



Original Article

Reality vs. Rationality: A Correlational Study of Cognitive Distortion and Problem-Solving in Engineering Students

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Abstract

The present study investigates the relationship between cognitive distortions and problem-solving skills among undergraduate engineering students. Cognitive distortions, defined as irrational and negative thought patterns, have been linked to emotional and behavioral dysfunctions. Problem-solving, on the other hand, is a critical 21st-century skill that requires logical reasoning and cognitive flexibility. A sample of 200 engineering students (100 males and 100 females) was selected using a simple random sampling technique. Two self-constructed and standardized tools—the Cognitive Distortion Scale and the Problem-Solving Scale—were administered to measure the respective variables. Results indicated that both cognitive distortion and problem-solving scores fell within the average range. However, a weak positive correlation ($r = 0.33912$) was found between the two variables, suggesting that students with higher cognitive distortions may exhibit slightly better problem-solving performance, although not significantly. These findings imply the need for targeted cognitive-behavioral interventions and integration of emotional intelligence training within technical education to enhance students' rational thinking and problem-solving capabilities.

Keywords: Cognitive Distortion, Problem-Solving, Engineering, Students, Rationality, Reality.

Introduction:

Our mental processes are what motivate us as humans. We encounter a variety of events in our daily lives; on some days, we respond to them maturely, while on other days, we respond immaturely. Every person has a unique method of analysis and thought. In extremely stressful situations, some people might maintain their composure, while others would get upset over a trivial matter. Are you aware of why? The solution lies in the way we think.

Irrational views are simply referred to as cognitive distortions. Serious repercussions including stress, worry, and depression can result from cognitive errors. In essence, cognitive distortions cause erroneous ideas and perceptions to warp reality. They impede an individual's development.

The American Psychological Association defines a cognitive distortion as an incorrect thought pattern. This is a fairly common mental process that happens to varied degrees in every individual. These mental filters are shortcuts that the brain develops to lessen the strain of digesting a large amount of information at once. Nevertheless, this can lead to oversimplifications of intricate ideas, which can negatively impact an individual's self-esteem. A 2021 study found that cognitive distortions may play a role in the onset and exacerbation of mental health disorders like depression. A person's mood can be lifted and their thinking reframed by learning to recognize cognitive distortions.

Types of Cognitive Distortions:

Research by Aaron Beck and colleagues in the 1960s and 1970s, which resulted in the development of cognitive behavioral therapy (CBT), revealed that there are at least ten different kinds of cognitive distortions. Comprehending these kinds is crucial to CBT's effectiveness.

- **Labelling:** This is a response, sometimes but not always, that occurs after a failed life event in which a person categorizes themselves in a completely negative manner. For instance, when their job application is rejected, they minimize themselves to a "failure."
- **Discounting the positive:** People tend to minimize and downplay any good things that happen in their lives, attributing them to chance or dismissing them as inconsequential.

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- **Mental filtering:** Even when confronted with contradicting information, this mental pattern persists and concentrates on unfavorable experiences or ideas.
- **Emotional reasoning:** When someone has emotional reasoning, they disregard the facts in front of them and let their feelings determine what they think is true.
- **Mindreading:** This cognitive distortion causes people to believe that others think poorly of them, even when this is not the case.
- **Catastrophising:** A person who engages in this behaviour fears the future and makes unfavourable predictions even in the absence of any supporting data.
- **Overgeneralizing:** This distortion entails presuming that because one event was bad, all subsequent ones will also be bad.
- **Personalization:** A person who suffers from this misperception feels that they are somehow to blame for every bad thing that happens.
- **"Should" statements:** Despite not having all the facts necessary to know how to behave, a person may always believe that they could have or must have done something in a specific way in the past.
- **All-or-nothing thinking:** This refers to seeing things as either-or or black and white, without taking the situation's specifics into account.

Problem-Solving:

Problem solving is commonly defined as dealing with and evaluating problems in order to find a solution. Problem solving may be described as providing a solution or an idea to a troublesome issue. Problem-solving abilities are vital talents in the educational field since a healthy community or nation can only survive by adapting to changing circumstances through problem-solving abilities. Problem-solving abilities are essential in all aspect of life in order to live a happy and healthy existence (Nazneen, 2024). The difficulties and obstacles of 21st-century existence necessitate being prepared to handle real-world issues, which call for advanced cognitive abilities, creativity, communication, innovation, teamwork, critical thinking, and problem-solving skills. Learning activities must be enhanced and developed in order to train and prepare the skills necessary to meet difficulties in the twenty-first century. The following abilities must be mastered: leadership and responsibility, social and cross-cultural skills, innovation skills, technology and information skills, and life and career skills.

As a summary of a clever and logical cognitive process, problem-solving offers a plausible explanation for a problem's resolution; in other words, thinking begins with the problem and concludes with the solution. The intellect and senses can be used to solve problems. The most crucial element of education is the ability of the learner to enhance their problem-solving technique (style of thinking). Planning, analyzing data, using techniques, verifying outcomes, experimenting with different approaches, and being open to receiving assistance from coworkers and others are all necessary for the problem-solving process. Four steps make up a problem-solving strategy: comprehending and articulating the problem, formulating a plan to solve the problem, putting the plan into action, and assessing the problem-solving process.

Problem-solving and cognitive distortion:

Cognitive distortions are merely methods by which an individual's thinking causes him to hold false beliefs. Negative ideas and opinions that skew a person's view of reality are known as cognitive distortions. According to McGrath and Repetti (2002), people commonly utilize these false beliefs to support negative ideas or feelings by telling oneself things that appear reasonable and true but only serve to maintain their negative self-perception. According to Nevid and Rathus (2005), people who are prone to depression often have a skewed perspective on the world, which affects how they perceive and understand life events. Individuals who suffer from anxiety or depression often have a negative attitude toward problem-solving, which keeps them from using their problem-solving abilities.

Review of Literature:

Rabina Debbarma. (2017). Cognitive distortion among Annamalai University students. The purpose of the study was to evaluate the degree of cognitive distortions among college students and investigate variations according to demographic characteristics like gender (male and female) and location (rural versus urban). Using simple random sampling, 100 students from Annamalai University in Tamil Nadu, ages 18 to 20, were chosen. The Cognitive Distortion Scale (CDS), created by Briere (2000), was used to gather data. The results showed that compared to male pupils, female students had more cognitive distortions. Students from rural and urban backgrounds had significantly different cognitive distortions, according to the data.

Omar Rimawi; Hussein Almasri. (2017). studied the Relationship Between Cognitive Distortions and Decision-Making Skills Among Al-Quds University Students. The purpose of this study was to investigate the connection between Al-Quds University students' cognitive distortions and decision-making abilities. 264 male and female students were chosen at random to take part in the study. Both decision-making skills and cognitive distortions were assessed using standardized instruments. The findings showed a negative relationship between cognitive distortions and decision-making abilities, indicating that poorer decision-making skills were linked to higher levels of distorted thinking. Furthermore, it was discovered that the average scores for cognitive distortions and decision-making abilities were both at a moderate level. Overthinking was shown to be the most common of the many kinds of cognitive errors. With higher levels seen among female students, those enrolled in the Faculty of Humanities, and students residing in villages, the results also demonstrated notable variations in cognitive distortions according to gender, academic subject, and location of residence.

I D Franestian, Suyanta, A Wiyono. (2020). Analysed problem solving skills of student in Junior High School. The specific goal of this study was to examine problem-solving abilities in relation to junior high school science instruction. Using a descriptive qualitative methodology, the study examined the outcomes of a test of problem-solving abilities. Purposive sampling was used in

the survey research method to choose 80 students who were classified as having low, medium, or high cognitive skills based on their results on the basic skill test taken at the time of new student entrance. The study used a five-item test of problem-solving abilities that was validated and modified to account for different problem-solving skill indicators.

Findings: The results showed that, on all measures, problem-solving abilities were typically poor. The following were the acquisition results for each component of problem-solving skills: 5.20% for problem identification, 57.60% for cause-and-effect connection, 47.10% for solution planning, 37.60% for identifying pertinent solutions, and 39.10% for analyzing the impact of solutions. According to the study's findings, junior high school students' problem-solving abilities in the context of studying science are in the low range.

Objectives:

- To study the cognitive distortion of Engineering students.
- To study the problem-solving skills of Engineering students.
- To study the Correlation between Cognitive distortion and problem-solving skill in Engineering students.

Hypothesis of the study:

- Cognitive distortion of Engineering students is High.
- Problem-solving skills of Engineering students are of a moderate level.
- There is a high correlation between cognitive distortion and Problem-solving skill among Engineering students.

Methodology:

Sample Size and Sampling Method:

In the present study, a sample of 200 students, comprising 100 males and 100 females, has been selected. For sampling, a Simple Random sampling technique was used to select 200 Engineering students.

Research Design:

A research design serves as the blueprint for a scientific study, encompassing research methodologies, tools, and techniques employed in the research process. It plays a crucial role in identifying and addressing potential issues that may arise during the research and analysis phases. In the current study, the aim is to investigate the level of cognitive distortion and problem-solving skills and their correlation.

Instruments Used:

1. **Cognitive Distortion Scale:** A standardized "Cognitive Distortion Scale" made by the researcher herself is used in the present research. It is a 40-item test for dysfunctional cognition. Cronbach's Alpha reliability was calculated which was found to be 0.636. To ensure its validity, the tool was subjected to both face and content validation by a panel of experts in the fields of psychology and education.
2. A standardized "**Problem-solving Scale**" made by the researcher herself is used in the present research. It is a 25-item test. Cronbach's Alpha reliability was calculated, which was found to be 0.636. To ensure its validity, the tool was subjected to both face and content validation by a panel of experts in the fields of psychology and education.

Analysis and Interpretation:

First objective of the research was **to study the cognitive distortion of Engineering students**. To check the level of Cognitive distortion of students, mean of the overall score was computed. In the table below, mean of the overall score of Cognitive distortion is mentioned.

N	200
Mean	141.25

Table 1: Mean of the overall score of Cognitive distortion of students.

Table 1 shows the mean of the overall score of Cognitive distortion of the Engineering students. According to the norm table of the Cognitive distortion scale, the score obtained from the statistical mean 141.25 lies in the average category. Thus, the first hypothesis, i.e., "Cognitive distortion of Undergraduate students is High" is **Rejected**.

Second objective of the research was **to study the Problem-solving skills of Engineering students**. To check the problem-solving skill of the students, mean of the overall score was computed. In the table below, mean of the overall score of problem-solving skill is mentioned.

N	200
Mean	84.64

Table 2: Mean of the overall score of Problem-solving skills of students.

Table 2 shows the mean of the overall score of problem-solving skills of Undergraduate students. According to the norm table of the problem-solving scale, the score obtained from the statistical mean 84.64 lies in the average category. Thus, the second hypothesis, i.e., "Problem-solving skills of Undergraduate students is of moderate level" is **Accepted**.

Third objective of the research was to study the Correlation between Cognitive distortion and problem-solving skill in Undergraduate students.

Variable	Pearson's Coefficient	Range	Degree of correlation
Cognitive Distortion and Problem-Solving Skill	0.33912	0.20-0.39	Weak Positive correlation.

Table 3: Correlation between Cognitive Distortion and Decision-Making skills

From the above table, the coefficient of correlation between **Cognitive Distortion** and problem-solving skills is +0.33912, which lies in the range 0.20–0.39, which shows a weak positive correlation. Thus, the third hypothesis, i.e., "There is a high correlation between cognitive distortion and problem-solving skill among Undergraduate students," is Rejected.

Discussion:

The present study aimed to investigate the level of cognitive distortions and problem-solving skills among engineering students, as well as to explore the correlation between the two variables. The findings provide valuable insight into the cognitive and behavioral patterns of undergraduate engineering students and highlight important implications for academic and personal development. Cognitive distortions are repeated negative thoughts that are often habitual and emphasized based on a person's own opinion or emotion. Researchers believe that cognitive distortions are sometimes but not always the result of stress, negative life events, or gradual smaller events, such as negative expressions from parents or caregivers, that continue to trigger this way of thinking later in life.

Firstly, the results revealed that the mean score for cognitive distortion among the sample of 200 engineering students was **141.25**, which falls within the **average** category according to the established norm table. This finding contradicts the initial hypothesis that cognitive distortion levels would be high among this population. The average level of cognitive distortions suggests that while engineering students do experience irrational thoughts and perceptions, these may not be excessively dominant or disruptive. This could be attributed to their exposure to technical education that encourages logical reasoning and analytical thinking, which may act as a buffer against extreme cognitive distortions. However, it is also essential to acknowledge that average levels still imply the presence of cognitive distortions, which, if left unchecked, could influence emotional regulation and academic functioning.

Secondly, the mean score of **84.64** for problem-solving skills also fell within the **average** category. This supports the second hypothesis and aligns with prior research that highlights moderate levels of problem-solving competence in undergraduate populations. Engineering students, by virtue of their curriculum, are frequently exposed to logical problem-solving tasks; however, the results suggest that these skills may not always transfer effectively to real-life situations or emotional challenges. Problem-solving, particularly in non-academic contexts, requires not just cognitive application but also emotional regulation and adaptive decision-making.

The most critical finding of the study is the presence of a **weak positive correlation ($r = +0.33912$)** between cognitive distortions and problem-solving skills, which led to the rejection of the third hypothesis positing a high correlation between the two variables. The weak correlation suggests that while there is a relationship, it is not strong enough to be deemed significant or predictive. This finding is consistent with earlier studies, such as those by Rimawi and Almasri (2017), which indicated a negative relationship between cognitive distortions and decision-making abilities. The presence of cognitive distortions may hinder individuals from employing effective problem-solving strategies by impairing judgment, inducing anxiety, and promoting avoidance behaviours. However, the weak strength of the correlation in the present study indicates that other mediating factors—such as personality traits, emotional intelligence, resilience, or academic pressure—may also play a role in shaping problem-solving efficacy.

This discussion underscores the importance of early cognitive-behavioural interventions that focus on identifying and restructuring distorted thinking patterns among students. Enhancing metacognitive awareness and emotional regulation through psychological training or counselling services may improve problem-solving abilities, particularly in emotionally charged or ambiguous situations.

Moreover, the findings reveal the potential benefits of integrating soft skills and emotional intelligence training into the engineering curriculum. While technical skills are crucial, the ability to address real-world problems effectively also depends on one's psychological flexibility and rational thought processes.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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