# Editorial

In this issue, varied themes as researched and explored by the contributors facilitate the readers to have a sight on various challenges and problems in India directly related to the education of different levels, and they will draw the attention of academicians, practitioners, and researchers related to education and teaching fraternity.

Shivraj Singh and Malvinder Ahuja in their study, which was conducted on 515 twelfth grade students representing CBSE, affiliated secondary schools of district Roopnagar Punjab. The study investigated effects of single variables (A. Self-Efficacy, B. Self-Regulation, and C. Satisfaction of students with school) on skill of decision-making. An Ex Post Facto design of the study led to an analysis of data through the statistical technique of 3x3x3 Anova substantiated by the t-test. The main effects of all three independent variables A, B, C were found to be significant at the .01 level of confidence, indicating a strong influence of each of these variables on the skill of decision-making.

In her study, Sunita Kathuria aimed to explore the usefulness of concept maps in the understanding of ideas in isolation and the use of mind maps in summarizing all the ideas as a whole on 30 students of IX grade for science education selected through purposive sampling technique. This was an experimental research with one sample, pre-post –test design. In her study she revealed that graphic organizers: the use of concept maps and mind maps were found to be effective pedagogical tools and were also useful in identifying learning gaps, build conceptual hierarchy and facilitate new learning onto the previous one, thus assists students to reach to the high levels of cognitive performance.

Atul Bamrara and Jagmohan Singh Kathait in their research attempted to highlight the design and development process of the training programmes run by DIET's to improve the learning level of elementary level teachers in various districts of Uttrakhand. The calculated sample for the study was $100^3$. A questionnaire has been developed using the various components of the ADDIE model viz. Analysis, Design, Development, Implementation, and Evaluation. The Statistical techniques used to analyze data were chi-square, Karl Pearson Coefficient of correlation. The study resulted that there is a strong correlation between the design and development of training programs with reference to teachers' qualification as well as experience. As the qualification of faculty members improve, the design and development process also gets improved.

Baljeet Singh and Shruti Kant Pandey in their study on 60 students studying in class VII in Government Senior Secondary Schools in Delhi were selected randomly for the data collection, and the present research studied factors associated with their achievement in Social Science subject-interest in studies, reading ability and critical thinking and concluded that academic achievement in the social subject, reading ability and critical thinking were significantly and positively correlated with each other.

Purpose of Anjali Gupta's study was to determine the vocational interest of 100 secondary level students (50 boys and 50 girls) reading in various schools of Meerut in relation to their gender who were selected by the simple random sampling procedure. The data were analyzed with the help of mean, SD, and T-test to study the vocational interests of secondary students. The result revealed that there existed differences in the vocational interest pattern of secondary school students in different vocational interest areas and exhibited that there is a significant difference in the vocational areas of secondary school students in relation to gender variation.

**Dr. Sangeeta Gupta**
Editor-in-chief
Head of Department,
Ram-Eesh Institute of Education,
Greater Noida
principal_rie@rameeshinstitutions.org

RESEARCH ARTICLE

JTER Volume 14, Issue 2, 2019 Print ISSN: 0974-8210 Online ISSN: 2454-1664

# Study of Decision-making Skill of +2 Students in Relation to their Self-Regulation, Self-Efficacy and Satisfaction with School

Shivraj Singh[1]*, Malvinder Ahuja[2]

[1]Lecturer Political Science, [2]Retired Professor and Head

[1]Department of Punjab School Education, Chandigarh, Panjab, India

[2]Dept of education, Panjab University, Chandigarh, Panjab, India

## Abstract

This study was conducted to investigate effects of single variables (A. self efficacy, B. self regulation and C. satisfaction of students with school) on skill of decision making of twelfth grade students and also their two order and three order interaction effects on decision making. Null hypotheses were framed for each effect. The sample comprised of 515 students chosen from representative CBSE affiliated secondary schools of district Roopnagar, Punjab. An ex post facto design of the study led to an analysis of data through a statistical technique of 3x3x3 ANOVA substantiated by t-test.

A brief summary of findings was as follows:

Main effects of all three independent variables A, B, C, were found to be significant at the .01 level of confidence indicating strong influence of each of these variables on skill of decision making. Out of the three two order interactions, only AxC was found to be significant at the .05 level of confidence and those of AXB and BXC were not found to be significant even at the .05 level of confidence. This indicated that AXC interacts to result into differences in means scores of decision making of various combination groups due to AXC only. The three order interaction of AXBXC was also found to be significant at the .05 level of confidence, which led to conclude that combination groups due to this interaction effect resulted in differences in decision making by twelfth graders.

**Keywords:** Decision Making, Satisfaction, Self efficacy, Self regulation.

*Journal of Teacher Education and Research* (2019). DOI: 10.36268/JTER/1424

## Introduction

Life skills are behaviors used appropriately and responsibly in the management of personal affairs. They are a set of human skills acquired via teaching or direct experience that are used to handle problems and questions commonly encountered in daily human life. The subject varies greatly depending on social norms and community expectations. Enumeration and categorization of various classifications of life skills are as under:-

- The WHO, 1997 categorizes the life skills into the three components;
- Cognitive-domain, emphasizing 1. Skill of Creative thinking, 2. Skill of Critical thinking
- Affective-domain; emphasising; 1. Skill of Self Awareness, 2.skill of Empathy
- Psychomotor Domain; 1. Skill of Interpersonal relationship and communication, 2. Skill of decision making and problem-solving, 3. Skill of Coping with emotion and coping with stress
- The Samaritans and Kelly support group (1999) has identified seven life skills by the 4h program as being essential for productive and healthy lives. These are;
  - Creative thinking
  - Decision making
  - Acquiring knowledge
  - Responsibility
  - Communication
  - Understanding self
  - Getting along with others

**Corresponding Author:** Shivraj Singh, Department of Punjab School Education, Chandigarh, Panjab, India, E-mail: shivdhillon83@yahoo.co.in

**How to cite his article:** Singh, S. and Ahuja, M. (2019). Study of Decision-making Skill of +2 Students in Relation to their Self-Regulation, Self-Efficacy and Satisfaction with School. Journal of Teacher Education and Research, 14(2): 3-16:

**Source of support:** Nil

**Conflict of interest:** None

In the present investigation Skill of decision making has been taken to be studied

### The Skill of decision Making

Decision making skill is that thinking which results in the choice among alternative courses of action (Taylor, 1965). Decision making is to opt for appropriate and suitable decision i.e., course, job, where to live and how to spend money, etc. from a number of choices. Developing self-responsibility and independence in the student is the main aim of the learning skill of decision-making. According to Myers Isabel Briggs (1962), a person's decision-making process depends to a significant degree on their cognitive style. The dimensions of cognition style are thinking and feeling, extroversion and introversion; Judgment and perception, and sensing and intuition. According to Toda (1979) a decision process consists of all the sub-processes pertaining to the selection of a course of action or a plan and to its execution. 'Satisficing', coined

by combining satisfactory and sufficient, is also the strategy for many small decisions in which the first satisfactory alternative is chosen rather than the best alternative. Maximax means 'maximize the maximums, ' which focuses on choosing the alternative based on their maximum possible pay off after evaluation.

### Characteristics of Decisions Making

- *Goal-oriented:* Decisions are made to achieve certain goals by bridging the gap between the present and desired position. The good decision helps to attain the desired goal.
- *Choice or selection:* decision making involves the most appropriate course of action among two or more alternatives.
- *Continuous process:* Decision-making exercise is a regular job of an individual.
- *Intellectual process:* decision making is an outcome of deliberations, reasoning, judgments, and evaluation. Intuition and experiences are also included in it.
- *Dynamic process:* Various techniques are used for decision making according to the nature of the problem.
- *Situational:* One may make a particular decision in one situation and opposite in another.

### Components of Decisions Making

- *Decision environment:* Environment is defined as the collection of information, alternative values, and preferences available for the decision to be taken. Both information and alternatives are constrained because the time and effort to gqaqqqqqwqaawaaAain information or identify alternatives are limited. The decisions must be made within this constrained environment.
- *Effects of quantity on decision making:* Selective use of information is required to make a good decision because overloaded information creates mental fatigue, which results in slower or poor quality decisions and delays which could impair the effectiveness of the decision.
- *Decision streams:* Most of the decision involves a choice from a group of pre-selected alternatives made available to us or previous decision that one individual has made which enables us to make future decisions and prevents other future decisions.

### Factors Influencing decision Making

Juliusson, Karlsson, and Garling (2005) indicated past decisions influence the decisions people make in the future because when something positive happens from a decision, people are more likely to decide similarly, given a similar situation. On the other way, people tend to avoid repeating past mistakes (Sagi, and Friedland, 2007). Although past experiences have an impact on the decision-making process and the decisions made but these decisions are not necessarily the best decisions. In addition to past experiences, several cognitive biases influence decisions making. Cognitive biases are thinking patterns based on observation and generalization that may lead to memory errors, inaccurate judgments, and faulty logic (Evans, Barston, and Pollard, 1983).

*The steps of the decision-making process are as follows:*

- Identify the problem
- Gather information about the problem and your options
- List your options
- Write down things.
- Enlist the things
- Compare

Decision making is a nonlinear, recursive process i. e. most decisions are made by moving back and forth between the choice of criteria and the identification of alternatives. Therefore, decision making is a reasoning process which can be rational or irrational and can be based on explicit assumptions.

## Self Regulation

Self-Regulation is the ultimate goal in learning by Bandura (1988). It is the conscious use of strategies for encoding-activity, organization, and elaboration without direction from others. Self-Regulation refers to the analysis of the causes of behavior. In other words, the behavior is self-determined and self-initiated, or it arises as a result of interpersonal/intrapersonal forces that include an element of pressure.

### Characteristics of the Self-regulated Learners

Self-regulated learners use cognitive and metacognitive strategies and are intrinsically motivated by Zimmerman (1994, 2002). Cognitive strategies are defined as the behaviors and thought in which students are engaged in while studying. Meta-cognitive processes involve learners' ability to plan, schedule, and evaluate their learning progress. Motivational processes indicate that learners are self-motivated and willing to take responsibility for their successes or failures. Behavior refers to the characteristics of the strategies that students utilize to optimize learning (Zimmerman and Martinez-Pons, 1986, 1988). Bulter and Winne (1995) proposed that self-regulation is a learning style for students, comprising of strong abilities like setting goals for developing knowledge and choosing balancing strategies against unwanted situations by determining goals, defined self-regulation as "the process whereby students activate and sustain cognitions, behaviors, and effect which are systematically oriented toward attainment of their goals." He proposed that self-regulated learning has a six-component model: content domain, cognitive strategies, cognitive regulatory strategies, metacognitive knowledge, and motivational belief, motivational strategy use, and motivational regulatory techniques (Bockaerts, 1997). Academic self-regulation has been studied in traditional classrooms as a means of understanding how successful students adapt their cognition, motivation, and behavior to improve learning. The central ideas underlying self-regulation are motivation and learning strategies that students utilize to achieve their learning goals.

## Self Efficacy

Self-efficacy is defined as a self-evaluation of one's competence to successfully execute a course of action necessary to reach desired outcomes (Bandura, 1977, 1982, 1986). According to Albert Bandura's social cognitive theory, self-efficacy is the perception or judgment of one's ability to perform a certain action successfully. Studies have shown that perceived self-efficacy is a significant determinant of performance that operates partially independent of underlying skills. In educational concerns, there are three different levels at which perceived self-efficacy operates as an important contributor to academic development. Students' beliefs in their efficacy to regulate their own learning and to master academic activities determine their aspirations, level of motivation. It is a multidimensional construct that varies according to the domain of demands (Zimmerman 2000), and therefore, it must be evaluated at a level that is specific to the outcome domain (Bandura, 1986 Pajares, 1996). Thus in academic settings, one should measure academic self-efficacy rather than generalized self-efficacy, where academic self-efficacy refers to students' confidence in their ability to carry out such academic tasks as preparing exams and writing

term papers. A large meta-analysis of studies of self-efficacy in academic environments concluded that the most specific academic self-efficacy indices had the strongest effect on academic outcomes, while the more generalized measures were less closely associated (Multon, Brown, and Lent, 1991). General self-efficacy measure was not found to be predictive of any college outcomes (Ferrari and Parker, 1992; Lindley and Borgen, 2002), while academic self-efficacy has been consistently shown to predict grades and persistence in college.

Bandura (1997) hypothesized that students from their self-efficacy by selecting and interpreting information from four primary sources, the most powerful of which is the result of their own previous performance or mastery experience. Students also build their self-efficacy belief through the vicarious experience of observing the actions of others. It is for this reason that models can play a significant role in the development of self-efficacy. The third source of self-efficacy information comes from the social persuasions that individuals receive from others. Students often depend on parents, teachers, and peers to provide evaluative feedback, judgments, and appraisal about their academic performance. Finally, self-efficacy beliefs are informed by emotional and physiological states such as arousal, anxiety, mood, and fatigue. Self-efficacy is task-specific and is not conceptualized as global personality characteristics. For example, an individual may have high self-efficacy at solving math problems but low self-efficacy at giving public speeches (Pajares 1996).

### Self-efficacy Beliefs can Influence People in Several Important Ways

The beliefs can affect the environment that people choose because most people prefer the environment in which they feel competent to avoid those in which they feel inadequate. Self-efficacy can also affect how individuals face failure and handle adversity. Academic self-efficacy refers to subjective convictions that one can successfully carry out given academic tasks at designated levels (Schunk, 1991). Task value is defined as an incentive to engage in academic activity, which represents a composite construct encompassing perceived importance, usefulness, and interest (Wigfield and Eccles, 1992). Perceptions of self-efficacy and task value often are correlated positively, and both have been proven effective predictors of a variety of academic outcomes (Multon, Brown, and Lent, 1991). Self-efficacy beliefs also are affected by attributions that students make for their success and failure. Attributions of success to stable factors such as high ability have the greatest impact on the increase in subsequent self-efficacy (Schunk, 1984; Schunk and Gunn, 1986).

## Student Satisfaction

The measurement of student satisfaction can be useful to secondary school students as well as the institution of their teaching, to help them to pinpoint their strengths and identify areas for improvement. Satisfaction ratings go beyond teaching assessments with a narrow focus, including broader aspects of the student learning experiences, to grasp the complexity of that learning experience. It is not enough to know the degree to which students are satisfied; it is important to understand the factors that contribute to student satisfaction.

### Teacher

Teachers who take the time to develop positive relationships with their students will see improvement in their students both academically, behaviorally, and emotionally Stipek (2006)

### Fellow Student

Peer acceptance and friendships are distinct constructs and contribute to youth development. Peer acceptance has been shown to be associated with greater feelings of belonging (Brown and Lohr, 1987) and fewer behavioral problems in youth (Coie, Terry, Lenox, Lochman, and Hyman, 1995)

### School Work

Students are a major stakeholder group in the school to work on the initiative; therefore, consulting with them about their perceptions about the impact of school to work program participation is an important aspect of school work evaluation.

### Student Activities

Supporters of high school sport programs argue that sport participation improves students achievement motivation (Casey, 1989; Parker and Johnson, 1981), improves students grades, keeps them in school, raises their educational aspirations (Melnick, Sabo, and Vanforsen, 1992) helps them appreciate health, exercise, and fitness, helps them learn about themselves and learn to handle adversity, and helps them experience teamwork and sportsmanship (Rasmussen, 2000).

### Student Discipline

Every effort is to be made to see that the child understands the reason for correction and the purpose of measures taken

### Decision making Opportunities

The relation between decision making opportunity in the classroom and student motivation behavior has been investigated extensively (Dechorms, 1968, 1976; Epstein, 1981; Richter and Tjosvold, 1980; Wang and Stiles, 1976). In-general, increased opportunity for decision making is associated with a more positive attitude toward self, teachers, and classrooms.

### School Buildings, Supplies, and Upkeeps

Loukas and Robinson (2004) found that the most significant aspects of school climate that influenced students' school conduct and depressive symptoms included cohesion, friction or competition amongst students, and overall satisfaction with students in the building. Mijanovich and Weitzman (2003) discovered that student's level of perceived school disorder had the most impact on their negative feelings of school safety.

### Communication

Students feel that communication channels in the schools are inadequate and sluggish. A study by Williams (1964) revealed that parents, students, and teachers look upon the administration as a friendly meeting place for all those participating in the school program, the nerve center of the school, the office should be adequately equipped with an intercom, bulletin boards and a conference room in which personal interaction can be facilitated. Thus, communication is a process crucial to the central idea of work. Communication can also be used to improve satisfaction by adjusting student's perceptions of issues.

## Significance of the Problem

Life skills are the skills that enable to succeed in the environment in which we live. Life skills are those competencies that help people

function well in the environment in which they live and improve the quality of life and general well being. The International Bureau of Education (IBE, 2006) derives its understanding from the UNESCO's Dalor report Learning: The treasure within (1996) are learning to know, learning to do, learning to be and learning to live together stated that basic education for all, both formal and Informal must be based on these four Pillars of education. These four pillars can only be achieved when there is the proper development of all the skills that are helpful to live with dignity. These skills are called life skills. These skills help to deal effectively with the demands and challenges of modern society. Today's children are facing numerous challenges i.e., different career choices, addictions, broken relationships, natural disasters, a highly competitive work spot, and more. Life skills-based education is being adopted the work over to help children, imbibe attitudes, behavioral patterns, and skills necessary to cope with the growing challenges. The need for life skills education is highlighted directly and indirectly in the convention of the child's right and a number of international recommendations.

This current scenario of the education system in India found that the development of life skills is an important part of personality development, which can be beneficial for all young adults. Life skills are the core competencies an individual possesses that enable them to cope with the difficulties in life. For this purpose, the investigator made a humble attempt to explore the effects of self-regulation, self-efficacy, and satisfaction of students with a school on the skill of decision Making. The researcher is keen to understand how self-regulation, self-efficacy, and satisfaction with school impact students learning of skill of decision Making.

### Delimitations of The Study

The present study was limited to the students studying in various schools located in the Roopnagar district of Punjab.

- The study was conducted on adolescents studying in class XII only.
- The study was limited to a sample of 515 twelfth grade students.
- The study was limited to the variable decision making skill of students as dependent variables and self-efficacy, self-regulation, and satisfaction of students with the school as independent variables.

### Objectives of the Study

- The present study was designed to attain the following objectives:
- To study the effect of low, average, and high self-efficacy in the acquisition of decision-making skills.
- To study the effect of low, average, and high self-regulation of students in the acquisition of decision-making skill.
- To study the effect of low, average, and high satisfaction of students with a school in the acquisition of decision-making skill.
- To study the interaction effect between self-efficacy and self-regulation in the acquisition of decision-making skill.
- To study the interaction effect between self-efficacy and satisfaction of students with the school in the acquisition of decision-making skills.
- To study the interaction effect between self-regulation and satisfaction of students in the acquisition of decision-making skills.
- To study the interaction effect among self-efficacy, self-regulation, and satisfaction of students with the school in the acquisition of decision-making skills.

### Hypotheses of the Study

*Ho 1:* Twelfth graders having high, average, and low self-efficacy will not be significantly different on scores of skill of decision making.

*Ho 2:* Twelfth graders having high, average and low self-regulation will not be significantly different on scores of the skill of decision making.

*Ho 3:* Twelfth graders having high, average, and low satisfaction of students with the school will not be significantly different on scores of the skill of decision making.

*Ho 4:* There will be no significant interaction effect of self-efficacy and self-regulation on scores of the skill of decision making for twelfth graders.

*Ho 5:* There will be no significant interaction effect of self-efficacy and satisfaction of students with school on scores of skill of decision making for twelfth graders.

*Ho 6:* There will be no significant interaction effect of self-regulation and satisfaction of students with school on scores of skill of decision making for twelfth graders.

*Ho 7:* There will be no significant interaction effect of self-efficacy, self-regulation and satisfaction of students with school on scores of skill of decision making for twelfth graders.

### Sample

The sample was comprised of 515 students chosen from representative CBSE affiliated secondary schools of district Roopnagar, Punjab. The survey questionnaire was given to all the 515 students in the above-mentioned schools. The classification of students was done on the basis of self-regulation (H, A, L) self-efficacy (H, A, L) and satisfaction of students with school (H, A, L) at the time of analyses.

### Tools Used

Following tools were used for the collection of data.

- Decision making in everyday life scale (Developed and standardized by Mincemoyer, Perkins and Munyua, 2001)
- Self-regulation scale (Developed and validated by Ahuja Malwinder and Suman, 2016).
- Self-efficacy scale (General self-efficacy scale (GSE) by Ralf Schwarzer and Matthias Jerusalem, 1993).
- Satisfaction/Dissatisfaction scale (Student satisfaction scale (FORM A) Developed and standardized by Neal Schmitt and Brain Loher, 1987).

## Analysis and Interpretation of Data

Ex post facto design was employed and 3x3x3 ANOVA was used to analyze data. Impact of three independent variables (self-efficacy, self-regulation and satisfaction of students with school) was studied on decision-making skill as dependent variable. Significant F-ratios were followed by t-tests.

### Descriptive Analysis

Descriptive statistics techniques like mean, standard deviation were used to describe the nature of data.

The results indicated that scores of skill of decision making for twelfth graders with high satisfaction of students with the school had yielded the most diversity. Therefore 3x3x3 ANOVA was used to analyses results. The sum of squares, mean sum of squares and F-ratios were computed for scores of skill of decision making. The main effects and interaction effects of various independent variables employing a 3×3×3 design were

**Table T. 1:** Table of number, means and standard deviation on skill of decision-making in relation to self-efficacy, self-regulation and satisfaction of students with school.

| *Variable* | *Group* | *Number* | *Mean* | *Standard deviation* |
|---|---|---|---|---|
| Self-Efficacy (SE) | High | 186 | 77.17 | 8.21 |
| | Average | 150 | 74.85 | 7.58 |
| | Low | 179 | 73.53 | 7.51 |
| Self-Regulation (SR) | High | 188 | 77.54 | 7.72 |
| | Average | 153 | 75.20 | 7.46 |
| | Low | 174 | 72.75 | 7.84 |
| Satisfaction of Students with School (SS) | High | 180 | 78.05 | 7.30 |
| | Average | 155 | 74.65 | 7.55 |
| | Low | 180 | 72.90 | 8.03 |

**Table T.2:** Sum of squares, Mean sum of squares and F-ratios for scores of skill of decision Making in relation to Self-Efficacy, Self-Regulation and Satisfaction of Students with the school.

| *Source of variation* | *Sum of squares (s.s)* | *Degree of freedom* | *Mean sum of squares* | *F-Value* |
|---|---|---|---|---|
| Main Effects | | | | |
| Self-Efficacy | 456.71 | 2 | 228.35 | 4.28** |
| Self-regulation | 1104.20 | 2 | 552.10 | 10.34** |
| Satisfaction of students with school | 1203.95 | 2 | 601.98 | 11.27** |
| Two Order Interaction | | | | |
| A×B | 269.08 | 4 | 67.27 | 1.26 |
| A×C | 509.44 | 4 | 127.36 | 2.39* |
| B×C | 280.46 | 4 | 70.12 | 1.31 |
| Three Order Interaction | | | | |
| A×B×C | 853.29 | 8 | 106.66 | 1.99* |
| Error: Within Variable | 26061.91 | 488 | 53.41 | |
| Total | 2946768.0 | 515 | | |

** Significant at 0.01 level of confidence
* Significant at 0.05 level of confidence

**Table T.3:** Table of Means, SD's and t-ratios for difference in scores of decision Making for High, average and low levels of Self-Efficacy

| *Self-efficacy* | *High level (A1)* | *Average level (A2)* | *Low level (A3)* |
|---|---|---|---|
| N | 186 | 150 | 179 |
| M | 77.17 | 74.85 | 73.53 |
| S.D. (σ) | 8.21 | 7.58 | 7.51 |
| High Level (A1) | | 2.66** | 4.42** |
| Average Level (A2) | | | 1.59 |
| Low Level (A3) | | | |

** Significant at 0.01 level of confidence

calculated. The summary of 3×3×3 design has been presented in the Table T.2.

## Main Effects

### Self-Efficacy (A)

Table T.2 shows that the F-ratio for the difference in the mean scores on the skill of decision making for twelfth graders with high, average, and low self-efficacy was found to be significant at the 0.01 level of confidence. It suggested that there was a significant difference between the mean scores on the skill of decision making for the twelfth grader of high, average, and low self-efficacy groups. The null hypothesis $H_0 1$ was rejected at the specified level. It may be inferred that the three groups of twelfth graders were different on the scores of skill of decision making. To ascertain the difference in groups, t-test was applied for various combination groups.

Following sub-hypotheses were tested through these t-ratios:

*Ho 1.1:* Twelfth graders having high (A1) and average (A2) self-efficacy will not be significantly different on the scores of skill of decision making.

*Ho 1.2:* Twelfth graders having high (A1) and low (A3) self-regulation will not be significantly different on the scores of skill of decision making.

*Ho 1.3:* Twelfth graders having average (A2) and low (A3) self-regulation will not be significantly different on the scores of skill of decision making.

Table T.3 shows that, the t-ratio for the difference in the mean scores on skill of decision making for twelfth graders with high (A1) and average (A2) self-efficacy and that for high (A1) and low (A3) self-efficacy were found to be significant at the 0.01 level of confidence. The null hypothesis $H_0$ *1.1* and *Ho 1.2* were therefore rejected at the specified level. A probe into the means led to infer that;

- The twelfth graders with high self-efficacy (M = 77.17) scored higher on skill of decision making than their counterparts with average self-efficacy (M = 74.85), and
- The twelfth graders with high self-efficacy (M = 77.17) achieved higher scores on decision-making than their counterparts with low self-efficacy (M = 73.53).

Table T.3 shows that the t-ratio for the difference in the mean scores of skill of decision making for twelfth graders with average (A2) and low (A3) self-efficacy was not found to be significant even at 0.05 level of confidence. The difference, if observed, may be ascribed to chance factors only. The null hypothesis $H_{0.}$ *1.3:* was not rejected at the specified level. It may be concluded that twelfth graders having average and low self-efficacy achieved equal mean scores on skill of decision making.

## Main Effect: Self-Regulation (B)

Table T.2 shows that the F-ratio for the difference in the mean scores on skill of decision making for twelfth graders with high, average and low self-regulation was found to be significant at the 0.01 level of confidence. It suggested that there was a significant difference between the means of scores on skill of decision making for twelfth grader of high, average and low self-regulation groups. The null hypothesis $HO_2$ was rejected at the specified level. T-test was applied for various combination groups, and corresponding t-ratios have been presented in the following table.

Following sub-hypotheses were tested through these t-ratios:

*Ho 2.1:* Twelfth graders having high (B1) and average (B2) self-regulation will not be significantly different on the scores of the skill of decision making.

*Ho 2.2:* Twelfth graders having high (B1) and low (B3) self-regulation will not be significantly different on the scores of the skill of decision making.

*Ho 2.3:* Twelfth graders having an average (B2) and low (B3) self-regulation will not be significantly different on the scores of skill of decision making.

Table T.4 shows that, the t-ratio for the difference in the mean scores on the skill of decision making for all the three combination groups like; 1 twelfth grader with high (B1) and average (B2) self-regulation and that for 2.the groups of twelfth graders with high (B1) and low (B3) self-regulation and 3. Twelfth graders with average (B2) and low (B3) self-regulation were found to be significant at the 0.01 level of confidence. This indicated that the mean scores of all these three combination groups were different. A probe into the means led to infer that

- The twelfth graders with high self-regulation (M = 77.54) achieved higher scores on decision-making than their counterparts with average self-regulation (M = 75.20) *Ho.2.1* rejected
- The twelfth graders with high self-regulation (M = 77.54) scored higher on the skill of decision making than their counterparts with low self-regulation (M = 72.75) *Ho.2.2* rejected
- The twelfth graders with average self-regulation (M = 75.20) was higher on scores of decision making than their counterparts with low self-regulation (M = 72.75) *Ho.2.3* rejected.

## Main Effect: Satisfaction of Students with School (C)

Table T.2 shows that, the F-ratio for the differences in the mean scores of skill of decision making for twelfth graders with high, average and low satisfaction of students with school was found to be significant at the 0.01 level of confidence. It suggested that there was significant difference between the mean scores of skill of decision making for twelfth grader of high, average and low satisfaction of students with school groups. The null hypothesis $H_o 3$ was rejected at the specified level. It may be inferred that the three groups of twelfth graders were different on the scores of skill of decision making. To ascertain which group of twelfth graders was significantly different from each other, t-test was applied for various combination groups and corresponding t-ratios have been presented in the following table.

Following sub-hypotheses were tested through these t-ratios:

*Ho 3.1:* Twelfth graders having high (C1) and average (C2) satisfaction of students with school will not be significantly different on the scores of skill of decision making.

*Ho 3.2:* Twelfth graders having high (C1) and low (C3) satisfaction of students with school will not be significantly different on the scores of skill of decision making.

**Table T.4:** Table of means, SD's and t-ratios for difference in scores of decision making for high, average and low levels of self-regulation

| *Self-regulation* | *High level (B1)* | *Average level (B2)* | *Low level (B3)* |
|---|---|---|---|
| N | 188 | 153 | 174 |
| M | 77.54 | 75.20 | 72.75 |
| S.D. (σ) | 7.72 | 7.46 | 7.84 |
| High Level (B1) | | 2.82** | 5.85** |
| Average Level (B2) | | | 2.88** |
| Low Level (B3) | | | |

** Significant at 0.01 level of confidence

**Table T.5:** Table of Means, SD's and t-ratios for difference in scores of decision making for high, average and low levels of satisfaction of students with school

| *Satisfaction of students with school* | *High level (C1)* | *Average level (C2)* | *Low level (C3)* |
|---|---|---|---|
| N | 180 | 155 | 180 |
| M | 78.05 | 74.65 | 72.90 |
| S.D. (σ) | 7.30 | 7.55 | 8.03 |
| High Level (C1) | | 4.18** | 6.37** |
| Average Level (C2) | | | 2.05* |
| Low Level (C3) | | | |

** Significant at 0.01 level of confidence

* Significant at 0.05 level of confidence

*Ho 3.3:* Twelfth graders having average (C2) and low (C3) satisfaction of students with school will not be significantly different on the scores of skill of decision making.

Table T.5 shows that, the t-ratio for the difference in the mean scores on skill of decision making for two combination groups like; 1 .twelfth graders with high (C1) and average (C2) satisfaction and that for 2.the groups of twelfth graders with high (C1) and low (C3) satisfaction were found to be significant at the 0.01 level of confidence, Whereas Twelfth graders with average (C2) and low (C3) satisfaction were found significantly different at the .005 level of confidence. This indicated that the mean scores of all these three combination groups were different. A probe into the means led to infer that;

- The twelfth graders with high satisfaction of students with school (M = 78.05) achieved higher on skill of decision making than their counterparts with average satisfaction of students with school (M = 74.65), $H_0$ *3.1* was rejected
- The twelfth graders with high satisfaction of students with school (M = 78.05) scored higher on skill of decision making than their counterparts with low satisfaction of students with school (M = 72.90) $H_0$ *3.2* was rejected
- The twelfth graders with average satisfaction of students with school (M = 74.65) achieved higher on scores of decision making than their counterparts with low satisfaction of students with school (M = 72.90) $H_0$ *3.3* was rejected

## Two Order Interaction Effect: Self-Efficacy × Self-Regulation (A×B)

Table T.2 shows that, the F-ratio for the difference in the mean scores on skill of decision making for twelfth graders due to interaction between self-efficacy and self-regulation was not found to be significant even at the 0.05 level of confidence. It suggested that the interaction effect of self-efficacy and self-regulation did not yield significantly different mean scores on skill of decision making for twelfth grader. The null hypothesis $H_0$ *4:* was not rejected at the specified level. It may be concluded that self-efficacy and self-regulation did not yield different mean scores on skill of decision making for twelfth graders.

## Two Order Interaction Effect: Self-Efficacy × Satisfaction of Students With School (A×C)

Table T.2 shows that, the F-ratio for the difference in the means of scores on skill of decision making for twelfth graders due to the interaction between self-efficacy and satisfaction of students with school was found to be significant at 0.05 level of confidence. It suggested that the interaction effect of self-efficacy and satisfaction of students with school yielded significantly different means on scores of skill of decision making for twelfth graders. The null hypothesis *Ho 5* was rejected at the specified level. To ascertain which combination groups of twelfth graders were significantly different from each other, t-test was applied for various combination groups and corresponding t-ratios have been presented in the table T.6. Following sub-hypotheses were tested through these t-ratios:

*Ho 5.1:* Twelfth graders having high SE, high SS (A1C1) and high SE, average SS (A1C2) will not be significantly different on the scores of skill of decision making.

*Ho 5.2:* Twelfth graders having high SE, average SS (A1C2) and high SE, low SS (A1C3) will not be significantly different on the scores of skill of decision making.

*Ho 5.3:* Twelfth graders having high SE, high SS (A1C1) and high SE, low SS (A1C3) will not be significantly different on the scores of skill of decision making.

*Ho 5.4:* Twelfth graders having average SE, high SS (A2C1) and average SE, average SS (A2C2) will not be significantly different on the scores of skill of decision making.

*Ho 5.5:* Twelfth graders having average SE, average SS (A2C2) and average SE, low SS (A2C3) will not be significantly different on the scores of skill of decision making.

*Ho 5.6:* Twelfth graders having average SE, high SS (A2C1) and average SE, low SS (A2C3) will not be significantly different on the scores of skill of decision making.

*Ho 5.7:* Twelfth graders having low SE, high SS (A3C1) and low SE, average SS (A3C2) will not be significantly different on the scores of skill of decision making.

*Ho 5.8:* Twelfth graders having low SE, high SS (A3C2) and low SE, low SS (A3C3) will not be significantly different on the scores of skill of decision making.

*Ho 5.9:* Twelfth graders having low SE, high SS (A3C1) and low SE, low SS (A3C3) will not be significantly different on the scores of skill of decision making.

*Ho 5.10:* Twelfth graders having high SE, high SS (A1C1) and average SE, high SS (A2C1) will not be significantly different on the scores of skill of decision making.

*Ho 5.11:* Twelfth graders having average SE, high SS (A2C1) and low SE, high SS (A3C1) will not be significantly different on the scores of skill of decision making.

**Table T.6:** Table of Means, SD's and t-ratios for difference in means on skill of decision making for various combination groups due to interaction of self-efficacy and satisfaction of students with school

| *Groups* | *A1C1* | *A1C2* | *A1C3* | *A2C1* | *A2C2* | *A2C3* | *A3C1* | *A3C2* | *A3C3* |
|---|---|---|---|---|---|---|---|---|---|
| N | 80 | 51 | 55 | 47 | 55 | 48 | 53 | 49 | 77 |
| M | 79.05 | 77.61 | 74.02 | 76.83 | 74.27 | 73.58 | 77.62 | 72.00 | 71.68 |
| S.D. (σ) | 7.45 | 7.45 | 9.11 | 7.80 | 6.92 | 7.84 | 6.51 | 7.37 | 7.22 |
| A1C1 | | 1.08 | 3.52** | 1.59 | 3.77** | 3.94** | 1.14 | 5.24** | 6.29** |
| A1C2 | | | 2.21** | .51 | 2.39** | 2.62** | .01 | 3.83** | 4.49** |
| A1C3 | | | | 1.59 | .17 | .26 | 2.36* | 1.23 | 1.65 |
| A2C1 | | | | | 1.75 | 2.02* | .55 | 3.12** | 3.74** |
| A2C2 | | | | | | .47 | 2.59** | 1.62 | 2.07* |
| A2C3 | | | | | | | 2.83** | 1.03 | 1.39 |
| A3C1 | | | | | | | | 4.09** | 4.80** |
| A3C2 | | | | | | | | | .24 |
| A3C3 | | | | | | | | | |

** Significant at 0.01 level of confidence

* Significant at 0.05 level of confidence

*Ho 5.12:* Twelfth graders having high SE, high SS (A1C1) and low SE, high SS (A3C1) will not be significantly different on the scores of skill of decision making.

*Ho 5.13:* Twelfth graders having high SE, average SS (A1C2) and average SE, average SS (A2C2) will not be significantly different on the scores of skill of decision making.

*Ho 5.14:* Twelfth graders having average SE, average SS (A2C2) and low SE, average SS (A3C2) will not be significantly different on the scores of skill of decision making.

*Ho 5.15:* Twelfth graders having high SE, average SS (A1C2) and low SE, average SS (A3C2) will not be significantly different on the scores of skill of decision making.

*Ho 5.16:* Twelfth graders having high SE, low SS (A1C3) and average SE, low SS (A2C3) will not be significantly different on the scores of skill of decision making.

*Ho 5.17:* Twelfth graders having average SE, low SS (A2C3) and low SE, low SS (A3C3) will not be significantly different on the scores of skill of decision making.

*Ho 5.18:* Twelfth graders having high SE, low SS (A1C3) and low SE, low SS (A3C3) will not be significantly different on the scores of skill of decision making.

As shown in table T.6, the t-ratios for the difference in the means of scores on skill of decision making for twelfth graders were found to be significant at the 0.01 level of confidence for the following combination group viz. (A1C2-A1C3, A1C1-A1C3, A3C1-A3C2, A3C1-A3C3, A1C2-A2C2 and A1C2-A3C2). This indicated that all these six combination groups were different in their mean scores beyond any chance factors. Therefore the corresponding hypotheses Ho5.2, Ho 5.3, Ho 5.7, Ho 5.9, Ho 5.13 and Ho 5.15 stand rejected at the specified level. An examination of their means led to following conclusions:

- High SE and Average SS (A1C2) achieved higher mean scores on skill of decision making as compared to their counterparts high SE and low SS (A1C3). *Ho 5.2* was rejected.
- High SE and high SS (A1C1) scored higher means on skill of decision making as compared to their counterparts high SE and low SS (A1C3). *Ho 5.3* rejected.
- Low SE and high SS (A3C1) achieved higher mean scores on skill of decision making as compared to their counterparts low SE and Average SS (A3C2). *Ho 5.7* rejected.
- Low SE and high SS (A3C1) scored higher mean scores on skill of decision making as compared to their counterparts low SE and low SS (A3C3). *Ho 5.9* rejected.
- High SE and Average SS (A1C2) scored higher mean scores on skill of decision making as compared to their counterparts Average SE and Average SS (A2C2). *Ho 5.13* rejected.
- High SE and Average SS (A1C2) achieved higher mean scores on skill of decision making as compared to their counterparts low SE and Average SS (A3C2). *Ho 5.15* rejected.
- Similarly in table T.6 the t-ratios for the differences in the means of scores on skill of decision making for the group A2C1-A2C3 were found to be significant at the 0.05 level of confidence. This indicated that these groups were different in their mean scores beyond any chance factors. The means of the two groups in the above mentioned combination groups led to the following conclusion:
- Average SE and low SS (A2C1) were higher on mean scores for skill of decision making as compared to their counterparts Average SE and low SS (A2C3). *Ho 5.6* rejected.
- However as shown in table T.6, the t-ratios for the difference in means on scores of skill of decision making for twelfth graders in the following combination groups A1C1-A1C2, A2C1-A2C2, A2C2-A2C3, A3C2-A3C3, A1C1-A2C1, A2C1-A3C1, A1C1-A3C1, A2C2-A3C2, A1C3-A2C3, A2C3-A3C3 and A1C3-A3C3 were not found to be significant even at the 0.05 level of confidence. The observed difference in means of these groups may be ascribed to chance factor only. Hence the corresponding null *Ho 5.1, Ho 5.4, Ho 5.5, Ho 5.8, Ho 5.10, Ho 5.11, Ho 5.12, Ho 5.14, Ho 5.16, Ho 5.17* and *Ho 5.18* were not rejected at the specified level. This led to the following conclusions.
- High SE, high SS (A1C1) and high SE, average SS (A1C2) of twelfth graders achieved equal mean scores on skill of decision Making. *Ho 5.1* was not rejected.
- Mean scores of Average SE, high SS (A2C1) and Average SE, average SS (A2C2) of twelfth graders on skill of decision making were not different. *Ho 5.4* was not rejected.
- Average SE, average SS (A2C2) and Average SE, low SS (A2C3) of twelfth graders achieved equal mean scores on skill of decision Making. *Ho 5.5* was not rejected.
- Low SE, average SS (A3C2) and low SE, low SS (A3C3) of twelfth graders achieved equal mean scores on skill of decision Making. *Ho 5.8* was not rejected.
- Mean scores of high SE, high SS (A1C1) and Average SE, high SS (A2C1) of twelfth graders on skill of decision making were not different. *Ho 5.10* was not rejected.
- Mean scores of Average SE, high SS (A2C1) and low SE, high SS (A3C1) of twelfth graders on skill of decision making were not different. *Ho 5.11* was not rejected.
- Mean scores of high SE, high SS (A1C1) and low SE, high SS (A3C1) of twelfth graders on skill of decision making were not different. *Ho 5.12* was not rejected.
- Mean scores of Average SE, average SS (A2C2) and low SE, average SS (A3C2) of twelfth graders on skill of decision making were not different. *Ho 5.14* was not rejected.
- Mean scores of high SE, low SS (A1C3) and Average SE, low SS (A2C3) of twelfth graders on skill of decision making were not different. *Ho 5.16* was not rejected.
- Mean scores of Average SE, low SS (A2C3) and low SE, low SS (A3C3) of twelfth graders on skill of decision making were not different. *Ho 5.17* was not rejected.
- Mean scores of high SE, low SS (A1C3) and low SE, low SS (A3C3) of twelfth graders on skill of decision making were not different. *Ho 5.18* was not rejected.

Only these primary combination groups were considered relevant for the present study therefore t-ratio for only these groups were interpreted.

## Two Order Interaction Effect: Self-Regulation × Satisfaction of Students with SchooL (B×C)

Table T.2 shows that, the F-ratio for the difference in the mean scores on skill of decision making for twelfth graders due to interaction between self-regulation and satisfaction of students with school was not found to be significant even at the 0.05 level of confidence. It suggested that the interaction effect of self-regulation and satisfaction of students with school did not yield significantly different mean scores on skill of decision making for twelfth grader. The difference if observed may be ascribed to chance factor only. The null hypothesis $H_o$ *6* was not rejected at the specified level. It may be concluded that self-regulation and satisfaction of students with school did not yield different mean scores on skill of decision making for twelfth graders.

### Three Order Interaction Effect: Self-Efficacy × Self-Regulation × Satisfaction of Students with School (A×B×C)

Table T.2 shows that, the F-ratio for the difference in the means of scores on skill of decision making for twelfth graders due to the interaction between self-efficacy, self-regulation and satisfaction of students with school was found to be significant at 0.05 level of confidence. It suggested that the interaction effect of self-efficacy, self-regulation and satisfaction of students with school yielded significantly different means on scores of skill of decision making for twelfth graders. The null hypothesis *Ho 7:* which stated that there will be no significant interaction effect of self-efficacy, self-regulation and satisfaction of students with school on the scores of skill of decision making for twelfth graders was rejected at the specified level. It may be inferred that the various combination groups of twelfth graders were different beyond any chance factors on their scores on skill of decision making. To ascertain, which group of twelfth graders was significantly different from each other, t-test was applied for various combination groups and corresponding t-ratios have been presented in the table T.7.

Following sub-hypotheses were tested through these t-ratios:

Ho 7.1: Twelfth graders having high SE, high SR, high SS (A1B1C1) and high SE, high SR, average SS (A1B1C2) will not be significantly different on the scores of skill of decision making.

Ho 7.2: Twelfth graders having high SE, high SR, high SS (A1B1C1) and high SE, high SR, low SS (A1B1C3) will not be significantly different on the scores of skill of decision making.

Ho 7.3: Twelfth graders having high SE, high SR, average SS (A1B1C2) and high SE, high SR, low SS (A1B1C3) will not be significantly different on the scores of skill of decision making.

Ho 7.4: Twelfth graders having high SE, average SR, high SS (A1B2C1) and high SE, average SR, average SS (A1B2C2) will not be significantly different on the scores of skill of decision making.

Ho 7.5: Twelfth graders having high SE, average SR, high SS (A1B2C1) and high SE, average SR, low SS (A1B2C3) will not be significantly different on the scores of skill of decision making.

Ho 7.6: Twelfth graders having high SE, average SR, average SS (A1B2C2) and high SE, average SR, low SS (A1B2C3) will not be significantly different on the scores of skill of decision Making.

Ho 7.7: Twelfth graders having high SE, low SR, high SS (A1B3C1) and high SE, low SR, average SS (A1B3C2) will not be significantly different on the scores of skill of decision making.

Ho 7.8: Twelfth graders having high SE, low SR, high SS (A1B3C1) and high SE, low SR, low SS (A1B3C3) will not be significantly different on the scores of skill of decision making.

Ho 7.9: Twelfth graders having high SE, low SR, average SS (A1B3C2) and high SE, low SR, low SS (A1B3C3) will not be significantly different on the scores of skill of decision making.

Ho 7.10: Twelfth graders having average SE, high SR, high SS (A2B1C1) and average SE, high SR, average SS (A2B1C2) will not be significantly different on the scores of skill of decision making.

Ho 7.11: Twelfth graders having average SE, high SR, high SS (A2B1C1) and average SE, high SR, low SS (A2B1C3) will not be significantly different on the scores of skill of decision making.

Ho 7.12: Twelfth graders having average SE, high SR, average SS (A2B1C2) and average SE, high SR, low SS (A2B1C3) will not be significantly different on the scores of skill of decision making.

Ho 7.13: Twelfth graders having average SE, average SR, high SS (A2B2C1) and average SE, average SR, average SS (A2B2C2) will not be significantly different on the scores of skill of decision making.

Ho 7.14: Twelfth graders having average SE, average SR, high SS (A2B2C1) and average SE, average SR, low SS (A2B2C3) will not be significantly different on the scores of skill of decision making.

Ho 7.15: Twelfth graders having average SE, average SR, average SS (A2B2C2) and average SE, average SR, low SS (A2B2C3) will not be significantly different on the scores of skill of decision making.

Ho 7.16: Twelfth graders having average SE, low SR, high SS (A2B3C1) and average SE, low SR, average SS (A2B3C2) will not be significantly different on the scores of skill of decision making.

Ho 7.17: Twelfth graders having average SE, low SR, high SS (A2B3C1) and average SE, low SR, low SS (A2B3C3) will not be significantly different on the scores of skill of decision making.

Ho7.18: Twelfth graders having average SE, low SR, average SS (A2B3C2) and average SE, low SR, low SS (A2B3C3) will not be significantly different on the scores of skill of decision making.

Ho 7.19: Twelfth graders having low SE, high SR, high SS (A3B1C1) and low SE, high SR, average SS (A3B1C2) will not be significantly different on the scores of skill of decision making.

Ho 7.20: Twelfth graders having low SE, high SR, high SS (A3B1C1) and low SE, high SR low SS (A3B1C3) will not be significantly different on the scores of skill of decision making.

Ho 7.21: Twelfth graders having low SE, high SR, average SS (A3B1C2) and low SE, high SR, low SS (A3B1C3) will not be significantly different on the scores of skill of decision making.

Ho 7.22: Twelfth graders having low SE, average SR, high SS (A3B2C1) and low SE, average SR, average SS (A3B2C2) will not be significantly different on the scores of skill of decision making.

Ho 7.23: Twelfth graders having low SE, average SR, high SS (A3B2C1) and low SE, average SR, low SS (A3B2C3) will not be significantly different on the scores of skill of decision making.

Ho 7.24: Twelfth graders having low SE, average SR, average SS (A3B2C2) and low SE, average SR, low SS (A3B2C3) will not be significantly different on the scores of skill of decision making.

Ho 7.25: Twelfth graders having low SE, low SR, high SS (A3B3C1) and low SE, low SR, average SS (A3B3C2) will not be significantly different on the scores of skill of decision making.

Ho 7.26: Twelfth graders having low SE, low SR, high SS (A3B3C1) and low SE, low SR, low SS (A3B3C3) will not be significantly different on the scores of skill of decision making.

Ho 7.27: Twelfth graders having low SE, low SR, average SS (A3B3C2) and low SE, low SR, low SS (A3B3C3) will not be significantly different on the scores of skill of decision making.

As shown in table T.7, the t-ratios for the difference in the means of scores on skill of decision making for twelfth graders were found to be significant at the 0.01 level of confidence for the following combination group viz. A1B1C1-A1B1C3, A1B1C2-A1B1C3, A1B2C1-A1B2C3, A2B1C1-A2B1C3, A3B1C1-A3B1C2, and A3B3C1-A3B3C3. This indicated that all these groups were different in their mean scores beyond any chance factors. Therefore the corresponding Ho 7.2, Ho 7.3, Ho 7.5, Ho 7.11, Ho 7.19, Ho 7.26, were rejected at the specified levels. An examination of means of the two groups in each of the above mentioned combination groups led to the following conclusions:

## With high Self Efficacy

- High SR, high SS (A1B1C1) achieved higher mean scores on skill of decision making as compared to their counterparts of high SR and low SS (A1B1C3). *Ho 7.2* rejected.
- High SR, average SS (A1B1C2) scored higher means on skill of decision making as compared to their counterparts of high SR and low SS (A1B1C3). *Ho 7.3* rejected.

## With Average Self Efficacy'

- Average SR, high SS (A1B2C1) was higher on mean scores for skill of decision making as compared to their counterparts of Average SR and low SS (A1B2C3). *Ho 7.5* rejected.
- High SR, high SS (A2B1C1) was higher on mean scores for skill of decision making as compared to their counterparts of high SR and low SS (A2B1C3). *Ho 7.11* rejected.

## With low Self Efficacy

- High SR, high SS (A3B1C1) was higher on mean scores for skill of decision making as compared to their counterparts low SE, high SR, average SS (A3B1C2). *Ho 7.19* rejected.
- Low SR, high SS (A3B3C1) was higher on mean scores for skill of decision making as compared to their counterparts low SR, low SS (A3B3C3). *Ho 7.26* rejected.

Similarly in table T.7, the t-ratios for the difference in the means of scores on skill of decision making for the group A2B1C1-A2B1C2, A3B1C1-A3B1C3 and A3B3C1-A3B3C2 were found to be significant at the 0.05 level of confidence. This indicated that all these groups were different in their mean scores beyond any chance factors. Therefore the corresponding Ho 7.10, Ho 7.20 and Ho 7.25 were rejected at the specified levels. An examination of means of the two groups in each of the above mentioned combination groups led to the following conclusions:

- Average SE, high SR, high SS (A2B1C1) achieved higher mean scores on skill of decision making as compared to their counterparts Average SE, high SR, average SS (A2B1C2). Therefore, *Ho 7.10* was rejected.
- Low SE, high SR, high SS (A3B1C1) scored higher means scores on skill of decision making as compared to their counterparts low SE, high SR and low SS (A3B1C3). Therefore, *Ho 7.20* was rejected.
- Low SE, low SR, high SS (A3B3C1) was higher on mean scores on skill of decision making as compared to their counterparts low SE, low SR, average SS (A3B3C2). Therefore, *Ho 7.25* was rejected

**Table T.7**: Table of t-ratios for difference in means on skill of decision making for various combination groups due to interaction of self-efficacy, self-regulation and satisfaction of students with school.

| | A1B1 C1 | A1B1 C2 | A1B1 C3 | A1B2 C1 | A1B2 C2 | A1B2 C3 | A1B3 C1 | A1B3 C2 | A1B3 C3 | A2B1 C1 | A2B1 C2 | A2B1 C3 | A2B2 C1 | A2B2 C2 | A2B2 C3 | A2B3 C1 | A2B3 C2 | A2B3 C3 | A3B1 C1 | A3B1 C2 | A3B1 C3 | A3B2 C1 | A3B2 C2 | A3B2 C3 | A3B3 C1 | A3B3 C2 | A3B3 C3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | 43 | 21 | 17 | 26 | 17 | 14 | 11 | 13 | 24 | 26 | 12 | 14 | 8 | 20 | 14 | 13 | 23 | 20 | 15 | 22 | 18 | 20 | 13 | 21 | 18 | 14 | 38 |
| M | 79.18 | 80.19 | 73.35 | 79.19 | 77.47 | 72.21 | 75.73 | 73.62 | 75.54 | 79.69 | 74.25 | 73.50 | 73.87 | 75.25 | 72.07 | 72.92 | 73.44 | 74.70 | 81.33 | 73.59 | 76.83 | 76.80 | 71.77 | 78.10 | 75.44 | 69.71 | 68.18 |
| S.D. (σ) | 7.25 | 6.38 | 10.63 | 6.42 | 7.69 | 7.85 | 9.98 | 7.44 | 8.76 | 6.72 | 7.59 | 8.39 | 10.53 | 7.95 | 6.30 | 5.88 | 5.71 | 8.59 | 4.59 | 6.32 | 6.83 | 6.26 | 9.00 | 5.80 | 7.11 | 7.16 | 6.83 |
| A1B1C1 | | .203 | 2.7** | .36 | 1.11 | 3.34** | 1.54 | 2.69** | 2.15* | .07 | 2.33* | 2.72** | 1.98 | 2.26* | 3.58** | 3.13** | 3.65** | 2.46** | .76 | 3.41** | 1.49 | 1.60 | 3.31** | 3.59** | 2.16* | 4.54** | 7.41** |
| A1B1C2 | | | 2.46** | .53 | 1.19 | 3.30** | 1.54 | 2.74** | 2.01 | .26 | 2.40* | 2.68** | 1.98 | 2.19* | 3.70** | 3.32** | 3.71** | 2.33* | .59 | 3.41** | 1.59 | 1.72 | 3.19** | 3.85** | 2.19* | 4.53** | 6.62** |
| A1B1C3 | | | | 2.25* | 1.29 | .33 | .59 | .08 | .72 | 2.40* | .25 | .04 | .12 | .62 | .39 | .13 | .03 | .43 | 2.69** | .09 | 1.16 | 1.22 | .43 | .09 | .69 | 1.89 | 2.17* |
| A1B2C1 | | | | | .79 | 3.03** | 1.27 | 2.43* | 1.69 | -0.27 | 2.08* | 2.40* | 1.75 | 1.86 | 3.37** | 2.95** | 3.29** | 2.03* | 1.13 | 3.03** | 1.17 | 1.27 | 2.97** | 3.37** | 1.82 | 4.28** | 6.49** |
| A1B2C2 | | | | | | 1.88 | .52 | 1.38 | .73 | 1.00 | 1.12 | 1.37 | .97 | .86 | 2.11* | 1.77 | 1.91 | 1.03 | 1.69 | 1.73 | .26 | .29 | 1.87 | 1.94 | .81 | 2.88** | 4.48** |
| A1B2C3 | | | | | | | .99 | .48 | 1.17 | 3.17** | .67 | .42 | .42 | 1.10 | .85 | .26 | .55 | .86 | 3.85** | .58 | 1.78 | 1.89 | .14 | .65 | 1.22 | .88 | 1.81 |
| A1B3C1 | | | | | | | | 0.58 | .056 | 1.42 | .40 | .61 | .39 | .15 | 1.12 | .86 | .86 | .30 | 1.93 | .75 | .36 | .37 | 1.02 | .84 | .09 | 1.76 | 2.89** |
| A1B3C2 | | | | | | | | | -0.98 | 2.57** | .21 | .04 | .07 | .59 | .58 | .26 | .08 | .37 | -3.43** | -0.17 | -1.40 | -1.46 | 0.43 | -0.17 | -0.85 | 1.22 | 2.12* |
| A1B3C3 | | | | | | | | | | 1.89 | .44 | .70 | .44 | .32 | 1.29 | .96 | .97 | .52 | 2.36* | .86 | .52 | .54 | 1.24 | .92 | .04 | 2.11* | 3.70** |
| A2B1C1 | | | | | | | | | | | 2.23* | 2.55** | 1.87 | 2.05* | 3.49** | 3.09** | 3.49** | 2.21* | .84 | 3.22** | 1.38 | 1.49 | 3.09** | 3.55** | 2.01* | 4.38** | 6.67** |
| A2B1C2 | | | | | | | | | | | | .24 | .09 | .35 | .80 | .49 | .36 | .15 | 2.99** | .27 | .97 | 1.03 | .74 | .32 | .44 | 1.57 | 2.81** |
| A2B1C3 | | | | | | | | | | | | | .09 | .62 | .51 | .21 | .03 | .41 | 3.15** | .84 | 1.24 | 1.32 | .52 | .03 | .71 | 1.26 | 2.34 |
| A2B2C1 | | | | | | | | | | | | | | .38 | .51 | .27 | .15 | .22 | 2.38* | .09 | .86 | .91 | .49 | .11 | .45 | 1.11 | 1.94 |
| A2B2C2 | | | | | | | | | | | | | | | 1.25 | .90 | .87 | .21 | 2.84** | .75 | .66 | .69 | 1.17 | .83 | .08 | 2.08* | 3.54** |
| A2B2C3 | | | | | | | | | | | | | | | | .36 | .68 | .97 | 4.54** | .70 | 2.02 | 2.16* | .10 | .81 | 1.38 | .92 | 1.86 |
| A2B3C1 | | | | | | | | | | | | | | | | | .26 | .65 | 4.25** | .31 | 1.67 | 1.78 | .39 | .36 | 1.05 | 1.27 | 2.23* |
| A2B3C2 | | | | | | | | | | | | | | | | | | .58 | 4.49** | .09 | 1.74 | 1.84 | .68 | .09 | 1.00 | 1.75 | 3.09** |
| A2B3C3 | | | | | | | | | | | | | | | | | | | 2.71** | .48 | .84 | .98 | .94 | .53 | .29 | 1.78 | 3.16** |
| A3B1C1 | | | | | | | | | | | | | | | | | | | | 4.06** | 2.17* | 2.36* | 3.62** | 4.98** | 2.76** | 5.24** | 6.95** |
| A3B1C2 | | | | | | | | | | | | | | | | | | | | | 1.50 | 1.65 | .70 | .01 | .87 | 1.70 | 3.04** |
| A3B1C3 | | | | | | | | | | | | | | | | | | | | | | .02 | 1.78 | 1.77 | .59 | 2.96** | 4.43** |
| A3B2C1 | | | | | | | | | | | | | | | | | | | | | | | 1.82 | 1.89 | .63 | 3.06** | 4.69** |
| A3B2C2 | | | | | | | | | | | | | | | | | | | | | | | | .77 | 1.27 | .66 | 1.50 |
| A3B2C3 | | | | | | | | | | | | | | | | | | | | | | | | | .99 | 1.94 | 3.23** |
| A3B3C1 | | | | | | | | | | | | | | | | | | | | | | | | | | 4.25** | 5.67** |
| A3 B3 C2 | | | | | | | | | | | | | | | | | | | | | | | | | | | .71 |
| A3B3C3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

** Significant at 0.01 level of confidence

* Significant at 0.05 level of confidence

As shown in Table T.7, the t-ratios for the difference in means on scores of skill of decision making for twelfth graders in the following combination groups A1B1C1-A1B1C2, A1B2C1-A1B2C2, A1B2C2-A1B2C3, A1B3C1-A1B3C2, A1B3C1-A1B3C3, A1B3C2-A1B3C3, A2B1C2-A2B1C3, A2B2C1-A2B2C2, A2B2C1-A2B2C3, A2B2C2-A2B2C3, A2B3C1-A2B3C2, A2B3C1-A2B3C3, A2B3C2-A2B3C3, A3B1C2-A3B1C3, A3B2C1-A3B2C2, A3B2C1-A3B2C3, A3B2C2-A3B2C3, and A3B3C2-A3B3C3 were not found to be significant even at the 0.05 level of confidence. The observed difference in means of these groups may be ascribed to chance factor only. Hence the corresponding null hypotheses Ho 7.1, Ho 7.4, Ho 7.6, Ho 7.7, Ho 7.8, Ho 7.9, Ho 7.12, Ho 7.13, Ho 7.14, Ho 7.15, Ho 7.16, Ho 7.17, Ho 7.18, Ho 7.21, Ho 7.22, Ho 7.23, Ho 7.24, and Ho 7.27, were not rejected at the specified level. An examination of means on skill of decision making of each of these combination groups led to the following conclusions.

- High SE, high SR, high SS (A1B1C1) and high SE, high SR, average SS (A1B1C2) of twelfth graders achieved equal mean scores on skill of hecision making. Therefore, *Ho 7.1* was not rejected.
- High SE, average SR, high SS (A1B2C1) and high SE, average SR, average SS (A1B2C2) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.4* was not rejected.
- High SE, average SR, average SS (A1B2C2) and high SE, average SR, low SS (A1B2C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.6* was not rejected.
- High SE, low SR, high SS (A1B3C1) and high SE, low SR, average SS (A1B3C2) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.7* was not rejected.
- High SE, low SR, high SS (A1B3C1) and high SE, low SR, low SS (A1B3C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.8* was not rejected.
- High SE, low SR, average SS (A1B3C2) and high SE, low SR, low SS (A1B3C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.9* was not rejected.
- Average SE, high SR, average SS (A2B1C2) and average SE, high SR, low SS (A2B1C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.12* was not rejected.
- Average SE, average SR, high SS (A2B2C1) and average SE, average SR, average SS (A2B2C2) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.13* was not rejected.
- Average SE, average SR, high SS (A2B2C1) and average SE, average SR, low SS (A2B2C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.14* was not rejected.
- Average SE, average SR, average SS (A2B2C2) and average SE, average SR, low SS (A2B2C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.15* was not rejected.
- Average SE, low SR, high SS (A2B3C1) and average SE, low SR, average SS (A2B3C2) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.16* was not rejected.
- Average SE, low SR, high SS (A2B3C1) and average SE, low SR, low SS (A2B3C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.17* was not rejected.
- Average SE, low SR, average SS (A2B3C2) and average SE, low SR, low SS (A2B3C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.18* was not rejected.
- Low SE, high SR, average SS (A3B1C2) and low SE, high SR, low SS (A3B1C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.21* was not rejected.
- Low SE, average SR, high SS (A3B2C1) and low SE, average SR, average SS (A3B2C2) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, *Ho 7.22* was not rejected.
- Low SE, average SR, high SS (A3B2C1) and low SE, average SR, low SS (A3B2C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, Ho 7.23 was not rejected.
- Low SE, average SR, average SS (A3B2C2) and low SE, average SR, low SS (A3B2C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, Ho 7.24 was not rejected.
- Low SE, low SR, average SS (A3B3C2) and low SE, low SR, low SS (A3B3C3) of twelfth graders achieved equal mean scores on skill of decision making. Therefore, Ho 7.27 was not rejected.

Only these primary combination groups were considered relevant for the present study therefore t-ratio for only these groups were interpreted.

## Major Findings

In the light of the interpretation of the results of the present study, the following conclusions were drawn:

### Conclusion Based on 3×3×3 Anova on Scores of Skill of decision making in Relation to Self-Efficacy, Self-Regulation and Satisfaction of Students with School.

- The mean scores of decision making for groups of self-efficacy (high, average and low) were different.
  - The mean scores of high Self-efficacy group were higher than the Average Self-efficacy group.
  - The mean scores of high Self-efficacy group were higher than the low Self-efficacy group.
  - The mean scores of decision making for two Self-efficacy groups (Average and Low) were equal.
- The mean scores of decision making for groups of Self-regulation (High, average and Low) were different.
  - The mean scores of high Self-regulation group were higher than the Average Self-regulation group.
  - The mean scores of high Self-regulation group were higher than the low Self-regulation group.
  - The mean scores of Average Self-regulation group were higher than the low self-regulation group.
- The mean scores of decision making for groups of satisfaction of students with school (high, average and low) were different.
  - The mean scores of high satisfaction of students with school group were higher than the average satisfaction of students with school group.
  - The mean scores of high satisfaction of students with school group were higher than the low satisfaction of students with school group.
  - The mean scores of average satisfaction of students with school group were higher than the low satisfaction of students with school group.
- The mean scores of decision making for twelfth graders due to interaction between Self-efficacy and Self-regulation were not different. The two variables may be treated as independent of each other.
- The mean scores of decision making for twelfth graders due to interaction between Self-efficacy and Satisfaction of students with school were different.

- High SE, high SS (A1C1) and high SE, average SS (A1C2) of twelfth graders achieved equal mean scores on skill of decision making.
- High SE and average SS (A1C2) achieved higher mean scores on skill of decision making as compared to their counterparts high SE and low SS (A1C3).
- High SE and high SS (A1C1) scored higher means on skill of decision making as compared to their counterparts high SE and low SS (A1C3).
- Mean scores of average SE, high SS (A2C1) and average SE, average SS (A2C2) of twelfth graders on skill of decision making were not different.
- Average SE, average SS (A2C2) and average SE, low SS (A2C3) of twelfth graders achieved equal mean scores on skill of decision making.
- Average SE and low SS (A2C1) were higher on mean scores for skill of decision making as compared to their counterparts average SE and low SS (A2C3).
- Low SE and high SS (A3C1) achieved higher mean scores on skill of decision making as compared to their counterparts low SE and average SS (A3C2).
- Low SE, average SS (A3C2) and low SE, low SS (A3C3) of twelfth graders achieved equal mean scores on skill of decision making.
- Low SE and high SS (A3C1) scored higher mean scores on skill of decision making as compared to their counterparts low SE and low SS (A3C3).
- Mean scores of high SE, high SS (A1C1) and average SE, high SS (A2C1) of twelfth graders on skill of decision making were not different.
- Mean scores of average SE, high SS (A2C1) and low SE, high SS (A3C1) of twelfth graders on skill of decision making were not different.
- Mean scores of high SE, high SS (A1C1) and low SE, high SS (A3C1) of twelfth graders on skill of decision making were not different.
- High SE and average SS (A1C2) scored higher mean scores on skill of decision making as compared to their counterparts average SE and average SS (A2C2).
- Mean scores of average SE, average SS (A2C2) and low SE, average SS (A3C2) of twelfth graders on skill of decision making were not different.
- High SE and average SS (A1C2) achieved higher mean scores on skill of decision making as compared to their counterparts low SE and average SS (A3C2).
- Mean scores of high SE, low SS (A1C3) and average SE, low SS (A2C3) of twelfth graders on skill of decision making were not different.
- Mean scores of average SE, low SS (A2C3) and low SE, low SS (A3C3) of twelfth graders on skill of decision making were not different.
- Mean scores of high SE, low SS (A1C3) and low SE, low SS (A3C3) of twelfth graders on skill of decision making were not different.

- The mean scores of decision making for twelfth graders due to interaction between self-regulation and satisfaction of students with school were not different. The two variables may be treated as independent of each other.
- The mean scores of decision making for twelfth graders due to interaction between self-efficacy, self-regulation and satisfaction of students with school were different.
  - High SE, high SR, high SS (A1B1C1) and high SE, high SR, average SS (A1B1C2) of twelfth graders achieved equal mean scores on skill of decision making.
  - High SE, high SR, high SS (A1B1C1) achieved higher mean scores on skill of decision making as compared to their counterparts high SE, high SR and low SS (A1B1C3).
  - High SE, high SR, average SS (A1B1C2) scored higher means on skill of decision making as compared to their counterparts high SE, high SR and low SS (A1B1C3).
  - High SE, average SR, high SS (A1B2C1) and high SE, average SR, average SS (A1B2C2) of twelfth graders achieved equal mean scores on skill of decision making.
  - High SE, average SR, high SS (A1B2C1) was higher on mean scores for skill of decision making as compared to their counterparts high SE, average SR and low SS (A1B2C3).
  - High SE, average SR, average SS (A1B2C2) and high SE, average SR, low SS (A1B2C3) of twelfth graders achieved equal mean scores on skill of decision making.
  - High SE, low SR, high SS (A1B3C1) and high SE, low SR, average SS (A1B3C2) of twelfth graders achieved equal mean scores on skill of decision making.
  - High SE, low SR, high SS (A1B3C1) and high SE, low SR, low SS (A1B3C3) of twelfth graders achieved equal mean scores on skill of decision making.
  - High SE, low SR, average SS (A1B3C2) and high SE, low SR, low SS (A1B3C3) of twelfth graders achieved equal mean scores on skill of decision making.
  - Average SE, high SR, high SS (A2B1C1) achieved higher mean scores on skill of decision making as compared to their counterparts Average SE, high SR, average SS (A2B1C2).
  - Average SE, high SR, high SS (A2B1C1) was higher on mean scores for skill of decision making as compared to their counterparts Average SE, high SR and low SS (A2B1C3).
  - Average SE, high SR, average SS (A2B1C2) and Average SE, high SR, low SS (A2B1C3) of twelfth graders achieved equal mean scores on skill of decision making.
  - Average SE, average SR, high SS (A2B2C1) and Average SE, average SR, average SS (A2B2C2) of twelfth graders achieved equal mean scores on skill of decision making.
  - Average SE, average SR, high SS (A2B2C1) and Average SE, average SR, low SS (A2B2C3) of twelfth graders achieved equal mean scores on skill of decision making.
  - Average SE, average SR, average SS (A2B2C2) and Average SE, average SR, low SS (A2B2C3) of twelfth graders achieved equal mean scores on skill of decision making.
  - Average SE, low SR, high SS (A2B3C1) and Average SE, low SR, average SS (A2B3C2) of twelfth graders achieved equal mean scores on skill of decision making.
  - Average SE, low SR, high SS (A2B3C1) and Average SE, low SR, low SS (A2B3C3) of twelfth graders achieved equal mean scores on skill of decision making.
  - Average SE, low SR, average SS (A2B3C2) and Average SE, low SR, low SS (A2B3C3) of twelfth graders achieved equal mean scores on skill of decision making.
  - Low SE, high SR, high SS (A3B1C1) was higher on mean scores for skill of decision making as compared to their counterparts low SE, high SR, average SS (A3B1C2).
  - Low SE, high SR, high SS (A3B1C1) scored higher means scores on skill of decision making as compared to their counterparts low SE, high SR and low SS (A3B1C3).

- Low SE, high SR, average SS (A3B1C2) and low SE, high SR, low SS (A3B1C3) of twelfth graders achieved equal mean scores on skill of decision making.
- Low SE, average SR, high SS (A3B2C1) and low SE, average SR, average SS (A3B2C2) of twelfth graders achieved equal mean scores on skill of decision making.
- Low SE, average SR, high SS (A3B2C1) and low SE, average SR, low SS (A3B2C3) of twelfth graders achieved equal mean scores on skill of decision making.
- Low SE, average SR, average SS (A3B2C2) and low SE, average SR, low SS (A3B2C3) of twelfth graders achieved equal mean scores on skill of decision making.
- Low SE, low SR, high SS (A3B3C1) was higher on mean scores on skill of decision making as compared to their counterparts low SE, low SR, average SS (A3B3C2).
- Low SE, low SR, high SS (A3B3C1) was higher on mean scores for skill of decision making as compared to their counterparts low SE, low SR, low SS (A3B3C3).
- Low SE, low SR, average SS (A3B3C2) and low SE, low SR, low SS (A3B3C3) of twelfth graders achieved equal mean scores on skill of decision making.

Only these primary combination groups were considered relevant for the present study therefore t-ratio for only these groups were interpreted.

## Discussion of Results

The results of the present investigation revealed that students with high, average or low self-efficacy did not achieve equal means on skill of decision making. The present study provides sufficient evidence to reject the hypothesis *Ho. 1* which states that twelfth graders having high, average and low self-efficacy will not be significantly different on scores of skill of decision making. It can be concluded that self-efficacy is contributory for the improvement of skill of decision making.

The present study provides sufficient evidence to reject the hypothesis *Ho.2*. This states that twelfth graders having high, average and low self-regulation will not be significantly different on scores of skill of decision making. It can be concluded that self-regulation is contributory for the improvement of skill of decision making. This skill is related to planning and managing strategies which is the core component of self regulation skill. Most of the studies have suggested that self- regulation of the students must be developed to cope up with difficult situations of life.

The present study provides sufficient evidence to reject the hypothesis *Ho. 3* which states that twelfth graders having high, average and low satisfaction of students with school will not significantly different on scores of skill of decision making. It can be concluded that satisfaction of students with school is contributory for the improvement of skill of decision making.

In present study the results did not support that interaction effect of self-efficacy and self-regulation has significant effect on skill of decision making. It was found that students with interaction effect of self-efficacy and self-regulation did not perform different on these skills. It can be concluded that interaction effect of self-efficacy and self-regulation is not found contributory for the improvement of skill of decision making.

The data of the present study revealed that self-efficacy and satisfaction of students with school did not operate independent of each other for skill of decision making. This means that these life skills seem to have been affected by the interaction of these two variables under study.

The results of the present study revealed that the self-regulation and satisfaction of students operated independent of each other for skill of decision making. In the course of present study, the interaction *Ho. 6* were not rejected. This means that skill of decision making did not seem to be affected by the interaction of the two variables under study. It can be concluded that interaction effect of self-regulation and satisfaction of students with school is not found contributory for the improvement of skill of decision making.

The results of the present study revealed that the self-efficacy, self-regulation and satisfaction of students with school did not operate independent of each other for skill of decision making. This means that skill of decision making seem to have been affected by the interaction of all the three variables under study. As it was found out that interaction of self-efficacy, self-regulation and satisfaction of students with school is proved to be beneficial for the improvement skill of decision making and related activities which are needed to live successful and smooth life and to make accurate decision in the life.

## References


Ahuja, M., & Suman (2016). Effect of online Mastery Learning on life skills in relation to Self-regulation and Self-esteem. UnPublished Ph. D. thesis, Punjab University, Chandigarh.

Bandura, A (1997). In the science of Personality, by Pervin, L.A, 1996.

Bandura, A. (1988). Self-regulation of motivation and action through goal systems. In V. Hamilton, G. H. Bower, & N. H. Frijda (Eds.), *cognitive perspectives on emotion and motivation.* pp.37-61. Dordrecht,Netherlands: KluwerAcademic.

Bandura, A. (1977). Self-Efficacy toward a unifying theory of behavioral change. *Psychology Review 84(2),* p191-215.

Bandura, A. (1982). Self-efficacy mechanisms in human agency. *American Psychologist, 37,* 122-147.

Bandura, A. (1986). Social Foundations of Thought and Action: A social Cognitive Theory, Prentise-Hall.

Boekaerts, M. (1997). Self-regulated learning: A new concept embraced by researchers, policy makers, educators, teachers, and students. Learning and Instruction, 7(2), 16-186.

Brown, B. B., & Lohr, M. J. (1987). Peer-group affiliation and adolescent self-esteem: An integration of ego-identity and symbolic-interaction theories. *Journal of Personality and Social Psychology, 52,* 47–55.

Butler, D., & Winne, P. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Researches,* 65, 245-281.

Casey, A. C. (1989). *Academic intramurals: The thrill of victory--The excitement of competition.* (ERIC Document Reproduction Service No. ED322574).

Coie, J., Terry, R., Lenox, K., Lochman, J., & Hyman, C. (1995). Childhood peer rejection and aggression as predictors of stable patterns of adolescent disorder. *Development and Psychopathology, 7,* 697–713.

Decharms, R. (1968). Personla Causation. New York: Academic press.

Decharms, R. (1976). Enhancing motivation. New York: Irvington publishers

Delors, J. (1996). Learning: The Treasure Within. Report of the UNESCO of the International Commission on Education for the Twenty First Century, UNESCO, Paris, p.141-142.

Epstein, J. L. (1981). The quality of school life. Lexington, Mass: D.C. Heath. Fraser, B. (1981). Validity and use of individualized classroom environment questionnaire. Paper presented at the Annual Meeting of Americal Educational Research Association, Los Angeles.

Evans, J. S. T., Barston. J. L., & pollard. P. (1983). On the conflict between Logic and Belief in syllogistic reasoning. *Memory and cognition, 11(3),* 295-306.FICCI (2003)www.ficci.com.

Ferrari, J. R., & Parker, J. T. (1992). High school achievement, self-efficacy, and locus of control as predictors of freshman academic performance. *Psychological Reports 71 (2):* 515-518.

Julinsson E. R., karlson, N., & Garling, T. (2005). Weighing the past and the future in decision making. *European Journal of Cognitive Psychology,17 (4),* 561-575.

Lindley, L. D., & Borgen, F. H. (2002). Generalized self-efficacy, Hallend theme self-efficacy and academic performance. *Journal of career assessment 10 (3):* 301-314.

Loukas, A. & Robinson S. (2004). Examining the Moderating Role of Perceived School Climate in Early Adolescent Adjustment. *Journal of Research on Adolescents, 14*, 209-233.

Melnick, M. J., Sabo, D. F., & Vanfossen, B. (1992). Educational effects of interscholastic athletic participation on African-American and Hispanic youth. *Adolescence, 27(106),* 295-308.

Mijanovich, T., & Weitzman, B. C. (2003). Which "broken windows" matter? School, neighborhood, and family characteristics associated with youths' feelings of unsafely. *Journal of Urban Health: Bulletin of the New York Academy of Medicine, 80*, 400-415.

Mincemoyer, C., Perkins, D. F., & Munyua, C. (2001). *Youth Life Skills Evaluation project at Penn State*. Retrieved on 10-1-2011 from http://www. pear web. org/ atis/tools/34

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of counseling Psychology 38 (1):* 30-38.

Myers, I. B. (1962). Gifts Differing: Understanding Personality Type. Mountain View, CA, Davies-Black publishing.

Pajares, F. (1996). Self-Efficacy beliefs in academic settings. *Review of educational research 66 (4):* 543-578.

Parker, J. E., & Johnson, C. E. (1981). *Affecting achievement motivation*. (ERIC Document Reproduction Service No. ED336833).

Rasmussen, K. (1999-2000). The changing sports scene. *Educational Leadership, 57*(4), 26-29.

Richter, F. D., & Tjosvold, D. (1980). Effects of Student participation in classroom decision making on attitudes, peer interaction, motivation, and learning. *Journal of Applied psychology, 65,* 74-80.

Sagi, A. & Friedland, N. (2007). The cost of Richness: The Effect of the Size and Diversity of decision sets on post-Decision Regret. *Journal of Personality and Social Psychology, 93(4)* 515-524, DOI:10.1037/0022-3514.93.4.515.

Schimtt, N. and Lohar, B. (1987). Examiners Manual, Nebraska: National Association of Secondary School Principal.

Schunk, D. H. (1984). Enhancing Self-Efficacy and achievement through rewards and goods: Motivational and informational effects. *Journal of Educational Research, 78,* 29-34.

Schunk. D. H. (1991). Efficacy and academic motivation. *Educational Psycho list 26,* 207-231.

Schunk, D. H. & Gunn, T. P. (1986). Self-efficacy and skill development: Influence of task strategies and attribution. *Journal of Educational Research, vol. 79,* p. 238-244.

Schwarzer, R., & Jerusalem, M. (1993). General Self-Efficacy Scale. Retrieved from http://wik.ed.uiuc.edu/ index.php/Self-efficacy.

Stipek, D. (2006). Relationship Matter. *Educational Leadership, 64 (1),* 46-49.

Taylor, R. G. (1965). Personality traits and discrepant achievement: a review. *Journal of Counseling Psychology,vol.11,* PP.76-81.

The International Bureau of Education (2006). *Definition of life skills*. In Manual for integrating HIV and AIDS education in school curricula TOOL 7 – Assessment of learning outcomes. UNESCO – Geneva.

The Samaritans, The Kelly Support Group & Outward Bound Hong Kong (1999). Life skills foundation A social service, organization. www. lifeskills.stl.org.com.

Toda, S. (1979). Complex human behavior. New York: Holt, Rinrhart and Winston in John, A Michon; Eijkman, G.J. and Deklerk F. Len (1983). Handbook of Psychonomics, oxford: North Holland Publishing Company, vol.2.

Wang, M. C., & Stiles, B. (1976). An investigation of Children's concept of self-responsibility for their school learning. *American Educational Research journal, 13*,159-179.

Wigfield, A. & Eccles, J. (1992). The development of achievement task values: A theoretical analysis. Dev. Rev. 12:265-310.

William W. (1964). Stanaly, Educational Administration in Secondary Schools. *Task & challenge,* Holt, Rechart, Winston.

World Health Organization. Life skills education for children and adolescents in schools, 1997. [On-line]. Available at: ttp://whqlibdoc.who.int/ hq/1994/WHO_MNH_PSF_93.7 A_Rev.2.

Zimmerman, B. J. (2000). Social learning theory and cognitive constructivism. In I. E. Sigel, D. M. Brodzinsky, & R. M. Golinkoff (Eds), *New directions in piagetian theory and practice,* (39-49). Hillsdale, NJ: Erlbaum.

Zimmerman, B. J. (1994). Dimensions of academic self-regulation: A conceptual framework for education. In D. H. Schunk and B. J. Zimmerman (Eds.), Self-regulation of learning and performance: Issues and educational applications. Pp. 3-22. Hillsdale, NJ: Erlbaum.

Zimmerman, B. J. (2002). Achieving self-regulation: The trial and triumph of adolescence. In F. Pajares & T. Urdan (Eds.), Academic motivation of adolescents (pp. 1-28). Greenwich, CT: Information Age.

Zimmerman, B. J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal, 23*(4), 614-628.

Zimmerman, B. J., & Martinez-Pons, M. (1988). Construct validation of a strategy model of student self-regulated learning. *Journal of Educational Psychology, 80*(3)

RESEARCH ARTICLE

JTER Volume 14, Issue 2, 2019 Print ISSN: 0974-8210 Online ISSN: 2454-1664

# Graphic Organisers: The Use of Mind Maps and Concept Maps for Indexing of Concepts in Science Education

Sunita Kathuria
Senior Research Fellow
School of Education, GGSIP University, Dwarka, Delhi, India

## Abstract

Teaching is not limited to making the learners literate; it aims at helping them to become a creator by employing the creative mental faculties such as perception, reason, will, memory, imagination and intuition. The teaching process involves input and output of lot of information which depends on several variables. One of the variables is the learning style of the student. Research acknowledges that every student has a specific or a combination of styles of learning. Like, some learns better while writing, some through listening, some through visuals, some through activity and some learns better if they are taught by using combination of two or more of these styles. The objective of every teacher is 'to impart the knowledge in the best possible manner' and for this, any unusual strategy used by the teacher to meet the diversified needs of the students, can be termed as an Innovative strategy. Such innovative strategies in teaching not only level up the standard of education but also empowers the future generation by strengthening their cognition. The present study aimed to explore the usefulness of concept maps in an understanding of ideas in isolation and the use of Mind Maps in summarising all the ideas as a whole. This was an experimental research with one sample, pre-post-test design. The researcher delivered three chapters of the Biology of IX grade through Concepts Maps and Mind Maps. The sample was selected through purposive sampling technique and the intervention was given for 4 weeks in one of the government schools of Delhi. The analysis revealed that the null hypothesis was rejected and the difference between the scores of pre and post-test was found to be significant. Through the analysis of the Researcher's Diary, used as tool to triangulate the quantitative findings, it was concluded that concept maps and mind maps were found to be effective pedagogical tools to develop the concepts, comparing and contrasting, improve factual recall and to have a deeper level of understanding through interlinking. It was revealed that the mapping was also found to be useful in identifying the learning gaps, build a conceptual hierarchy, and facilitate new learning onto the previous one. The findings of this study were in consonance with the viewpoint of other studies conducted on Graphic organizers. The study suggests the use of Graphic Organisers in the classrooms across the curriculum and subjects as it is based on the technique in which the new information is matched, compared to, contrasted to, joined with or modified to fit in with the previously attended information, thus, assists students to reach to the high levels of cognitive performance.

**Keywords:** Graphic Organisers, Concept and Mind Map, Indexing of concepts, Innovative Strategy and Pedagogical Tool.

*Journal of Teacher Education and Research* (2019): 10.36268/JTER/1425

## Introduction

### Graphic Organisers

*"Leading innovation is not a linear process, educators need to embrace the complexity of improving student outcomes."*

*-Dr. Aasma Alfadala*

Graphic organizers are a visual display of interconnecting different ideas, facts, and thoughts. It is powerful learning, teaching, and assessment tool which guides the learners' thinking and assists them to index new concepts, link new with the prior one and thus ultimately contribute in developing a habit of structured thinking. These tools can be used in any learning situations across the curriculum to arrange ideas. It can be defined as "visual tools that employ lines, circles and boxes to depict four common ways to organize information: hierarchic, cause/effect, compare/contrast, cyclic or linear sequences" (Ellis, E., 2004). It gives visual cues that facilitate in identifying the main areas in wide topic, understand cause and effect, compare and contrast, sequencing and organisation of the whole concept.

Guiding Principles of Graphic Organisers (Figure 1.1):

- Constructivist
- Interactive
- Innovative
- Experimental

Corresponding Author: Senior Research Fellow, School of Education, GGSIP University, Dwarka, Delhi e-mail: sunit.kath@gmail.com

**How to cite his article:** Kathuria, S. (2019). Graphic Organisers: The Use of Mind Maps and Concept Maps for Indexing of Concepts in Science Education. Journal of Teacher Education and Research, 14(2): 17-23:

**Source of support:** Nil

**Conflict of interest:** None

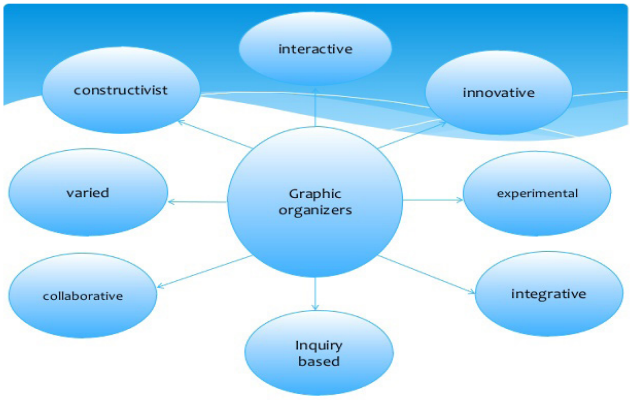



**Figure 1.1:** Principles of Graphic Organisers
(Source: http://www.inspiration.com/visual-learning/graphic-organizers)

- Varied
- Collaborative
- Inquiry-Based and Integrative.

### Types of Graphic Organisers:

The graphic organizers are numerous, and still, the number is growing as more and more creativity is being put into it. The graphic organizers are prepared for different objectives; some are prepared for information gathering, some help in a sense making of the information gathered, and some helps in analysis, and some contribute into reaching a conclusion. Some of the examples of graphic organizers are given in Figure 1.2.

### Concept Mapping and Mind Mapping as learning tools

*Introduction to Concept Maps:* Novak (2006) defines "Concept maps are hierarchical graphical tools used to organize and represent concepts and ideas in the best possible understandable manner. It is an attempt to show how the key idea can be split down further into specific sub-ideas. They include concepts, usually enclosed in circles or boxes, to represent relationships between concepts indicated by a connecting line linking two concepts. Words on the line referred to as linking words or linking phrases, specify the relationship between the two concepts." Concept maps are "visual road maps" to show pathways in a specific knowledge domain. Novak explains some of the terms connected with concept maps, they are as follows: • Concepts: Concepts are perceived regularity in events or objects, or records or events or objects designated by a label. The label for the most concept is a word or more than one word, sometimes symbols such as + or % are used. • Propositions: propositions are the statements about some object or event in the universe, either naturally occurring or constructed. Propositions contain two or more concepts connected using linking words or phrases to form a meaningful statement. Sometimes these are called semantic units, or units of meaning. It is acknowledged in the researches that the concept maps are one of the powerful tools in assisting students to reach to the high levels of cognitive performance. Concept maps define the relationship between the concepts. It represents "meaningful relationships between concepts in the form of propositions" and explains "propositions as two or more concept labels linked by words in a semantic unit" (Novak, 2006). In concept maps the concepts are seen in boxes or bubbles, and there is a link line with a connecting verb. The concept maps show hierarchy with the most inclusive concept at the top and the subtopic come down the line, which can have cross-links.

#### *Introduction to Mind Maps*

Wikipedia has defined mind map as "a diagram used to represent words, ideas, tasks, or other items linked to and arranged radially around a central keyword or idea. It is generally used to generate, visualize, structure, and classify different ideas. As an aid in dealing with complex information, the mind map assists in organizing, problem-solving, decision making, and defining. Mind maps have only one central idea at the center and the keywords all around the central concept. There are no linking words, and concepts are not in bubbles or boxes.

#### *How Information get Processed and Indexed in Mind*

The whole functioning and processing of brain involves gathering of information (encoding), storage of gathered information, and retrieving the stored information as and when required. As per the Information Processing Theory, Memory can be divided into three storage systems, i.e., sensory, short term, and long term memory. Sensory memory (SM) is said to be responsible for the transduction of external sensory information to electrical stimulation, which generally works for less than ½ second for vision and about 3 seconds for hearing. The SM holds a replica of what is received through auditory and visual modalities. After, SM, limited information is transferred to short term memory (STM), and during this phase, some information loss occurs, as decay appears to be the primary mechanism of memory loss. Within STM, there are three basic operations which runs i.e., iconic memory (the ability to hold visual images), acoustic memory (the ability to hold sounds) and working memory (how the individual is responding to given information at any given point of time). The encoding and consolidation of information lead to the transfer of information from STM to the long term memory (LTM). Only limited information, which is attended, rehearsed, properly organized and indexed, transfers from STM to LTM. The process of transfer of information depends on several factors like the meaningfulness or emotional content of an item. Therefore, the Information Processing Theory for better retention suggests to make the learning more relevant, meaningful and linked to previous ones.

## Review of Related Literature

*Eppler J. Martin (2006)* conducted a study on the comparison between concept maps, mind maps, conceptual diagrams, and visual metaphors as complementary tools for knowledge construction and sharing. The study revealed that different visualization techniques could be used in complementary ways to augment motivation, attention, understanding and recall. The researcher discussed the advantages and disadvantages of concept maps, mind maps, conceptual diagrams and visual metaphors.

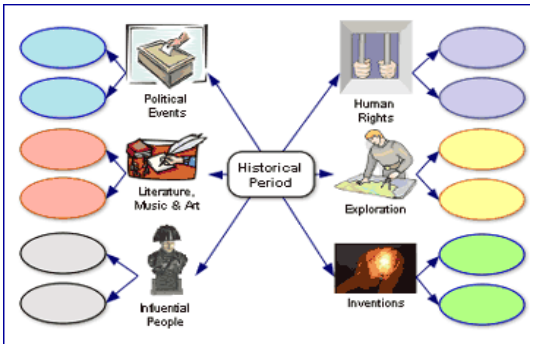
*Trifone, J. D. (2006)* found in the study titled "The Efficacy of Concept Mapping in Motivating Students to take a more meaningful approach to learn" that concept mapping was helpful in encouraging a meaningful approach to learning. Adaptive variations were in direct relation to the standard of mapping proficiency. The results support the principles of the expectancy-value theory. The study has revealed that the use of concept mapping is an effective learning approach.

*Vakilifard, A., and Armand, F.* (2006) in the study "Effects of 'Concept Mapping' on Second language learners' Comprehension of Informative Text" revealed that the experimental group obtained better performance than the group that had used the traditional approach.

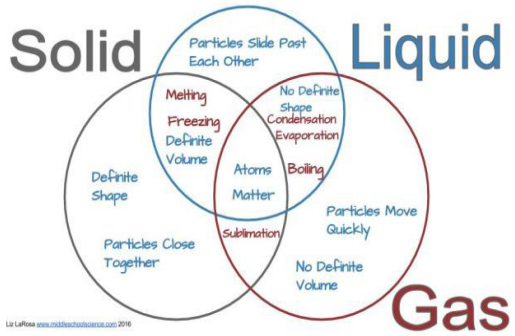
*Rao, P.M.* (2004) in the study "Effect of Concept mapping in Science on Science Achievement Cognitive skills and Attitude of Students" revealed that the experimental group students had performed better when compared to the control group on an achievement test, process skills and concept attainment test on the post-test. The analysis of the attitude shows that 90% of the students had a positive attitude towards concept mapping strategy. The strategy had a differential effect on the different levels of intelligence groups. The F-value shows for concept attainment test was found significant, implying that there is a difference within and between the students of different intelligence in their concept attainment ability. But there was no difference found either between or within the different grades of students in their performance of process skills. There was no difference observed between girls and boys in their achievement, process skills, concept attainment and in their attitude towards concept mapping.

*Farrand, Hussain and Hennessey (2002)* conducted a study to examine the effectiveness of using the 'mind map' study technique to improve the factual recall from the given text. It was found that

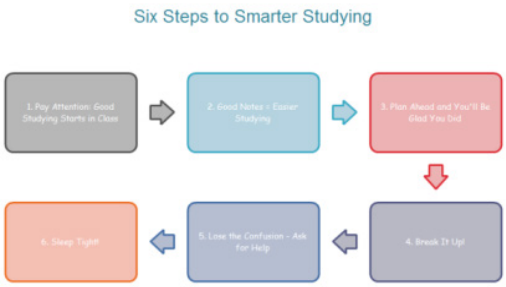
**Web Organiser:**



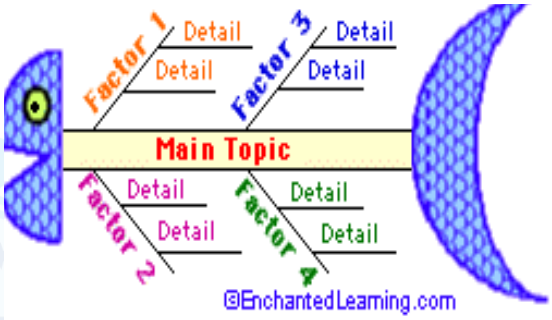

**Venn Diagram:**



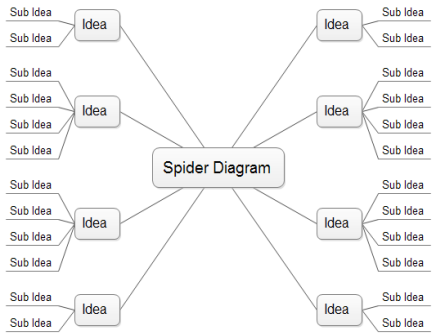

**Sequence Chart:**



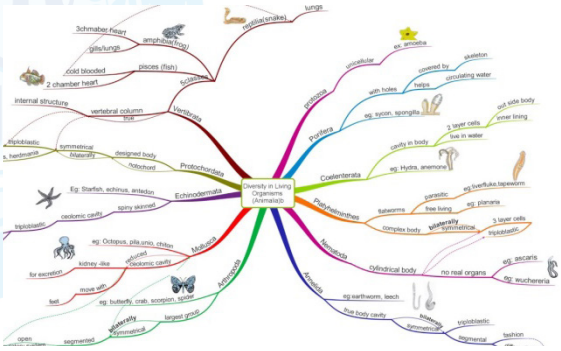

**Fish Bone Map:**




**Spider Map:**




**Mind Map:**



**Cluster/ Cloud Maps**


**Concept Map:**

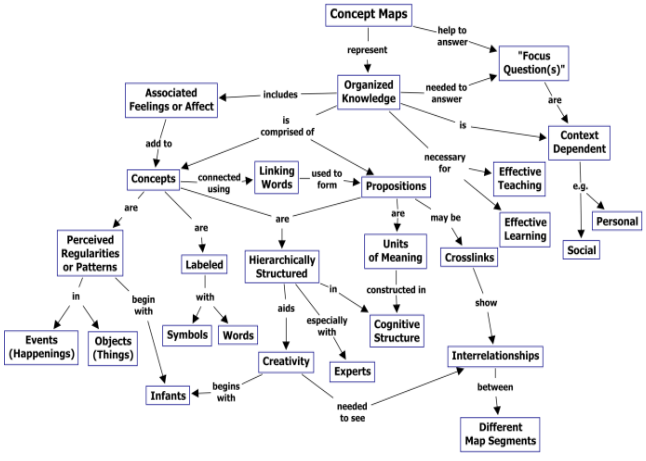



**Figure 1.2:**. Representing some of the types of Graphic Organisers
**(source:** https://mindmappingsoftwareblog.com/concept-maps-vs-mind-maps/, https://www.enchantedlearning.com/graphicorganizers/)

Mind maps proved to be an effective study technique when used for written material. However, in the study, it was suggested that before applying mind maps as a study technique, one needs to consider ways of improving motivation amongst users. The sample in the experimental group was trained in the mind map technique and was asked to apply it to the text. Recall was measured after a week. The findings states that the factual knowledge in the experimental group was found to be greater by 10% (adjusting for baseline) (95% CI -1% to 22%).

*Andal, R. (1991)* in the study "Concept mapping in learning Physical Science and its relation to Scholastic Performance, Cognitive Ability, Attitude towards Concept Mapping and Science Interest among standard IX students" found that cognitive ability, attitude towards concept mapping and science Interest had both a significant direct influence on scholastic performance and an indirect influence through concept mapping. On comparing the coefficientt of determination, the highest extent of determination had been found between cognitive ability and concept mapping for all the three groups. For coeducation students, 51% cognitive ability accounted for concept mapping performance; for boys, it had been 49% and for girls 44%. The contribution of cognitive ability to scholastic performance had been lower in all three groups. 19 % in the case of boys, 37% in the case of girls, and 38% in the case of coeducation students. The experimental and control group of boys, girls, and coeducation students were found to have no difference in the post-test scholastic performance scores in physical science. Girls were found to have performed better than boys in post-test scholastic performance scores in physical science. Coeducation students were found to have performed better than girls and boys in post-test scholastic performance in physical science. Co-education students were found to have performed better than girls and boys in concept mapping.

## Rationale

The performance in the academic area is directly proportional to the creativity of the learners in indexing the newly learnt information and relating it to the previously saved one. And, the Investment theory (Sternberg, 2006) states that such creativity requires a confluence of six distinct but interrelated resources i.e., intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment. In the present scenario, the main focus of educational scientists is towards making the learning experiences more meaningful and relevant so that our future citizen becomes creative thinkers rather than followers. Recently in India, the teacher education curriculum is also revamped as per the new requirement of the era. The innovative methods of teaching are preferred over traditional methods of teaching, and the teachers are also aimed to prepare in the teacher education institutions in the same way. Presently, there is a demand for system of more researches in researching the effectiveness and implications of innovative pedagogical tools. It is acknowledged in various recent researches that the graphic organizers are based on the constructivist cognitive model and are also considered to be the new and creative strategy of teaching and learning. The review on 'the usage of graphic organizers' has stimulated the curiosity in the researcher to explore how children index newly learnt concepts through the use of graphic organizers. The researcher have attempted in this study to find the effectiveness of concept maps and mind maps in teaching and learning of science concepts.

## Research Questions

- How can the complex and technical based information in Science be made more interesting and easy for the learners?
- What innovative strategy can be adopted in the classrooms to make Science understandable rather than a subject of rote memorization?
- How the use of mapping the concepts in Science influence the cognitive abilities of the learners?

## Objectives of the Study

- To study the effectiveness of graphic organizers on the comprehension of Science content by the Learners of Secondary Stage.

## Hypothesis

The hypothesis of the study is:-

- There is no statistically significant difference in the pre-tests and post-test scores of the test (achievement test on comprehension) in science after the intervention (teaching through concept and mind maps).

## Delimitations of the Study

- Out of all the Graphic Organisers, concept, and mind maps are used in the study.
- In Science, three chapters of Biology i.e. 1: Cell: The structural unit of life, 2: Why do we fall ill? and 3: Diversity in living organisms, selected in the study.
- The study is conducted on IX grade students of Government Sarvodaya Co-Educational Senior Secondary School Sector-7, Rohini, New Delhi.

## Research Methodology

The present study has a mixed design with a qualitative and quantitative approach for data collection and analysis. The data collected before and after the intervention was analyzed qualitatively (through content analysis) and quantitatively through (inferential statistics).

### Population and Sample of the Study

The population of the study was the IX grade students of the government school of Delhi. The sample was selected through a purposive sampling technique, and 30 students have been selected for the study. This was an experimental study, with one sample, pre-post test design. It has one independent variable and one dependent variable. Teaching biology chapters through graphic organizers (concept and mind maps) was the independent variable, and achievement test in Science was the dependent variable.

### Tools used in the Study

The following tools were used in the study

- Three achievement tests (with the same degree of difficulty) of Biology, IX grade, prepared by the researcher.
- Researcher's Diary (maintained throughout the study).

### Procedure

The study started after seeking permission from the Principal. The objective and rationale of the research was explained to the Principal and Science teacher of IX grade of Government school taken under study. On discussion with the science teacher, one section of IX grade was found to be academically weak and with some behavioral issues. It was decided to experiment the strategy on this class for improvement and better academic results. The

chapters were identified and selected by the science teacher. Due to time constraints, only three chapters were selected. Although these chapters were already taught by the Science teacher, most of the students were failing in remembering the concepts. They were performing not up to the mark academically (as assessed in pre-test and school regular assessments).

The researcher prepared concept maps and mind maps on three chapters of Science from the Biology Section and got it approved by the experts. The concept and mind maps were made on four parameters: the visual appeal, information covered, degree of complexity, and linking of new to previous related concepts.

The students were taught for about 15 days and 80 minutes (2 periods) each day (1200 hours in 15 days). The students were informed in advance about the pre-test (10 Multiple Choice based questions from each chapter: total 30 questions) to be taken on these three chapters. After taking the pre-test, from the next day, the intervention started. To maintain the internal validity of the research, all three chapters were taught by the researcher only. The concept building of each chapter was done by using the concept maps, and in the end, summarising of the chapter was done by using mind maps. The researcher prepared chart papers and pasted them on the walls of the classrooms, conducted discussions, brainstorming sessions to maintain interest and motivation. After teaching each chapter, a quiz on the concepts and a group activity on preparing concept and mind maps were conducted in order to provide hands-on experience on map making in Science. After teaching all three chapters, a final post-test (with the same difficulty index, 30 MCQs, 10 from each chapter) was prepared and administered. (Images 1.1, 1.2, 1.3, 1.4 and 1.5 showing the execution of experiment in school). After the span of 4 weeks, the second post-test was administered to assess the retention and concept and mind mapping skills.

The pre-test score and post-test scores were collected after careful administration of the test. Scoring of the data was done using the procedure and marking scheme. It was then carefully tabulated and fed into the computer. The data collected was analyzed by applying inferential statistics.

**Image 1.1:** The researcher explaining concept and mind mapping

**Image 1.2:** The researcher explaining the Indexing of different concepts

**Image 1.3:** Students practicing concept map on board

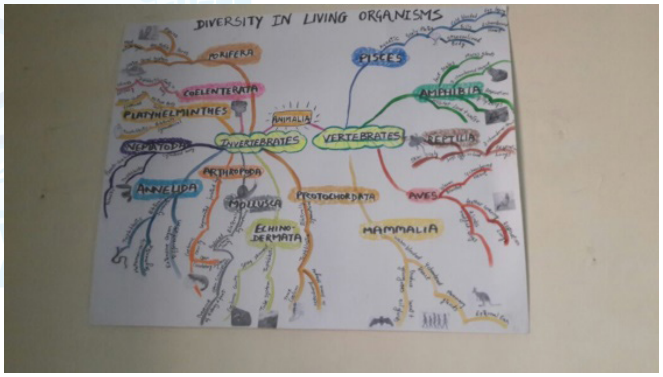



**Image 1.4:** The final Mind Map prepared by the students in Group work on 'Diversity in living organisms'

**Image 1.5.:** Students presenting their concept maps

**Table 1:** Percentage Means

| *S.No.* | *Sample Size (N)* | *Pre Test Score* | *Post Test 1 Score* | *Post Test 2 Score* |
|---|---|---|---|---|
| 1. | 30 | 32% | 48% | 45% |

**Table 2:** t-value analysis

| *Scores* | *N* | *Mean* | *SD* | *df = (n-1)* | *t (computed value)* | *t (expected value) at 0.05 level* | *Result* |
|---|---|---|---|---|---|---|---|
| Pre-test Score | 30 | 7.8 | 2.71 | 29 | 3.83 | 2.048 | SIGNIFICANT |
| Post Test Score | 30 | 18.6 | 4.83 | | | | |

## Analysis and Findings of the Study

Level of significance: 0.05

As the computed value of t is greater, it is considered significant at 0.05 level of significance (for a two-tailed test), and hence $H_o$ stands rejected.

Null hypothesis framed in the study was found to be rejected. There is a statistically significant difference found in the pre-test scores and post-test scores of the achievement test of the sample under study.

The prime focus of the researcher in the study was to see the effectiveness of concept mapping and mind mapping on academic achievement in Science (Biology). The analysis of the scores obtained in the academic achievement test shows that there is a significant difference between the pre-test and post-test scores of the students. Moreover, the observation schedule used for triangulation has also revealed the impact of the usage of concept and mind maps on the learning and interest of students.

*Analysis of the researcher's diary* (observation notes): In this study the researcher used concept mapping for introduction and explanation of the concepts, and it was found that it has helped students to identify their misconceptions and to link up their prior knowledge with the new one. It has led to the active participation of students throughout the teaching. The researcher observed students taking part actively in group discussions and in the construction of maps. The construction of concept mapping has given them a better scope of reviewing the topic taught, recapitulate and also to reflect on the content. Preparing smaller concept maps while teaching step by step with an aim to deconstruct the chapter and then merging many concept maps with one major concept has helped students in conceptual bridging. It was found that concept maps and minds maps have helped the teacher to organize the content of the chapter in the systematic hierarchy so that no idea is unaddressed or presented in a slapdash manner. The concept maps helped to focus and bring the attention of the students towards how to establish relationships and connections between ideas and concepts, which ultimately helps in better retention of the concept. It was observed that it not only impacts on the learning of students but also on the creativity and ability of self-expression. It also functions as a mnemonic aid, induces attention, and stimulates curiosity. It allowed the space for divergent questioning.

At the end, the researcher used the construction of Mind maps for summarising the whole chapter. It was found to be an excellent tool for consolidating the whole chapter. It has been observed that the mind maps used in the research by the researcher have made a high impact on the mind of the learners as it gives a full range of visual and sensory tools. They can be used by the students to express their ideas, identify the links and present the relationships between thoughts. It helps the teachers to identify the learning gaps, build conceptual understanding and facilitate new learning onto the previous one. The degree of hierarchy in the construction of mind maps represented the ability of students to reorganize existing and new knowledge in different levels and it reveals the degree of mastery of the conceptual structure of the topic.

## Conclusion

The result shows that there was an enhancement in learning and understanding of students taken understudy as a sample. It is concluded in the study that the graphic organizers are proved to be effective in better comprehension of Science content by the Learners of Secondary Stage.

## Suggestions

This study has indicated that concept mapping and mind mapping are effective pedagogical tools that can be used by the teachers in classrooms. It not only breaks the monotony of teaching through the lecture method but also supports the construction of knowledge by the student. The researcher presents the following suggestions:

Teachers must use different defensible strategies in teaching-learning. The introduction of new techniques creates and maintains the interest of students towards learning.

A teacher may plan to give an opportunity to students for self-learning and to construct the knowledge on their own through different techniques like using concept and mind maps. However, meaningful feedback to students while construction of concept maps and mind maps must be considered on a serious note.

A teacher may use concept and mind maps for different purposes, for example, for teaching, for making the students learn, for assessment, etc.

## Recommendations for Future Research

To study the effectiveness of concept mapping and mind mapping in different academic domains.

- To study the efficacy of graphic organizers as assessment tools.
- To study the impact of usage of graphic organizers on students with special needs.

## References

Andal, R. (1991). Concept mapping in learning physical science and its relation to scholastic performance, cognitive ability, attitude towards concept mapping and science interest among standard IX students. In M.B. Buch.(Ed).*Fifth Survey of Educational Research* 1988-92 ( Vol:2). New Delhi: NCERT.

Ellis, E. (2004). 200 Makes sense literacy think-sheets.Lillian, AL: GraphicOrganizers.com

Farrand, Paul & Hussain, Fearzana & Hennessey, Enid. (2002). The efficacy of the mind map study technique. *Medical Education*. 36(5):426-31 · June 2002. DOI: 10.1046/j.1365-2923.2002.01205.x

Eppler, M. J. (2006). A comparison between concept maps, mind maps, conceptual diagrams, and visual metaphors as complementary tools for knowledge construction and sharing. *Information Visualization*, 5(3), 202-210. doi:10.1057/palgrave.ivs.9500131

Langer, Ellen. (2000). Mindful Learning. *Current Directions in Psychological Science*. Vol 9, No.6, Pg. 220-223. sDOI: 10.1111/1467-8721.00099

Novak, J. D., Gowin, D. B., & Kahle, J. B. (2006). Concept mapping for meaningful learning. *Learning: How to Learn*, Pg. 15-54. doi:10.1017/cbo9781139173469.004

Rao,P.M.(2004). Effect of concept- mapping in science on science achievement, cognitive skills and attitude of students. Episteme-1 An international conference to review on Science Technology and Mathematics Education. Abstracts of presentation. Homi Bhabha Centre for Science Education (HBCSE ), Mumbai.125 –128.

Sternberg, R.J. (2006) The nature of creativity. *Creativity Research Journal*, 18 (I), 87-98.

Trifone, J.D.( 2006). The efficacy of concept mapping in motivating students to take a more meaningful approach to learning.

Vakilifard, A., & Armand, F. (2006). The effects of concept mapping on second language learners' comprehension of informative text. Concept Maps: Theory, Methodology, Technology. Proc. Of the Second International Conference on concept Mapping. Canas A.J & Novak J.D (Eds) San Jose. amirreza.vakilifard@umontreal.ca.

## Websites

https://mindmappingsoftwareblog.com/concept-maps-vs-mind-maps/
http://www.inspiration.com/visual-learning/graphic-organizers)
https://www.enchantedlearning.com/graphicorganizers/
https://www.mindtools.com/pages/article/newISS_01.htm
https://www.teachervision.com
https://www.eduplace.com/graphicorganizer/
http://www.theteachertoolkit.com/index.php/tool/graphic-organizers
https://www.cultofpedagogy.com/graphic-organizer/
https://k12teacherstaffdevelopment.com/tlb/why-use-graphic-organizers-in-the-classroom/

RESEARCH ARTICLE

JTER Volume 14, Issue 2, 2019 Print ISSN: 0974-8210 Online ISSN: 2454-1664

# Exploring the Association Between Design of Training and Trainer Demographics

Atul Bamrara[1]*, Jagmohan S. Kathait[2]

[1]Assistant Teacher, Lecturer[2]

[1]Department of School Education, Government of Uttarakhand, India

[2]Lecturer, District Institute of Education and Training, Pauri Garhwal, Uttarakhand, India

## Abstract

Trainings are the basic component of job enrichment and effective trainings program can surely result in improved output at workplace. The present study is an attempt to highlight the design and development process of the training programs run by District Institute of Education and Training to improve the learning level of elementary level teachers in various districts of Uttarakhand. The respondents have been surveyed to express their views on five levels of ADDIE model. Further, an association has been explored between the demographics of trainers and design and development process of the training programs.

**Keywords:** Design of training, Instructional design, Observation, Discussion, Questionnaire

*Journal of Teacher Education and Research* (2019): DOI: 10.36268/JTER/1422

## Education–An Introduction

Education is provided by public as well as private institutions in India and it is the responsibility of central as well as state governments to provide the educational facilities to countrymen. Since independence, there were various commissions, policies, acts, rules and regulations have been formulated at both the school as well as h igher education levels to improve the status of education. After independence it has been realized by the policy makers and as per Article 45 of the Indian Constitution–

*"The State shall endeavor to provide, within a period of ten years from the commencement of this Constitution, for free and compulsory education for all children until they complete the age of fourteen years (MHRD, 2017)."*[1]

Articles 15, 16, 19, 28, 25, 29, 46, 146, 244, 330, and 335 of the Indian Constitution provide various constitutional provisions with reference to education and equity. In spite of these all constitutional and legislative provisions, the outcome is not as healthy as it must be. The child is the focus of our whole education system and teachers play a pivotal rule in shaping the child's ideology. The quality of education depends largely on the quality of its teachers but this observation has not been expanded to the intention that quality teachers comes out from the institutions where high quality teacher educators exist. A significant contribution of teacher preparation in its development of teachers' aptitude to examine teaching from the learners' point of view brings diverse experiences and analogies to the classroom (Darling-Hammond, 2000). Although, there are serious drawbacks in teacher preparation programs either in-service or pre-service. Formal teacher education persists to have low 'ecological validity', and emphasizes tensions in the selection and technical expertise of district institute of education and training (DIET) staff, and in their attitudes towards basic teachers, that confine engagement with local contexts (Dyer *et al*., 2004). According to Anurag Behar, CEO *Azim Premji* Foundation there are four methods to improve our education system that[2]–

**Corresponding Author:** Atul Bamrara, Assistant Teacher, Department of School Education, Government of Uttarakhand, India, e-mail: atulbamrara@gmail.com

**How to cite this article:** Bamrara, A., Kathait, J.S. (2019). Exploring the association between design of training and trainer demographics. Journal of Teacher Education and Research, 14(2): 24-30:

**Source of support:** Nil

**Conflict of interest:** None

- In order to perform better, the faculties must be paid better, which will then lead to improvement (Ballou & Podgursky, 1997).
- Governments should attempt and attract scholastic fraternity to become teachers. Coherent salary packages, high standard recruitment practices and conditions to support professional satisfaction are some key areas which should be kept in consideration.
- There is no alternate of a good teacher and the capacities of teachers must be developed to perform better via high quality teacher trainings.

The teachers who are more prepared for teaching are more confident and successful with students than those who have had little or none (Darling-Hammond, 2000). The research also indicates that the reforms in teacher training creating more tightly integrated programs with specialized coursework on teaching and learning construct teachers who are more effective as well as more likely to come into and stay in teaching profession. The policies implemented by states regarding teacher training and professional development may create a significant difference in the qualifications and capacities that teachers bring to their profession (Darling-Hammond, 2000). Policy recommendations comprise the development and upgrading of teacher training programs in India as well as other developing countries, along with thorough research into the demographic, structural, and cultural framework for each program and focusing on the advancement of teacher knowledge and aptitude in specific subject areas (Husen *et al*., 1978).

1 *http://mhrd.gov.in/directive_principles_of_state_policy_article-45*

2 *http://www.livemint.com/Opinion/fneTCbkEoKXbS1DzaZur8M/How-to-improve-education.html*

## Review of Literature

The analyze, design, develop, implement, and evaluate (ADDIE) Model has been first developed by Florida State University for in-service training of military personnel and further it has been extensively applied for other relevant areas. The most extensively used style for developing new training programs is Instructional Design (ID). This approach offers a sequential system to evaluate the learners' requirements, the design and development of training objects, and the evaluation of the usefulness of the training program (Kruse, 2002). Instructional designers believe that the use of systematic design procedures can make instruction more useful, well-organized and applicable than less precise approaches to planning instruction. The system approach entails an analysis of how its constituents interrelate with each other and requires synchronization of all activities. Nevertheless, a multiplicity of systematic ID processes (Dick & Carey, 1996; Gagne *et al*., 1974, Kemp *et al*. 1998, Smith & Ragan, 1998) have been illustrated, but all descriptions comprise the core components of ADDIE to ensure analogy among goals, strategies, evaluation as well as the efficacy of the resulting instruction (Gustafson and Branch, 2002).

Figure 1 ADDIE model. In Wikipedia, n.d., retrieved January 28, 2017, from https://en.wikipedi a.org/wiki/ADDIE_Model. Copyright 2017 by Wikipedia

The ADDIE Model is a practical and easy framework for ID. The process can be applied in a multiplicity of settings, because of its methodical and generic structure. The structure provides trainers by recognizing the trainee needs and applies this information to the design and development of the training programs (Petersen, 2003).

## Objectives of the Proposed Research

After completing this research, we will be able-

- To explore the correlation between the design/development of training and experience of trainers
- To explain the relationship between the design/development of training program and academic background of the trainers
- To understand the instructional design process through ADDIE Model

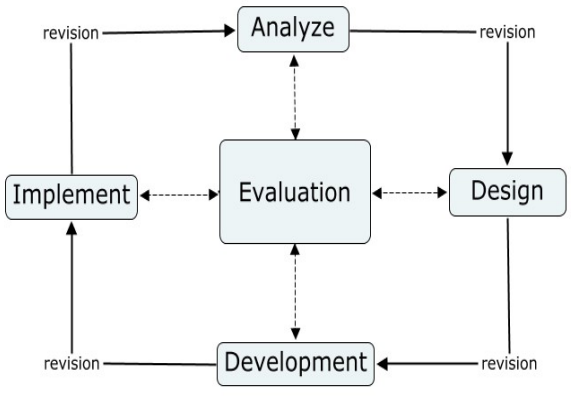



**Figure 1:** ADDIE model. In Wikipedia, n.d., retrieved January 28, 2017, from https://en.wikipedia.org/wiki/ADDIE_Model. Copyright 2017 by Wikipedia

### Hypothesis

- $H_0$: There is no significant relationship between qualification of the trainers and design of training (DoT) program.
- $H_0$: There is no significant relationship between experience of trainers and development of the training program.

## Research Methodology

ADDIE model has been used for the purpose of research. A questionnaire has been developed using the various components of ADDIE Model. Demographic profile of the respondents has been sought in the form of their age, work experience, designation and qualification, which will further assist the study. Respondents were supposed to supply their views on five point Likert scale ranging from 1-Strongly agree (SA), 2-Agree (A), 3-Neutral (N), 4-Disagree (D) and 5-strongly disagree (SD). The collected data has been analyzed using R programming to explore the necessary statistic (Chi square value and karl pearson coefficient of correlation) to relate various variables identified in the study.

### Sampling

For the sampling purpose, the faculty members of DIET in Uttarakhand have been selected randomly using stratified random sampling method, because it provides a better estimate of the whole and it results in more reliable and detailed information (Kothari, 2011). There are 13 DIETs functioning in the state, vis., Tehri, Gauchar, Ratura, Roorkee, Charigaon, Barkot, Dehradun, Almora, Didihat, Lohaghat, Bageshwar, Bhimtal, and Rudrapur and there are approximately 215 faculty members working in various departments (In service programs field interaction innovation and coordination, pre-service teacher education, district resource unit, planning and management, educational technology, work experience, curriculum material development and evaluation, administrative branch etc.) of the institute, so the calculated sample for the study becomes 100[3]. The information have been sought from the respondents either personally, e-mail or Google Forms. The demographic profile of the respondents is presented in Table 1.

### Data Analysis

The research data has been collected from hundred respondents. On cross-tabulating the data between 'formulation of learning objectives by trainers and trainers' qualification', it has been observed that 30% respondents who are Masters with B Ed, 29% with Masters with M Ed degree and 10% with PhD degree have strongly/agreed that they formulate the learning objectives for the training program which they design upon. Whereas, 28% respondents have responded as neutral and 3% have disagreed that they formulate the learning objectives for the training program (Table 2). The Karl Pearson Coefficient of Correlation is calculated as 0.059, which shows a positive correlation between $Des_1$ and H. The calculated value of $\chi^2$ at 95% confidence level is 1.687 which is less than the tabulated value ($\chi^2_{cal}$ = 12.592) for six degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between formulation of learning objectives and trainers' qualifications.

On cross-tabulating the data between 'applying a mix of instructional methods and trainers' qualification', it has been

3 $n = \frac{z^2 . p . q . N}{e^2 (N-1) + z^2 . p . q}$, *where p = 0.02, q = 0.98, N = 215, e = 0.02, z value at 95% confidence level.*

**Table 1:** Demographic profile of respondents

| *Demographic profile* | | *Frequency* | *Percent* |
|---|---|---|---|
| Designation | Lecturer | 88 | 88% |
| | Senior Lecturer | 12 | 12% |
| Highest qualification | Masters with B Ed | 42 | 42% |
| | Masters with M Ed | 42 | 42% |
| | PhD | 16 | 16% |
| Experience (in years) | < 10 Years | 24 | 24% |
| | 11-20 Years | 24 | 24% |
| | 21-30 Years | 40 | 40% |
| | > 30 Years | 12 | 12% |
| Gender | Male | 42 | 42% |
| | Female | 58 | 58% |
| Age (in years) | 25-35 | 16 | 16% |
| | 36-45 | 47 | 47% |
| | 46-60 | 37 | 37% |

**Table 2:** Cross-tabulation between design of training program and qualifications of trainers

| | *Highest Qualification (Q)* | | | | |
|---|---|---|---|---|---|
| Formulation of learning objectives for the training program (Des1) | | Masters with B Ed | Masters with M Ed | PhD | Statistic |
| | SA | 19 | 21 | 6 | $\chi2$= 1.687 |
| | A | 11 | 8 | 4 | |
| | N | 11 | 12 | 5 | R = 0.059 |
| | D | 1 | 1 | 1 | |
| | SD | - | - | - | df = 6 |
| Mix of instructional methods/activities (Des2) | | Masters with B Ed | Masters with M Ed | PhD | Statistic |
| | SA | 18 | 18 | 5 | $\chi2$= 6.909 |
| | A | 14 | 20 | 9 | |
| | N | 6 | 4 | 1 | R = -0.054 |
| | D | 4 | 0 | 1 | |
| | SD | - | - | - | df = 6 |
| Designing content outline (Des3) | | Masters with B Ed | Masters with M Ed | PhD | Statistic |
| | SA | 10 | 10 | 4 | $\chi2$= 10.704 |
| | A | 16 | 5 | 4 | |
| | N | 3 | 5 | 0 | R = 0.116 |
| | D | 10 | 18 | 7 | |
| | SD | 3 | 4 | 1 | df = 8 |

observed that 32% respondents who are Masters with B Ed, 38% with Masters with M Ed degree and 14% with PhD Degree have strongly/agreed that they apply a mix of instructional methods and activities to design the training program. Whereas, 11 % respondents have responded as neutral and 5% have disagreed that they formulate the learning objectives for the training program (Table 2). The Karl Pearson Coefficient of Correlation is calculated as –0.054, which shows a negative correlation between Des2 and Q. The calculated value of $\chi2$ at 95% confidence level is 6.909 which is less than the tabulated value ($\chi2$cal = 12.592) for six degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between applying a mix of instructional methods and trainers' qualifications. Further, 26% trainers who are Masters with B Ed, 15% with Masters with M Ed degree and 8% with PhD Degree have strongly/agreed that design the content outline for the training program. Whereas, 8 % respondents have responded as neutral and 43% have strongly/disagreed that they design the content outline for the training program (Table 2). The Karl Pearson Coefficient of Correlation is calculated as 0.116, which shows a positive correlation between Des3 and Q. The calculated value of $\chi2$ at 95% confidence level is 10.704 which is less than the tabulated value ($\chi2$cal = 15.507) for eight degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between designing the content outline and trainers' qualifications.

On cross-tabulating the data between 'developing the content plan and instructional methods and trainers' qualification', it has been observed that 23% respondents who are Masters with B Ed, 22% with Masters with M Ed degree and 11% with PhD degree have strongly/agreed that they develop the content plan and instructional methods for the training program which they act upon (Table 3). Whereas, 10% respondents have responded as neutral and 34% have strongly/disagreed. The Karl Pearson Coefficient of Correlation is calculated as -0.109, which shows a negative correlation between Dev1 and Q. The calculated value of $\chi2$ at 95% confidence level is 3.558 which is less than the tabulated value ($\chi2$cal = 15.507) for eight degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship

**Table 3:** Cross-tabulation between development of training program and experience of trainers

| | *Highest qualification (Q)* | | | | |
|---|---|---|---|---|---|
| Development of content plan and instructional methods ($Dev_1$) | | Masters with B Ed | Masters with M Ed | PhD | Statistic |
| | SA | 8 | 9 | 5 | $\chi^2_{=}$ 3.558 |
| | A | 15 | 13 | 6 | |
| | N | 4 | 5 | 1 | R = -0.109 |
| | D | 11 | 13 | 4 | |
| | SD | 4 | 2 | 0 | df = 8 |
| Development with the help of scholarly books/ journals/ magazines ($Dev_2$) | | Masters with B Ed | Masters with M Ed | PhD | Statistic |
| | SA | 6 | 15 | 1 | $\chi^2_{=}$ 11.232 |
| | A | 9 | 3 | 3 | |
| | N | 11 | 5 | 1 | R = 0.073 |
| | D | 10 | 13 | 9 | |
| | SD | 6 | 6 | 2 | df = 8 |
| Development with the help of subject matter experts ($Dev_3$) | | Masters with B Ed | Masters with M Ed | PhD | Statistic |
| | SA | 14 | 13 | 5 | $\chi^2_{=}$ 7.609 |
| | A | 15 | 10 | 4 | |
| | N | 6 | 4 | 0 | R = 0.143 |
| | D | 7 | 15 | 7 | |
| | SD | - | - | - | df = 6 |
| Development with the help internet/online tools ($Dev_4$) | | Masters with B Ed | Masters with M Ed | PhD | Statistic |
| | SA | 4 | 4 | 2 | $\chi^2_{=}$ 14.763 |
| | A | 11 | 6 | 1 | |
| | N | 15 | 23 | 5 | R = 0.150 |
| | D | 11 | 9 | 5 | |
| | SD | 1 | 0 | 3 | df = 8 |

between development of content plan/instructional methods and trainers' qualifications. Further, cross-tabulating the data between 'development with the Help of scholarly books/ journals/ magazines and trainers' qualification', it has been observed that 15% respondents who are Masters with B Ed, 18% with Masters with M Ed degree and 4% with PhD Degree have strongly/agreed that they take the help of books/ journals or magazines (Table 3). Whereas, 17% respondents have responded as neutral and 46% have strongly/ disagreed. The Karl Pearson Coefficient of Correlation is calculated as 0.073, which shows a positive correlation between Dev2 and Q. The calculated value of $\chi 2$ at 95% confidence level is 11.232 which is less than the tabulated value ($\chi 2cal$ = 15.507) for eight degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between developing the training program with the help of scholarly books/ journals/ magazines and trainers' qualifications.

On cross-tabulating the data between 'developing the training program with the help of subject matter experts and trainers' qualification', it has been observed that 29% respondents who are Masters with B Ed, 23% with Masters with M Ed degree and 9% with PhD Degree have strongly/agreed that they develop training program with the help of subject experts (Table 3). Whereas, 10% respondents have responded as neutral and 29% have disagreed. The Karl Pearson Coefficient of Correlation is calculated as 0.143, which shows a positive correlation between $Dev_3$ and Q. The calculated value of $\chi^2$ at 95% confidence level is 7.609 which is less than the tabulated value ($\chi^2_{cal}$ = 12.592) for six degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between developing the training program with the help of subject matter experts and trainers' qualifications. Further, cross-tabulating the data between 'development with the Help of internet and online tools and trainers' qualification', it has been observed that 15% respondents who are Masters with B Ed, 10% with Masters with M Ed degree and 3% with PhD Degree have strongly/agreed that they take the help of internet and online tools. Whereas, 43% respondents have responded as neutral and 29% have strongly/disagreed (Table 3). The Karl Pearson Coefficient of Correlation is calculated as 0.150, which shows a positive correlation between $Dev_4$ and Q. The calculated value of $\chi^2$ at 95% confidence level is 14.763 which is less than the tabulated value ($\chi^2_{cal}$ = 15.507) for eight degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between developing the training program with the help of internet, online tools, and trainers' qualifications.

On cross-tabulating the data between 'formulation of learning objectives by trainers and trainers' experience', it has been observed that 15% respondents who have less than 10 years experience, 17% with experience between 11 to 20 years, 29% between 21 to 30 years and 8% with more than 30 years have strongly/agreed that they formulate the learning objectives for the training program which they design upon. Whereas, 28% respondents have responded as neutral and 3% have disagreed that they formulate the learning objectives for the training program. The Karl Pearson Coefficient of Correlation is calculated as –0.080, which shows a negative correlation between $Des_1$ and E (Table 4). The calculated value of $\chi^2$ at 95% confidence level is 5.259 which is less than the tabulated value ($\chi^2_{cal}$ = 16.919) for nine degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between formulation of learning objectives and trainers' experience.

On cross-tabulating the data between 'applying a mix of instructional methods and trainers' experience', it has been

**Table 4:** Cross-tabulation between development of training program and experience of trainers

| | *Experience in Years (E)* | | | | | |
|---|---|---|---|---|---|---|
| Formulation of learning objectives for the training program ($Des_1$) | | < 10 | 11-20 | 21-30 | > 30 | Statistic |
| | SA | 8 | 13 | 19 | 6 | $\chi^2_{=}$ 5.259 |
| | A | 7 | 4 | 10 | 2 | |
| | N | 8 | 6 | 11 | 3 | R = -0.080 |
| | D | 1 | 1 | 0 | 1 | |
| | SD | - | - | - | - | df = 9 |
| Mix of instructional methods/ activities ($Des_2$)W | | < 10 | 11-20 | 21-30 | > 30 | Statistic |
| | SA | 9 | 9 | 16 | 7 | $\chi^2_{=}$ 6.813 |
| | A | 12 | 13 | 14 | 4 | |
| | N | 2 | 1 | 7 | 1 | R = -0.025 |
| | D | 1 | 1 | 3 | 0 | |
| | SD | - | - | - | - | df = 9 |
| Designing content outline ($Des_3$) | | < 10 | 11-20 | 21-30 | > 30 | Statistic |
| | SA | 5 | 5 | 13 | 1 | $\chi^2_{=}$ 12.916 |
| | A | 6 | 7 | 8 | 4 | |
| | N | 2 | 0 | 6 | 0 | R = -0.009 |
| | D | 9 | 11 | 9 | 6 | |
| | SD | 2 | 1 | 4 | 1 | df = 12 |

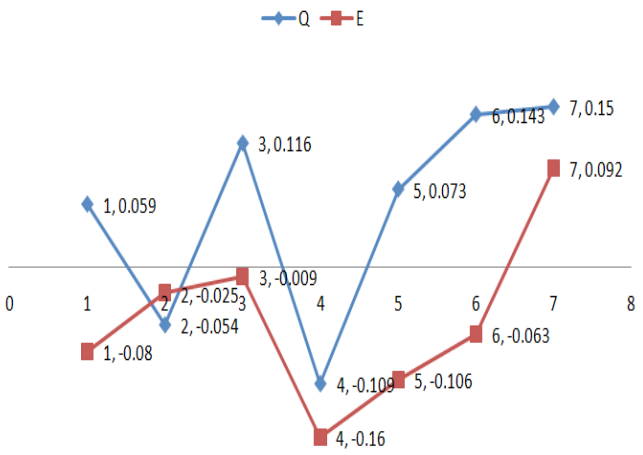
observed that 21% respondents who have less than 10 years experience, 22% with experience between 11 to 20 years, 30% between 21 to 30 years and11% with more than 30 years have strongly/agreed that they apply a mix of instructional methods and activities to design the training program (Table 4). Whereas, 11% respondents have responded as neutral and 5% have disagreed that they formulate the learning objectives for the training program. The Karl Pearson Coefficient of Correlation is calculated as -0.025, which shows a negative correlation between $Des_2$ and E. The calculated value of $\chi^2$ at 95% confidence level is 6.813 which is less than the tabulated value ($\chi^2_{cal}$ = 16.919) for nine degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between applying a mix of instructional methods and trainers' experience. Further, it has been observed that 11% respondents who have less than 10 years experience, 12% with experience between 11 to 20 years, 21% between 21 to 30 years and 5% with more than 30 years have strongly/agreed that they design the content outline for the training program. Whereas, 8% respondents have responded as neutral and 43% have strongly/ disagreed that they design the content outline for the training program. The Karl Pearson Coefficient of Correlation is calculated as -0.009, which shows a negative correlation between $Des_3$ and E (Table 4). The calculated value of $\chi^2$ at 95% confidence level is 12.916 which is less than the tabulated value ($\chi^2_{cal}$ = 21.026) for twelve degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between designing the content outline and trainers' experience.

On cross-tabulating the data between 'developing the content plan and instructional methods and trainers' experience', it has been observed that 12% respondents who have less than 10 years experience, 13% with experience between 11 to 20 years, 23% between 21 to 30 years and 8% with more than 30 years have strongly/agreed that they develop the content plan and instructional methods for the training program which they act upon. Whereas, 10% respondents have responded as neutral and 34% have strongly/disagreed (Table 5). The Karl Pearson Coefficient of Correlation is calculated as -0.160, which shows a negative correlation between $Dev_1$ and E. The calculated value of $\chi^2$ at 95% confidence level is 18.698 which is less than the tabulated value ($\chi^2_{cal}$ = 21.026) for twelve degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between development of content plan/instructional methods and trainers' experience. Further, cross-tabulating the data between 'development with the Help of scholarly books/ journals/ magazines and trainers' experience', it has been observed that 6% respondents who have less than 10 years experience, 11% with experience between 11 to 20 years, 18% between 21 to 30 years and 2% with more than 30 years have strongly/agreed that they take the help of books/ journals or magazines. Whereas, 17% respondents have responded as neutral and 46% have strongly/disagreed. The Karl Pearson Coefficient of Correlation is calculated as -0.106, which shows a negative correlation between $Dev_2$ and E. The calculated value of $\chi^2$ at 95% confidence level is 13.552, which is less than the tabulated value ($\chi^2_{cal}$ = 21.026) for twelve degrees of freedom and it shows that null hypothesis is accepted (Table 5). Hence, there is a significant relationship between developing the training program with the help of scholarly books/ journals/ magazines and trainers' experience.

On cross-tabulating the data between 'developing the training program with the help of subject matter experts and trainers' experience', it has been observed that 14% respondents who have less than 10 years experience, 16% with experience between 11 to 20 years, 21% between 21 to 30 years and 10% with more than 30 years have strongly/agreed that they develop training program with the help of subject experts (Table 5). Whereas, 10% respondents have responded as neutral and 29% have disagreed. The Karl Pearson Coefficient of Correlation is calculated as -0.063, which shows a negative correlation between $Dev_3$ and E. The calculated value of $\chi^2$ at 95% confidence level is 6.353 which is less than the tabulated value ($\chi^2_{cal}$ = 16.919) for nine degrees of freedom and it shows that null hypothesis is accepted. Hence, there is a significant relationship between developing the training program with the help of subject matter experts and trainers' experience. Further, cross-tabulating the data between 'development with the help of internet, online tools, and trainers' experience', it has been observed that 7% respondents who have less than 10 years experience, 8%

**Table 5:** Cross-tabulation between development of training program and experience of trainers

| | *Experience in Years (E)* | | | | | |
|---|---|---|---|---|---|---|
| Development of content plan and instructional methods ($Dev_1$) | | < 10 | 11-20 | 21-30 | > 30 | Statistic |
| | SA | 3 | 3 | 10 | 6 | $\chi^2_{=}$ 18.698 |
| | A | 9 | 10 | 13 | 2 | |
| | N | 2 | 3 | 2 | 3 | R = -0.160 |
| | D | 10 | 6 | 11 | 1 | |
| | SD | 0 | 2 | 4 | 0 | df = 12 |
| Development with the help of scholarly books/journals/ magazines ($Dev_2$) | | < 10 | 11-20 | 21-30 | > 30 | Statistic |
| | SA | 4 | 5 | 12 | 1 | $\chi^2_{=}$ 13.552 |
| | A | 2 | 6 | 6 | 1 | |
| | N | 2 | 4 | 8 | 3 | R = -0.106 |
| | D | 9 | 7 | 11 | 5 | |
| | SD | 7 | 2 | 3 | 2 | df = 12 |
| Development with the help of subject matter experts ($Dev_3$) | | < 10 | 11-20 | 21-30 | > 30 | Statistic |
| | SA | 7 | 7 | 13 | 5 | $\chi^2_{=}$ 6.353 |
| | A | 7 | 9 | 8 | 5 | |
| | N | 2 | 3 | 5 | 0 | R = -0.063 |
| | D | 8 | 5 | 14 | 2 | |
| | SD | - | - | - | - | df = 9 |
| Development with the help internet/online tools ($Dev_4$) | | < 10 | 11-20 | 21-30 | > 30 | Statistic |
| | SA | 4 | 3 | 3 | 0 | $\chi^2_{=}$ 9.434 |
| | A | 3 | 5 | 7 | 3 | |
| | N | 11 | 8 | 20 | 4 | R = 0.092 |
| | D | 4 | 8 | 9 | 4 | |
| | SD | 2 | 0 | 1 | 1 | df = 12 |




with experience between 11 to 20 years, 10% between 21 to 30 years and 3% with more than 30 years have strongly/agreed that they take the help of internet and online tools. Whereas, 43% respondents have responded as neutral and 29% have strongly/disagreed. The Karl Pearson Coefficient of Correlation is calculated as 0.092, which shows a positive correlation between $Dev_4$ and E. The calculated value of $\chi^2$ at 95% confidence level is 9.434 which is less than the tabulated value ($\chi^2_{cal}$ = 21.026) for twelve degrees of freedom and it shows that null hypothesis is accepted (Table 5). Hence, there is a significant relationship between developing the training program with the help of internet, online tools, and trainers' experience.

## Conclusion and Recommendations

Education is a dynamic subject which needs regular updating in curriculum, subjects offered, teaching methodology as well as teaching pedagogy. We are living in a rapid changing technology era where we need to update ourselves to keep track with the global pace. Trainings are closely associated with education and it is must for an organization to update the knowledge of its teaching fraternity. A significant relationship has been observed between the development (content plan/instructional methods, use of internet/ online tools, Use of Books and magazines, coordination with subject matter experts etc.) of the training program and experience as well as qualifications of the trainers. There is a strong correlation between the design and development of training programs with reference to trainers' qualification as well as experience. As the qualification of the faculty members improve, the design and development process also gets improved. It has been observed that as the experience of the trainers increase, they develop the training program based on their experiences instead of being reluctant on books, magazines or online tools. Further, a significant relationship has been observed between the design of the training program (a provision to mix of instructional methods and content outline, formulation of learning objectives), and experience and qualifications of the trainers. Effective trainings help the individuals to perform better and improve the workplace output as well. So, in order to design and develop effective training programs the trainers must follow the standard instructional design models (e.g., ADDIE model, Rapid prototyping, Dick & Carey and Kemp ISD, Gagne's Model, Kilpatrick's Four Level Evaluation model), which they feel handy and functional in their processes. During development of the training program-online tools, internet, books, magazines,

journals and subject matter experts must be involved in the process to impact the output.

## References


Allison, P. D. (2002). Missing data: Quantitative applications in the social sciences. British Journal of Mathematical and Statistical Psychology, 55(1), 193-196.

Ballou, D., & Podgursky, M. J. (1997). Teacher pay and teacher quality. WE Upjohn Institute.

Bates, A. W. (2000). Managing Technological Change: Strategies for College and University Leaders. The Jossey-Bass Higher and Adult Education Series. Jossey-Bass Publishers, 350 Sansome St., San Francisco, CA 94104.

Darling-Hammond, L. (2000). How teacher education matters. Journal of teacher education, 51(3), 166-173.

Darling-Hammond, L. (2000). Teacher quality and student achievement. Education policy analysis archives, 8, 1.

Dick, W., Carey, L., & Carey, J. O. (2006). The systematic design of instruction.

Dyer, C., Choksi, A., Awasty, V., Iyer, U., Moyade, R., Nigam, N., & Sheth, S. (2004). Knowledge for teacher development in India: the importance of 'local knowledge' for in-service education. International Journal of Educational Development, 24(1), 39-52.

Husen, T., Saha, L. J., & Noonan, R. (1978). Teacher Training and Student Achievement in Less Developed Counties. World Bank Staff Working Paper No. 310.

Gagne, R. M., & Briggs, L. J. (1974). Principles of instructional design. Holt, Rinehart & Winston.

Gustafson, K. L., & Branch, R. M. (2002). What is instructional design. Trends and issues in Instructional Design and Technology, 16-25.

Jones, B. A. (2014). ADDIE Model (Instructional Design).

Kemp, J. E., Morrison, G. R., & Ross, S. M. (1998). Designing effective instruction. Columbus, Ohio, EEUU.

Kruse, K. (2002). Introduction to instructional design and the ADDIE model. Retrieved January, 26, 2005.

Peterson, C. (2003). Bringing ADDIE to life: Instructional design at its best. Journal of Educational Multimedia and Hypermedia, 12(3), 227-241.

Raina, V. K. (1995). Teacher educators in India: in search of an identity. Journal of Teacher Education, 46(1), 45-52.

Smith, P. L., & Ragan, T. J. (1999). Instructional design (p. 3). New York: Wiley

RESEARCH ARTICLE

JTER Volume 14, Issue 2, 2019 Print ISSN: 0974-8210 Online ISSN: 2454-1664

# Correlates of Academic Achievement: A Study of Social Science Students

Baljeet Singh[1], Shruti Kant Pandey[2]*

[1]Research Scholar, [2]Associate Professor

[1]Faculty of Education, Mewar University, Chittorgarh, Rajasthan, India

[2]Amity University Uttar Pradesh, Noida, Uttar Pradesh, India

## Abstract

**Aim:** Present paper identifies the factors associated with the academic achievement of students in a social science subject. Factors studied in the present study associated with achievements were-interest in studies, reading ability, and critical thinking.

**Methods:** A total of sixty students studying in class VII in government senior secondary schools of Delhi were selected randomly for the data collection. Interest Inventory by R P Singh (2010), critical thinking scale prepared by C. G. Venkatesha Murthy (2014), reading ability test, and achievement test prepared by researchers themselves were administered on the selected sample.

**Findings:** This study reveals that academic achievement in social subjects, reading ability, and critical thinking are significantly and positively correlated with each other.

**Keywords:** Achievements in social science, Critical thinking, Interest in studies, Reading ability.

*Journal of Teacher Education and Research* (2019). DOI: 10.36268/JTER/1423

## Prologue

Education is the most vital instrument which has been developed by the man for his own growth. Therefore, all the dynamic and developed countries claim such an instructive system that will take control in directing and handling a future, which will ensure a healthier life to all. Hence, the progress of any society depends mainly on the utilization of the potential of its individuals and of the best educational ideas in all disciplines of knowledge. This is only possible if we have a good academic system to educate our future generation, and if any lacuna occurs, it has to be curbed out well in time. Pieces of evidence show that teachers are overburdened because they are engaged in some other tasks which are not directly related to the curricular or co-curricular achievements of the students. In such cases, they find that their students are getting slow in their learning and other school-related activities. If the teachers give time to think who are backward in their studies or even genius, definitely a shining solution will come out. It is also proof in history that many slow learners or academically backward students have qualified themselves as great scientists or writers in their lives. The discussion in the real classroom situation may help the teacher to improve the skills of such children. It has also been observed that sometimes the reading ability, mental ability, and background influence their academic achievement.

Reading is not a natural human ability but instead is a socio-cultural artifact that inter-plays between language, socio-cultural norms, and a collective body of knowledge. (Dimitra and Barbara, 2000). A total of 60% of knowledge comes through reading only (Nautiyal, 1995). Early reading was associated with early academic success. (Kumar Harish, 2014–2015). Ital t was found that early emergence and persistence of achievement gaps related to poverty, the high and accumulating risk for migrating students, and the significance of oral reading in first grade as both an early indicator of risk and a potential protective factor.

Critical thinking is that manner of rational about a subject in which a thinker improves the quality her thinking by competently examining, assessing, and rebuilding it. Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking. It assumes agreement to demanding standards of distinctive and attentive understanding of their use. It involves actual proclamation and problem-solving abilities, as well as a grantee to overcome our native egocentrism and socio-centrism.

The history of critical thinking is not new. Dimensions of critical thinking have been engraved out in intellectual debate and dispute through 2400 years of intellectual history. Even during ancient times, many competitions were organized by the then kings were based on debates. Either to select a person for the main administration or to invite the grooms for their daughters. The *Shastrarth* between *Kalidas* and Princes *Vidyotma* is the most reliable example of critical thinking.

A number of studies have been conducted on the variable-namely critical thinking and learning, which showed a positive impact on student's achievement. Paul and Binker (1990) reviewed 39 studies on critical thinking and published a book on critical thinking. Both the reviewers strongly argued that conduction the studies on critical thinking is a need of the hour. Norris and Ennis (1989) investigated various methods being applied to assess students' critical thinking at the class level. The findings of this study can be established with the achievement of students. Gokhale (1995) found that critical thinking can be enhanced by applying various methods like collaborative and blended teaching-learning.

**Corresponding Author:** Shruti Kant Pandey, Associate Professor, Amity University Uttar Pradesh, Noida, Uttar Pradesh, India, E-mail: spandey2@amity.edu

**How to cite this article:** Singh, B. and Pandey, S.K. (2019). Correlates of academic achievement: a study of social science students. Journal of Teacher Education and Research, 14(2): 31-33:

**Source of support:** Nil

**Conflict of interest:** None

It was logical decision that helps the learner to enhance his thinking ability. Velea and Lache, (2015) declared that the logical outcomes or conclusion helps in increasing reasoning ability. Finding of various studies showed positive impacts of critical thinking on getting up of academic achievement (e.g., Wang, Pascarella, Laird, and Ribera, 2015; Tiruneh, Verburgh, and Elen, 2014; Chan, 2013; Boghossian, 2006; Fleming, Garcia, and Morning, 1995).

## Methodology

A sample of 60 students studying in class VI in government Senior Secondary Schools, Delhi was selected. Researchers themselves prepared interest inventory by R P Singh (2010), reading ability test, and critical thinking ability scale designed by C. G. Venkatesha Murthy (2014) was used. This scale carries the items on the components like - process of thinking and product of thoughts. The test was administered on the selected sample. Similarly an achievement test in social science and reading ability test was prepared and administered by researchers themselves.

### Hypothesis

Following hypothesis were formulated and statistically tested.

HO1 There may be no significant relationship between academic achievements in social science and interest in studies.

HO2 There may be no significant relationship between academic achievements in social science and reading ability.

HO3 There may be no significant relationship between academic achievement in social science and critical thinking.

### Analysis of the Results

It may be observed from Table 1 that interest in studies is significantly positively correlated with academic achievement in social science. Hence, it may be concluded that interest and achievement increase or decrease proportionally. Thus, the above stated hypothesis that there may be no significant relationship between academic achievements in social science and interest in studies is rejected.

It may be seen from Table 1 that the value of the coefficient of correlation of reading ability and achievement is found to be significant. Hence, it may be inferred that there is a significant relationship between reading ability and academic achievement. Therefore, the hypothesis that there may be no significant relationship between reading ability and academic achievement of students is rejected.

Table 1 reveals that critical thinking is significantly and positively correlated with academic performance. This result rejected the hypothesis that there may be no significant relationship between critical thinking and the academic achievement of students in social science.

Table 2 indicates that academic achievement and spelling are positively and significantly correlated. Similarly, academic achievement and critical thinking are positively and significantly correlated. So it can be concluded if these variables are given more concentration by the students during their study definitely there will be positive results in the achievements of students.

## Epilogue

Education is not only responsible for providing the reading and writing skills to the learners, but it goes beyond to this and helps learners in providing them value education and making them up-to-date and opening their horizons of thinking. It is well understood that quality education has to make the learners competitive in the present day. It has also been experienced that all over the world, the present education system is under fire in all sections of the society, mainly because it is not delivering the goods properly. The emphasis has always remained on memorization. Thus the qualitative development of the pupils remains helpless, even up to

**Table 1:** Inter-correlation matrix of variables–interest in studies, reading ability, critical thinking and academic achievement in Social Science.

| *S. No.* | *Variables* | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|---|
| 1 | Interest | 1.00 | | | | |
| 2 | Reading ability | .28* | 1.00 | | | |
| 3 | Critical thinking | .29* | .32* | 1.00 | | |
| 4 | Academic achievement in social science | .36** | .21 | .21 | 1.00 | |
| 5 | General mental ability | .46** | .23 | .36** | .32* | 1.00 |

Note: **Pí .01, *Pí.05

**Table 2:** Inter-correlation matrix of the components of, critical thinking, reading ability, and academic achievement of students. (N 60)

| *Broad areas* | *S. No.* | *Components* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Critical thinking | 1 | Critical thinking process | 1.00 | | | | | | | | | |
| | 2. | Critical thinking product | .36** | 1.00 | | | | | | | | |
| | 3 | Language | .18 | .39 | 1.00 | | | | | | | |
| Reading ability | 4 | Reading speed | .19 | .20 | .47 | 1.00 | | | | | | |
| | 5 | Comprehension | .14 | .34 | .12 | .26 | 1.00 | | | | | |
| | 6 | Vocabulary | .50 | .25 | .03 | .21 | .71** | 1.00 | | | | |
| | 7 | Spelling | .15 | .19 | .17 | .01 | .60** | .39** | 1.00 | | | |
| | 8 | Hand-writing | .48 | .18 | .08 | .04 | .43** | .16 | .63** | 1.00 | | |
| | 9 | General mental ability | .29 | .33 | .42 | .45 | .28 | .41 | .32 | .27 | 1.00 | |
| Achievement in social science | 10 | Academic achievement | .26 | .34* | .15 | .26 | .45** | .26 | .36** | .28 | .35 | 1.00 |

Note: **Pí .01, *Pí.05

adulthood. That is why a majority of students are found below to their mental level, and they fail to develop their thinking as per the need of the hour. Hence it is very essential to develop psychological inputs to the achievement of the students. Undoubtedly, continuous and comprehensive evaluation (CCE) is a progressive and qualitative sign in the development of learners, and its result will be seen in the form of 100% pass result. Here, teachers and policymakers and planners will also have to construct such a curriculum so that the learners could develop the interest in their studies.

## References


Boghossian, P. (2006). Socratic pedagogy, critical thinking, and inmate education. Journal of Correctional Education, 57(1), 42-63. Retrieved from http://www.jstor.org/stable/23282687

C. G. Venkatesha Murthy (2014) Mysore Critical Thinking Scale, Mysore

Chan, Z. C. Y. (2013). A systematic review of critical thinking in nursing education. Nurse Education Today, 33, 236-240. Retrieved from http://dx.doi.org/10.1016/j.nedt.2013.01.007

Critical Thinking and Education. (n.d.). Retrieved November 26, 2015, from http://sta.uwi.edu/ct/ctande.asp

Fleming, J., Garcia, N., & Morning, C. (1995). The critical thinking skills of minority engineering students: An exploratory. The Journal of Negro Education, 64(4), 437-453. Retrieved from http://www.jstor.org/stable/2967266

Gokhale, A. A. (1995). Collaborative Learning Enhances Critical Thinking. Journal of\ Technology Education, 7(1). Retrieved from http://scholar.lib.vt.edu/ejournals/JTE/v7n1/gokhale.jte-v7n1.html?ref=Sawos.Org

Kumar Harish (2014). Influence of general mental ability, study habits, reading ability and socio-economic status on the academic achievements of students, international journal of education and extension (IJEE), Baraktullah University Bhopal, (Jan-2014) Vol. 2, Issue 2, ISSN:2278-537X

Kumar Harish (2015). Inculcation of values through Literature among Children: An evaluation of NCERT English Textbook of Class- V, Journal of Teacher Education, and Research, Ram-Eesh Institute of Education, Vol. 10, No. 1,June 2015, ISSN 2454-1664,

Kumar Harish ( 2015) Psycho-Social Factors Causing Stress: A Study of Teacher Educators, Journal of Education and Practice ISSN 2222-288X Vol.6, No.4 (2015)

Kumar Harish ( 2016) Teaching Excellence and Innovative Practices: A Case Study of National Awardee Teachers of India Journal of Education and Practice,(Online)Vol.7,No.1,2016.

Kwean, H. (2011). The Analysis of 6th-Grade Elementary School Student's Proportional Reasoning Ability and Strategy According to Academic Achievement. Communications of Mathematical Education, 25(3), 537–556.

Kyllonen, P. C., & Christal, R. E. (1990). Reasoning ability is (little more than) workingmemory capacity?! Intelligence, 14(4), 389–433. http://doi.org/10.1016/S0160-2896(05)80012-1

Norris, S. P., & Ennis, R. H. (1989). Evaluating Critical Thinking. The practitioners' guide to teaching thinking series. Critical Thinking Press and Software, Box 448, Pacific Grove, CA 93950-0448; telephone: 800-458-4849; fax: 408-393-3277 ($17.95). Retrieved from http://eric.ed.gov/?id=ED40483

Pandey L. and Ameta D. (2017), Effect of Constructivist Based Training on Learning and Teaching: An Experiment in Classroom, Journal of Education and Practice, 8(13).

Paul, R. W., & Binker, A. J. A. (1990). Critical Thinking: What Every Person Needs To Survive in a Rapidly Changing World. Center for Critical Thinking and Moral Critique, Sonoma State University, Rohnert Park, CA 94928 ($19.95). Retrieved from http://eric.ed.gov/?id=ED338557

Singh R P (2010) Interest Inventory, NPC, Agra

Tiruneh, D. T., Verburgh, A., & Elen, J. (2014). Effectiveness of critical thinking instruction in higher education: A systematic review of intervention studies. Higher Education Studies, 4(1), 1-17. Retrieved from http://dx.doi.org/10.5539/hes.v4n1p1

Velea, M. N., & Lache, S. (2015). Decision Making Process on Multi-Objective Optimization Results. International Journal of Materials, Mechanics and Manufacturing, 4(3), 213–217. http://doi.org/10.7763/IJMMM.2016.V4.259

Wang, J.-S., Pascarella, E. T., Laird, T. F. N., & Ribera, A. K. (2015). How clear and organized classroom instruction and deep approaches to learning affect growth in critical thinking and need for cognition. Studies in Higher Education, 40(10), 1786–1807. http://doi.org/10.1080/03075079.2014.914911

RESEARCH ARTICLE

JTER Volume 14, Issue 2, 2019 Print ISSN: 0974-8210 Online ISSN: 2454-1664

# A Comparative Study of Vocational Interests of Secondary School Students in Relation to their Gender

Anjali Gupta
Associate Professor
Institute of Teacher Education, Kadrabad, Modinagar, Ghaziabad, Uttar Pradesh, India

## Abstract

Students all over the world at some points have to make a choice of profession for sustaining their livelihoods. If the chosen profession is according to their choice, they can excel in their field of work. In the present scenario, students and their families are more concerned about their future. In this regard, a study has been conducted to know the vocational interests of secondary school students concerning their gender. Through this study, the researcher has tried to know and acknowledge the vocational interest of secondary school students in relation to their gender. The simple random sampling procedure selected a sample of 100 students (50 boys and 50 girls) reading in various schools in the district of Meerut of Uttar Pradesh state. A standardized tool developed by Bansal V. P and Srivastava D. N. (1975) named "Vocational Interest Record" was used for the collection of primary data. The data were analyzed with the help of Mean, SD, and t-test to study the vocational interests of secondary students. The result revealed that there existed a difference in the vocational interest pattern of secondary school students in different vocational interest areas. The result also revealed that there is a significant difference in the vocational areas of secondary school students in relation to gender variation.

**Keywords:** Interest, Gender, Secondary, Vocational.

*Journal of Teacher Education and Research* (2019). DOI: 10.36268/JTER/1421

## Introduction

Education is a dynamic process that brings change in the behavior of a student by raising the level of social education and vocational awareness of youth and enabling them to adopt a realistic attitude towards the world of work. Nowadays, students are more conscious of their future and aware of different types of professions. In terms of family education, diversification of information, and the use of technology, wide advertisement plays a vital role in collecting information regarding the professions. They prefer their career according to their interest, capability, aptitude, and family status. The right choice of vocations will give the person more happiness, and there are greater chances of his adjustment. Its effect doesn't stop here. It also has great social and national importance.

### Vocational Interest: Concept and Meaning

Vocational interest can be identified by an individual's preferences for a number of vocations and are often stable through adulthood. Vocational interests are primarily a development task that typically occurs during adolescence. Interest, aptitude, personality characteristics, family background, social skill, and vocational needs have been considered to be an important factor that determines one's occupational choice. There are some environmental factors that influence the vocational interest of the students.

Vocational guidance should be provided to the child at a very early stage when the child enters school and continue even after a suitable choice has been made. In this regard, students need a great variety of guidance activities and opportunities to explore their personal characteristics and vocational options. Secondary school is a good time to begin encouraging students to participate in a range of experiences. Students who have explored all of their educational and career options make more informed career decisions and thus are happy with their professions. Education and occupation should, therefore, be related to the interest of students. Only education without occupation and occupation without education is of no use. The education should relate to them and help students achieve their goals in life, be successful, satisfied, and, after all, enjoy a fruitful life. A system must be developed to protect human resources at any cost by way of early identification, encouragement, and providing opportunities for their upward mobility.

The government has also made suitable provisions for the vocational guidance for the children. The vocational guidance is the process of assisting a student in choosing a profession, preparing for it, entering upon and progress in it. It is a concern primarily with helping a student to make decisions and choices involved in planning a future and building a career decision. The main aim of vocationalization of education is to provide education and training to students, enabling them to contribute their best to the country's development.

### Need and Significance of the Study

The present education system provides basic education at various levels without focusing on students' innate capacities and interests, leading to mismatch for the jobs in the market, resulting in a loss of manpower, unemployment, low economic productivity, and vocational maladjustment. The majority of the students are neither well acquainted with the employment avenues nor have

**Corresponding Author:** Anjali Gupta, Associate Professor, Institute of Teacher Education, Kadrabad, Modinagar, Ghaziabad, Uttar Pradesh, India, E-mail: dranjali1972@gmail.com

**How to cite this article:** Gupta A. (2019). A comparative study of vocational interests of secondary school students in relation to their gender. Journal of Teacher Education and Research, 14(2): 34-36.

**Source of support:** Nil

**Conflict of interest:** None

any information regarding the job opportunities. They take up a vocation by their parents and other persons. They work in the job for which they are not at all fit. This leads to widespread frustration among learners. Our educated youth fall an easy prey of disgust and boredom every hour due to their wrong choice of profession. With the advancement of scientific knowledge and gradual development of materialistic outlook, it is believed that education should enable a student to earn his living. It implies vocational courses should be introduced in the secondary schools along with the general education according to the vocational interests of the students.

### Statement of the Problem

"Vocational interest of secondary school students concerning their gender."

## Objective of the Study

The present study has the following objectives:

- To study vocational interest patterns of secondary school students in the different vocational areas.
- To find out a significant difference in interests of different vocational areas of secondary students in relation to gender variation.

## Hypothesis of the Study

Following null hypotheses have been formulated for the study:

*Ho1:* There doesn't exist any difference in the vocational interest pattern of secondary school students in different vocational interest areas.

*Ho2:* There is no significant difference in the vocational areas of secondary school students in relation to gender variation.

### Tools Used

A standardized tool developed by Bansal V. P & Srivastava D. N. (1975) named as "Vocational Interest Record" was used for the collection of data. The test consisted of 128 items of 8 different vocational areas named as agriculture, artistic, commercial, executive, house hold, literacy, scientific, and social. In each area, 16 items were there, which were marked by the responders.

### Statistical Technique Used

In order to find out the vocational interests of boys and girls of secondary school, t-test was employed as a statistical technique.

From the Table 1, the mean score of boys and girls in agriculture trade is 6.54 and 5.58. Their t-value is 2.21, which is significant at 0.05 level. Therefore, the researcher found through data analysis that there exists significant difference in the agricultural vocational interest pattern of secondary school students in relation to gender variation. The mean score of boys and girls in artistic trade is 5.02 and 5.04, respectively their t-value is 0.04, which is insignificant at 0.05 level. Therefore, the researcher found through data analysis that there exists no significant difference in the artistic vocational interest pattern of secondary school students in relation to gender variation. The mean score of boys and girls in commercial trade is 4.80 and 5.38, respectively their t-value is 1.42, which is insignificant at 0.05 level. Therefore, the researcher found through data analysis that there exists no significant difference in the commercial vocational interest pattern of secondary school students in relation to gender variation. The mean score of boys and girls in executive trade is 7.20 and 8.36, respectively their t-value is 1.73, which is insignificant at 0.05 level. Therefore, the researcher found through data analysis that there exists no significant difference in the executive vocational interest pattern of secondary school students in relation to gender variation. In the household area, the mean score of boys and girls is 5.26 and 5.50, respectively their t-value is 0.57, which is insignificant at 0.05 level. Therefore, the researcher found through data analysis that there exists no significant difference in the household vocational interest pattern of secondary school students in relation to gender variation. In the literary area of vocational interest, the mean of boys and girls is 6.74 and 7.40, respectively their t-value is 1.08, which is insignificant at 0.05 level. Therefore, the researcher found through data analysis that there exists no significant difference in the literary vocational interest pattern of secondary school students in relation to gender variation. In the scientific trade of vocational interest, the mean of boys and girls is 7.28 and 8.62, respectively and t-value is 1.88, which is insignificant at 0.05 level. Therefore, the researcher found through data analysis that there exists no significant difference

**Table 1:** Showing difference in mean scores of vocational interest (area wise) of boys and girls of secondary school students

| *Dimensions* | *Group* | *No. of pupils* | *Mean* | *SD* | *t-value* | *Level of significance* |
|---|---|---|---|---|---|---|
| Agriculture trade | Boys | 50 | 6.54 | 2.11 | 2.21 | Significant |
| | Girls | 50 | 5.58 | 2.25 | | |
| Artistic trade | Boys | 50 | 5.02 | 2.63 | 0.04 | Not significant |
| | Girls | 50 | 5.04 | 2.33 | | |
| Commercial trade | Boys | 50 | 4.80 | 2.30 | 1.42 | Not significant |
| | Girls | 50 | 5.38 | 1.78 | | |
| Executive trade | Boys | 50 | 7.20 | 3.68 | 1.73 | Not significant |
| | Girls | 50 | 8.36 | 3.01 | | |
| Household trade | Boys | 50 | 5.26 | 2.30 | 0.57 | Not significant |
| | Girls | 50 | 5.50 | 1.87 | | |
| Literary trade | Boys | 50 | 6.74 | 3.48 | 1.08 | Not significant |
| | Girls | 50 | 7.40 | 2.58 | | |
| Scientific trade | Boys | 50 | 7.28 | 3.79 | 1.88 | Not significant |
| | Girls | 50 | 8.62 | 3.35 | | |
| Social trade | Boys | 50 | 5.06 | 1.94 | 0.37 | Not significant |
| | Girls | 50 | 4.92 | 1.78 | | |

in the scientific vocational interest pattern of secondary school students in relation to gender variation. In the social area, the mean score of boys and girls is 5.06 and 4.92 and their t-value is 0.37, which is insignificant at 0.05 level. Therefore, the researcher found through data analysis that there exists no significant difference in the social, vocational interest pattern of secondary school students in relation to gender.

### Findings

After analyzing the data, it is found that there exists a significant difference in the vocational interest pattern of secondary school students in agriculture vocational interest areas. Moreover, the girls' mean was a little more than the boys' mean in some fields. So the girls were slightly more interested in artistic, commercial, household, and social fields. In agriculture and social fields, boys were slightly more interested than that of girls.

## Conclusion

The vocational choice is one of the most important tasks for every student. The right decision at the right moment can change the whole life of a person and his professional environment. If proper vocational guidance is provided to the students based on their interest in a particular vocation, they can utilize their energies in the right direction, and this will increase their efficiency.

## References


Bhargava, R. (1991). Interest and difficulties faced by the students studying in vocational stream. Fifth Survey of Educational Research, VOL-II, New Delhi, NCERT, p.1509.

Best, John W. (1988) Research in Education New Delhi Prentice-Hall of India Pvt. Ltd.

Hoouse, J. (2018). Vocational Interest of Secondary school students in relation of their level of aspiration Vol 8(4)

Koul, L. Methodology of Educational Research New Delhi Vikas Publication (1998)

Kumari, B. (2015). Level of Aspiration on Academic Performance of School Students. *The International Journal of Indian Psychology, Volume 3,* (Issue 1).

Mohanty Prasad . S. (2011), Vocational Interest in Science and Technology of higher Secondary Pupils with reference to parental academic qualification and occupation, Himalayan Journal of Social Science, VOL-I , ISSUE II, p-24.

Mondel, G.C. (2018). A comparative study of vocational interest of secondary school students in relation to their gender Vol. 5(3)

Nandwana, S. and Asawa. N. (2007), Vocational interest of high and low creative adolescent, Himalayan Journal of social science, p-185.

Sarsswathi, L. (1992). Relationship between personality dimensions and vocational interests of pupils of standard X. In Fourth Survey of Research in Education, New Delhi: Publication Department NCERT, p.1533