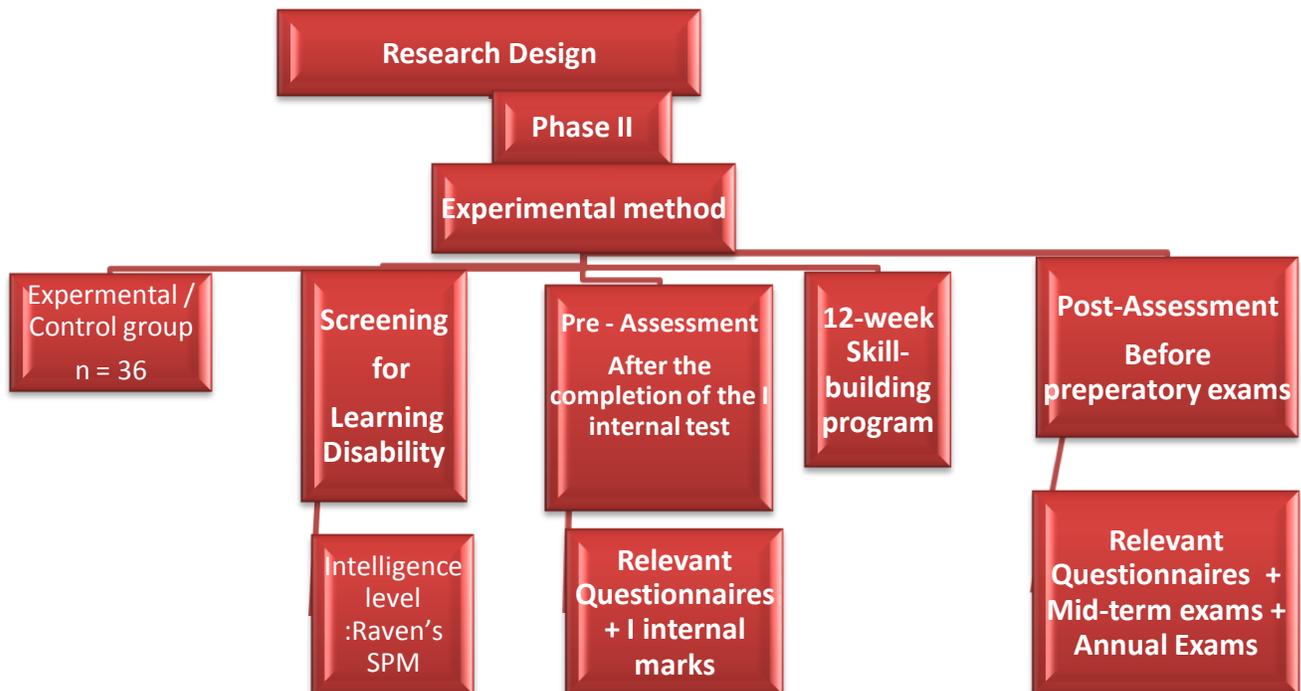
Phase II:

A Experimental method was used. A class of I P.U students of the science stream was selected through purposive sampling method to participate in the skill building program. The program is referred and implemented treating the skill sets to be taught, along the lines of life-skills, therefore no screening process was used for admittance into the program. Of the participating colleges, a single class was chosen based on permission acquired considering the schedule changes that would be required for the implementation of the program.

Students were briefed about the objective of the program and were given the option to enrol into the program, which formed the experimental group (n=36), another group of (I P.U the same college was designated as the control group (n=36).

Their scores on the independent (Explanatory styles, low frustration tolerance, mindset, metacognitive awareness and expectation) and dependent variables (I internal test scores) were measured before the commencement of the program and again measured after the completion of the program.

Students in this phase were screened for learning disabilities and their Intelligence level was measured to study their influence in relation to the independent variables on the participating students' (experimental group) academic achievement



Variables: Common to Phase I & II

Dependent variable:

- 1) Core subject scores (I internal test)

Independent variables:

1. Explanatory style
2. Mindset
3. Low Frustration tolerance
4. Metacognitive awareness

5. Perceived peer empathy
6. Perceived teacher empathy

Inclusion criterion:

1. English medium of instruction
2. Urban population
3. Type of Syllabus followed

Extraneous variables:

1. Family related variables like: Socio-economic status, Parent educational background, Parental profession, Parental expectation, nature of family, number of siblings, order of birth etc.
2. School related variables like: School climate, leadership style of the principle, mission statements of the schools, teacher remuneration, teacher job satisfaction etc.
3. Student related variables: self efficacy beliefs, locus of control, self concept, student motivational style, cognitive abilities, gender etc.

Specific (additional variables) to Phase II:

Independent variable:

Expectation score

Control Variable:

Learning disability

Intervening variable:

Intelligence level

Operational definitions:

Academic performance: As defined by Farrington et al 2012, is considered as a combination of content knowledge, core academic skills and non academic cognitive factors measured in terms of academic achievement scores obtained by a student in tests or examinations in the duration of an academic year.

In the current study the academic performance has been measured by academic achievement scores in -

Phase I: Core subjects' (Physics, chemistry, mathematics and biology) scores in I Internal test.

Phase II: Core subjects' (Physics, chemistry, mathematics and biology) scores in I Internal test , mid-term scores, preparatory exams and final exam.

Academic cognitive factors: The term Academic cognitive factors refers to intelligence, memory, reasoning, problem solving, as well as cognitive factors as delineated by Farrington 2012d, to include the “content” focused upon in school, particularly a student’s grasp of content knowledge and academic skills such as writing and problem-solving. The term also is inclusive of students ‘capacity’ to learn, namely intelligence, memory, attention, learning strategies.

Non academic cognitive factors: Refers to what has been previously referred to as noncognitive factors (Farrington 2012e), as enumerated in fig 3(introduction chapter). The researcher does not propose to study all the mentioned factors but a selection and an addition of constructs not covered by the review namely: Explanatory style (Seligman 1982), Mindset (Dweck 2006), Metacognitive awareness (Schraw, Dennison 1994), frustration tolerance (Bernard, Cronan 1999), Empathy (as perceived by the student from peers and teachers).

These diverse factors ranging from student’s attitudes towards learning, to their conceptions of intelligence and their ability to regulate their learning related behaviours. Also it includes students’ quality of relationship with peers and teachers who comprise a significant component of their learning experience have an indelible but ill understood

effect on the emotional climate created around learning itself and thereby effects. academic performance.

Adaptive behaviours: The adaptive extreme of the continuum of the non academic cognitive factors that facilitate academic performance.

Maladaptive behaviours: The maladaptive extreme of the continuum of the non academic cognitive factors that are deterrent to academic performance.

Non-academic cognitive profile: Student profile developed on the cognitive constructs of explanatory style, mindset, low frustration tolerance, metacognitive awareness, perceived peer empathy and perceived teacher empathy.

High academic achievers: Students whose aggregate scores on PCMB (physics, chemistry, mathematic and biology) lie at and above the score of 75, in examinations where the maximum score possible is 100.

Low academic achievers: Students whose aggregate scores on PCMB (physics, chemistry, mathematics, biology) are below the minimum passing score of 35, in tests where the maximum possible score is 100.

Perceived Attributes: Refer to beliefs, which are in turn defined as descriptive, inferential and imperative cognitions (Ellis, Dryden 2007). The beliefs that have been considered for study in this research are namely, Explanatory styles (Optimistic/pessimistic), mindset (growth/fixed) and Low frustration tolerance. Explanatory styles are descriptive and inferential beliefs, mindset is an inferential belief and Low frustration tolerance is an imperative belief.

Mindset: Dweck (2006) proposed two kinds of mindset –

Fixed mindset – In a fixed mindset, people believe their basic qualities, like their intelligence or talent, are simply fixed traits.

Growth mindset - In a growth mindset, people believe that their most basic abilities can be developed through dedication and hard work—brains and talent are just the starting point.

Explanatory style: As proposed by Seligman (2007):

Explanatory Style: refers to one's habitual way of explaining life's events,

Optimistic explanatory style : Optimistic explanatory style attributes success to stable, global, and internal causes. And failures to unstable, specific and external causes.

Pessimistic explanatory style: Pessimistic explanatory styles, attributes failures to stable, global, and internal causes. And Success to unstable, specific and external causes.

Low Frustration tolerance: Low Frustration tolerance occurs when one sees that tasks are more difficult, tedious, or boring than one wants, but exaggerates the badness of this to something that is wrongly too hard, too much, not as easy as it should be or beyond what one can stand. (Ellis, 1997)

Metacognitive awareness: An ability that enables an individual to plan sequence and monitor their learning, in a way that directly improves performance –Schraw & Dennison (1994).

Perceived emotional climate: as perceived by a student in a classroom setting from their perception of empathy received from two sources – teachers and peers.

Perceived peer empathy: refers to student's perceptions of being understood and respected by peers for his/her academic identity irrespective of their academic performance (favourable or unfavourable).

Perceived teacher empathy: refers to the perceptions of the student being understood and respected for his/her academic identity by concerned teachers irrespective of their academic performance (favourable/unfavourable).

Tools used in the construction of the questionnaire and in the duration research:

1. To assess Explanatory style - Attribution style questionnaire Semmel, Baeyer, Abramson, Metalsky, Seligman 1982. As the original questionnaire was developed for an adolescent growing up in a western context, some items were found to be irrelevant and therefore adapted to the India context.

The questionnaire is designed more as a survey questionnaire than a standardized measure. It consists of statements required to be marked true or false each receiving a score of '0' or '1'. The statements are classified into two broad categories – explanatory style for good events and explanatory style for bad events. Each category further evaluates the items, which are a series of diverse hypothetical scenarios into three dimensions of explanatory style namely – permanence/temporary; specific/global and personal/others.

The scores are added on all the three dimensions for each category and the final score is obtained by subtracting the score obtained on the bad events category from the score obtained on the good events category. The scores can be interpreted based on the norms provided. The maximum possible score is '24', closer the score is to the maximum, higher is the optimism score of the individual.

For the purpose of the current study the scores obtained by the participants have not been interpreted so no norms have been used. Instead the raw scores of the participants on the questionnaire have been used to be compared statistically as required.

2. To assess mindset: Growth and Fixed mindset questionnaire, Dweck 2006. The original questionnaire is designed more as survey and screening tool than a standardized measure and consists of 4 questions, requiring only an agreement or disagreement to the questions ('yes/no').

The survey questionnaire was expanded to 10 items. Items were included to further examine and measure attitude towards effort in order to further establish the mindset theory that claims a positive attitude towards effort as indicative of growth mindset.

The 'yes' and 'no' response was substituted with a 6 point likert scale (strongly agree, mostly agree, agree, disagree, mostly disagree and strongly disagree) to capture a more gradient response. The maximum possible score is '60'. The scores have not been interpreted, just as in the original questionnaire, with a higher score indicative of 'growth mindset'. Raw scores of the participants have been used for statistical operations.

3. To assess Metacognitive awareness – The Metacognitive Awareness Inventory by Schraw, G. & Dennison, R.S. (1994), was used to assess metacognitive awareness. The inventory was used without making any changes as the items were worded in 'easy to understand' language and based on familiar study skill practices.

The inventory contains 52 items that have been categorized under two broad categories – Knowledge about cognition and Regulation about cognition. Knowledge about cognition is inclusive of three components- declarative knowledge, procedural knowledge and content knowledge. While regulation about cognition is inclusive of five components – Planning, Information management strategies, comprehension monitoring, debugging strategies and evaluation.

The items are presented as true/false statements with each affirmation earning a point. The score is calculated for each component and then final score is obtained by summing up the individual component scores. The authors have not provided norms for interpretation. As '52' is the maximum score possible on the inventory, scores tending towards the maximum indicative of presence of metacognitive awareness. Raw scores obtained on the inventory have been used for statistical calculations.

4. To assess frustration tolerance – The child and adolescent scale of irrationality developed by Bernard & Cronan 1999, was used. The scale is based on logical analysis of children's and adolescents' values and concerns and REBT theory. The scale contains 19 items categorized under two factors – Demands of fairness and intolerance to work frustration. The scale measures subject responses on a 5- point likert scale (strongly agree, agree, not sure, disagree and strongly disagree).

The scale's internal reliability (Cronbach alpha) for demands of fairness is (.60) and for intolerance to work frustration is (.72). The scale has significant correlations at .001 level

when compared to teacher ratings for low effort, behaviour problems and emotional problems. The scale does not provide norms, a maximum score of '90' is recorded. The more a score tends to maximum higher is the frustration level. For the current study the scores have not been interpreted, participants raw scores on the scale has been used for statistical calculations.

5. A researcher developed survey questionnaire has been used to assess – Perceived peer empathy and Perceived teacher empathy, due to lack of relevant tools. The Perceived peer empathy survey questionnaire contains 17 items while the perceived teacher empathy scale contains 14 items.

Items have been framed with regard to empathy as perceived from teacher and peers towards a student's academic identity comprising of the student's academic performance or lack of it and student's inherent ability to perform. These perceptions in turn creates, 'a feeling of safety or lack of it' in the learning environment.

The questionnaire uses a, 4 point likert scale (strongly agree, agree, disagree and strongly disagree) with a maximum possible score of '56' for perceived teacher empathy questionnaire and '68' for perceived peer empathy questionnaire. Participants' raw/running scores have been used for statistical computations.

6. A researcher developed single item questionnaire was used to assess the expectation level of students participating in the skill building program. Students responded by choosing a range of improvement they expected to see in their academic achievement from 0% , 25%,50% and above 75%. The responses were given a score of 0 to 4 for no improvement to highest possible improvement, respectively.

7. To screen students participating in the skill building program, a specific learning disability screening questionnaire (SLD-SQ) has been used. The screening tool has been developed to be a reliable but brief, easy to administer and score instrument, to detect any signs of specific learning disability.

The questionnaire involves 12 items, to be answered with a 'yes' or 'no' and can be answered by a teacher/parent/adult care giver familiar with the student's academic work. Every 'yes' on the questionnaire is given a score of 1 and no scores are given for a 'no'.

The questionnaire is administered having ruled out that performance of the student in question is not affected by the sensory impairment or mental retardation. Any score above '4' indicates possibility of specific learning disability. The test-retest reliability at the interval of 1 month time period is 0.87.

8. Ravens standard progressive matrices have been used to gauge the intellectual levels of the students in the experimental group. This has been done for two purposes, first as a protocol to rule out mental retardation, before screening for learning disability. Second, to understand the effect of intelligence in comparison to the select non academic cognitive factors on academic performance. For the study the raw scores obtained on the test have been used for statistical procedure.

The tool has established high reliability, the reliability values range from 0.73 to 0.93 (Dey, 1984, Rao and Reddy, 1972 and Dolke and Sharma, 1976). The Test-retest method has a reliability of 0.91 on the Indian population (Rath, 1959).

Criterion-oriented validity with the Binet and Wechsler scales for English-speaking children and adolescents have ranged from 0.54 to 0.86. For the Indian population Narayanan and Paramesh (1978) reported a correlation of 0.58 between RPM and Cattell's Culture Fair test among Tamil respondents.

A brief on the nature of the skill building program launched in Phase II:

The Skill building program a 12 week program designed with the objective of creating an understanding of the constructs namely – explanatory style, mindset, frustration tolerance and metacognitive awareness, an assessment of self in relevance to the constructs and learning tools to apply. Participants were screened for Learning disability before the skill building program was launched to rule out any incidence of learning disability.

The program was built based on the model suggested in the current study connecting the perceived attributes (explanatory style, mindset, low frustration tolerance) of academic performance and metacognitive awareness. The order of the introduction of the variables has been reassigned in the skill building program so as to facilitate better comprehension and effective delivery. The variables were not treated as stand alone segments of training but as interlinked units. Each variable paving the path for the delivery of the next variable.

The 12 week program devotes 3 weeks each to the understanding of every construct. Every week comprises of two classes of 90 minutes each. So, each individual construct is discussed for 9 hours and on the whole the skill building program comprises of 36 hours of training.

Based on the researcher's background as a life skills trainer, the program has been designed along similar lines to be delivered in an interactive framework, utilizing audio-visual aids, games, group discussion and worksheets to be completed individually and in groups.

The skill building program constitutes of the following four individual components:

1. An introduction to the fundamental principles of REBT:

Week 1: Objective – To understand the ABC model.

Using appropriate visual aids students were presented with a series of hypothetical situations. And were asked to, delineate desirable and undesirable consequences for each.

Desirable consequences were basically understood as situation endings that were less emotionally taxing or intense, did not intentionally cause harm to people involved, enabled people to clarify their actions and as much as possible inclined towards a negotiable goal.

Week 2: Objective – To understand the role of thoughts in leading to consequences (emotional and behavioural consequences).

Students were previously taught that (day to day) situations to most extent unless in extreme adverse conditions need not be faced helplessly. And is in fact a result of behaviour choices made by people involved. These behaviour choices can be made bearing the desirability of goal intended. These behaviour choices are in turn a result of, thoughts and therefore if one intends to change one's behavior, they need to begin with their thoughts.

Again audio-visual aids and worksheets designed to identify the thoughts behind these behaviour choices were used to allow students to practice the skill of identifying the underlying thought behind a given behaviour choice.

Week 3: Objective – To differentiate between rational and irrational thoughts.

Having learnt about the ability to, determine consequences, by making desirable behaviour choices and understanding the role of the underlying thoughts that dictated the behaviour choices. Students were next trained to identify the rationality of their thoughts. They were trained to identify 'demandingness and awfulizing' content in their thoughts. They were taught to dispute these thoughts based on evidence, meaning proof that validated them, functionality i.e. did thinking the way they did serve in favour of the person and finally providing objectifying comparisons for their 'this is too awful to bear moment'. Students were next trained to replace the irrational content with toned down, plausible and manageable thought content. Students were provided with practice in this technique using audio visual clippings of popular film characters and worksheets that focused on everyday situations that allowed students to witness the chain of rational/irrational thought flowing into desirable and undesirable consequences.

2. The prescribed program as described in the book ‘The Optimistic Child’ (Seligman 1995) to help cultivate Optimistic Explanatory style, was used with required changes to suit the Indian context.

Students are given an introduction to ‘Optimistic style of thinking’. Misconceptions regarding being optimistic or the more popular layman term of ‘being positive’ are addressed. For example, being optimistic/positive is not to be confused with ‘being happy always’ or ‘increasing the expectation of only positive things/ happening to you’ or ‘problems magically disappearing’ or even ‘wishful thinking’.

But it required consistent effort, in catching one’s thought process, evaluating the same and adopting a more objective thought content in a given situation. Optimistic or positive thinking is introduced as a shock absorber that does not save one from adverse situations but instead keeps one safe or keeps the damage to a minimum in case of an adverse situation.

The next three weeks are utilized to teach students the three dimensions of evaluating their thought content namely, pervasiveness- whether a given adverse situation will spill over and affect all situations whether related or otherwise. Personalization – if an adverse situation is attributed to self or otherwise and the last being permanence – whether the adverse situation is a transient occurrence or not.

Week 1: Objective- After a brief introduction to the significance of ‘positive thinking’. The first dimension of Permanence is taught to students. Students are allowed to examine the premise of considering an adverse situation as permanent or as transient and how that affects their actions and their resources of dealing with the same. The REBT technique of disputation of permanence is predominantly used in discussing this dimension. They are taken through a series of hypothetical situations involving two characters, one who purely considered the adverse situations as permanent while the other deciphered the same as temporary.

Students began with identifying through the scripts, which character advocated what style of attribution. Next a series of hypothetical situations were presented and students were required to identify the two disparate style of attributions in thoughts and the resultant actions. The last practice for the permanence involved students identifying their personal adverse situation with and without academic relevance and interpreting them along the two arms of the permanence dimension. Students were made aware of the choice of using the two attributing styles and encouraged to make a choice keeping in mind the probable resultant consequences.

Week 2: Objective – The second dimension of personalization is next introduced to students to learn to attribute a situation along the lines of personalization dimension. Students are made aware of the lopsided accountability that they assume or blame others for an unfolding situation, especially an adverse situation, that intensifies their emotional responses and the corrective strategies they choose to apply next also might be ineffective because of such inappropriate attributions. They are encouraged to objectively attribute the situation to various factors that could have contributed to the resultant situation. This is done using the technique of a pie diagram, with each plausible contributory factor represented as a slice of the pie. Students are encouraged to practice this style of attribution with first hypothetical and then real life situations just as with the previous dimension. Also as with the previous dimensions they are not prescribed a stringent style of attribution to follow but rather encouraged to evaluate how the two styles allow for a more effective coping strategy in a given situation.

Week 3: Objective – The last dimension of pervasiveness as an attribution style is introduced to students. Students are made aware of the process of generalizations of the outcomes especially adverse outcomes as opposed to restricting it to the area of origin. The consequence of spill-over of unfavourable outcomes to unrelated areas is compared to restraining them. Students are encouraged to evaluate the compartmentalization of the effect of undesirable outcomes to area of origin compared to generalization. Functionality (a REBT technique) of compartmentalizing consequences are discussed. As with the

other dimensions, students are encouraged to discuss and evaluate their stands on the said dimension, instead of promoting a specific pattern. Students initially practice the current attribution style for hypothetical situations and eventually on real life situations.

The third component of the skill building program involves training students in the skill of growth mindset (Dweck 2007). The program is two pronged, students are enrolled in learning the concept (growth mindset) online by participating in a Stanford University research initiative called Brainology that trains students in cultivating the growth mindset. Students' progress in the online component was closely monitored by the researcher. Each of the three weeks in class reinforced the online learning of the student.

Week 1: Objective Brain basics: Students are introduced to basic anatomy and physiological working of the brain. In easy to comprehend literature consisting of imagery, analogies and metaphors, the concept of brain plasticity and with it its ability to improve with deliberate effort is focused on upon.

Week 2: Objective Brain building: This segment introduced students to the two mindset types namely growth and fixed mindset and the behaviours representative of them like being process, effort and mastery oriented rather than result, praise and ability oriented. Students were given case studies to identify the associated behaviours. Students then had to come up with different areas of life where these behaviours could be found and where the debate of, ability versus effort were applicable. They were encouraged to evaluate the two mindsets and choose where and when to apply either of the mindsets instead of recommending them the use of one over the other.

Week 3: Objective Brain Boosters: Having understood the 'plasticity of ability' and the awareness of identifying behaviours associative of the two mindsets. The last segment of the program focused on cultivating 'habits of mind' and practices that nurtured growth mindset. This segment also focused on usual barriers and pitfalls associated with cultivation of these new practices. Students were encouraged to individualize their plan

of action in one area where they would like to test out the practices and work in a ‘buddy-system’ to help keep tabs on each other’s practice.

The last three weeks of the program is focused on teaching students the concept of metacognitive awareness and training them in strategies that can be applied across pedagogies. Students are briefed about metacognitive awareness, as simply the process of watching what they are saying to themselves as they are involved in various tasks, as they have already been doing for the past few weeks with regard to other constructs like optimism, mindset. To begin they first learnt to relate feelings and actions to their thoughts. Next, choosing appropriate manageable thoughts, that lead to desirable actions. Following, which they were taught to, evaluate their thoughts for different dimensions of attributions and chose for helpful attributions. Students were next, made aware of how they thought about their abilities as being fixed or improving with effort and therefore realize that effort determines ability and not performance. Students were briefed just like watching their thoughts, evaluating and changing them as they chose was appropriate, helped them regulate their attitude towards academics and academic performance. Learning to watch their thoughts while studying and using this information to better strategize their efforts during studies could also improve their academic performance.

To accomplish the above, techniques as constructed by Fogarty (1994), has been used. The author categorizes the techniques into – planning, monitoring and evaluating. Four techniques have been chosen under each category (except the last category/week), based on ease of comprehension and malleability of the technique for easy adaptation by individual students. The metacognitive component of this training is the discussion (a result of metacognitive awareness) ensuing the use of the strategies with regard to the content (the cognitive component).

Week 1: Objective – After a brief introduction to metacognitive awareness, the first category as prescribed by Fogarty (1994), which is ‘planning’ is taught. The four techniques that have been chosen in this category are,

- a) Film footage. Primarily a visualization technique which can be used to remember information or used for goal setting as well. The technique is flexible to be adapted to different pedagogies and is only limited by the students' attention for detail and constructive imagination.
- b) Fat and skinny questions. Designated as a higher order cognitive task by the author. Students are taught to frame questions on the material they have learnt. These questions based on its complexity are identified as fat or skinny questions. More frequently they frame a fat question the more mastery they gain over their learnt material.
- c) A road map: A strategic planning tool, that does not, merely quantitatively divided the information needed to be learnt in terms of the time within which it needs to be learnt. But also qualitatively flags the information. For example the level of difficulty, the number of revisions required, a separate learning strategy to be used, memory aids that need to be incorporated, mock testing the material etal.
- d) Prime the pump: The graphic organizer technique of KWL is taught to students. Students are taught to connect to the prior knowledge to the current topic and enlist what they 'KNOW'. Next they are taught to be aware of what they would 'WANT' to know and finally deduce what they have 'LEARNT'. These steps provide for an instant feedback to their just concluded study time and make their aware and regulate their attention span.

The stress in these strategies is to optimize the 'quality' of study time and not stress on any ideal quantity of time.

Week 2: Objective – Having learnt how to plan their study time, the following week looks into training participants in monitoring and recovering skills. This skill allows students to know 'what they know' and 'what they don't know'.

- a) Alarm clock: Students are introduced to the rationale behind recovering strategies that as more often than not, topics are studied in chunks than in marathon sessions. To make such chunked studies effective one must continuously review what had happened till then as they do in tele serials. When reviewing material it is often observed that same segments of material are forgotten or found difficult to remember. These sections are then tagged to the concept of alarm clock. A cue (visual/auditory/logical) is devised to

facilitate in its recovery. The process of how the visual material was recovered is given as much importance to as the material being recovered.

b) Instant Replay: This technique is used for what is discerned by the student as the most confounding material to learn. The ‘mastery/process of learning’ and not only the content of such material is tape recorded (all participants had cell phones with a voice recording facility). Students were asked to narrate how they navigated their way through the material, the pit falls, the recovery strategies used, the other texts with which the current material was often mixed up with etc. These recordings are then replayed and used as a recovery strategy.

c) Transfer talk: Students are encouraged to find parallels in skills that were used across pedagogies. They are thrown ‘connect the dots’ questions like how the learning of biological systems has improved their understanding of electrical circuits in physics better or vice versa. Such bridging across pedagogies provides more cues for learning materials and students often ‘transfer’ skills used in pedagogy they are confident about onto not so confident material in a different pedagogy.

d) Recorded observation “The bottom line is....”: The most simplest and perhaps therefore the most ill used technique is to summarize the material just learnt. Students are taught to summate a recently learnt material using only key words or concepts into the restrictive space of a ‘post it’. These recorded summative becomes the review point for the entire section. The main challenge in this skill is the art of summarizing itself. The ability to prune and narrow down what needs to constitute the summary requires much practice.

Week 3: Objective – This component was executed in the format of peer learning. The component is designed to encourage a healthy habit of evaluation of learning, exercise openness to feedback through the means of obtaining a grade for the learnt material.

- a) Sow a seed: A single word pertaining to a topic is given and students are required to reconstruct the topic from the given word while substantiating the connections between them. The activity is conducted in pairs and the work done by one peer is reviewed by other in the pair.
- b) Catch me wrong: The content given for evaluation contains errors at differentiated levels (omission/commission/logical). Requires the errors to be spotted and corrected by the student, with supportive rationale for the same.

The next chapter titled 'Results' presents the results after the data analysis. The data has been analyzed using the following statistical tools, presented in accordance to the phases.

1. Phase I- Product mean correlation will be used to check for any significant relationship between the independent variables and the dependent variable.
2. Phase I – Product mean correlation to check for collinearity between the independent variables.
3. Phase I- Multiple regression to check whether the independent variables are predicting academic achievement.
4. Phase I – Logistic regression, to identify the predictors for high and low academic achievement.
5. Phase II – t test to evaluate the difference between pre- program and post program scores on the independent variables.
6. Phase II – ANACOVA to understand the relationship of intelligence to academic achievement

Sections 4.I to III, presents the results of Phase I data. Section 4.I & II uses descriptive statistics to understand the sample characteristics in terms of sample distribution across age, gender and college. While section 4.II presents the surface level analysis of, the data collected for the independent variables.

Section 4.III, presents the analysis of phase I data using inferential statistics. Subsection 4. A, uses Pearson product-moment correlation to test the hypotheses of Phase I. This allows for checking which of the proposed independent variables are significantly correlated to academic performance.

Subsection 4.III.B presents the result of using Multiple Regression to check for the proposed model strength, of the proposed independent variables functioning as predictor variables in estimating academic performance.

Subsection 4.III.C, uses the statistical tool of Logistic regression to determine, the independent variable/s most discriminating of academic performance at high/low levels of achievement.

Finally, subsection 4.III.D, presents the analysis of the data, using independent t test to differentiate between the high and low academic achievement groups and identify the Non-academic cognitive profile of the two groups.

Section IV, presents the phase II analysis of data using inferential statistics. Subsection 4.IV.A, uses t tests to verify phase II hypotheses 1-6. This is carried out at different levels between the experimental and control groups at pre and post skill building program. The next subsection 4.IV.B, uses Pearson product-moment correlation to test phase II hypothesis 7, that relates the independent variable of expectation with the dependent variable of academic achievement. Finally, subsection 4.IV.C, presents the result of using repeated measures to check if Academic achievement of the experimental group has significantly enhanced in the course of the year.