# APPLYING FUZZY LOGIC DECISION MAKING APPROACH TO ANALYZE THE STUDENT'S SELF-MANAGEMENT PERSPECTIVE IN PROFESSIONAL EDUCATION

**Dr. K. Ravichandran**
*Chairperson, School of Business Studies, Madurai Kamaraj University.*
**Dr. R. Muruganandham**
*Assistant Professor, Department of Mechanical Engineering, Thiagarajar College of Engineering.*
**Dr. S. Muralidharan**
*Associate Professor, Department of Mechanical Engineering, Thiagarajar College of Engineering.*

**Abstract**
*Professional Education has become very much challenging as it is competitive, research oriented and result oriented. The students have to struggle and toil to cope up with their academic schedule. As the day to day activities are hectic and tightly scheduled, the students have to balance their academic and personal life for which emotional stability is very much essential. Stress is the main factor responsible for weakening the emotional balance of the students. Our paper has made an attempt to peruse and analyze the causes and effects of stress using an optimization technique with Fuzzy Logic Decision Making (FLDM). The paper has applied Multi Criteria Decision Making tool (MCDM) for analyzing the data and has offered valid findings and valuable suggestions. The purpose of the paper is to understand and demonstrate the concepts of Fuzzy Logic Decision Making (FLDM) approach. The methodology involves identifying the key parameters and developing the fuzzy sets for all the parameters. From the developed fuzzy sets, membership grades are calculated, tabulated and ranked as per the fuzzy norms. The study is limited to the students of professional education.*

***Keywords:Education, Fuzzy logic Decision Making (FLDM), Personal life and Stress.***

## Objectives
1. To identify the various factors causing stress to engineering students.
2. To study and analyses the factors causing the work stress among engineering students.
3. To compare the stress causing factors among the students of various engineering disciplines.
4. To suggest appropriate stress-relieving techniques with a main focus on Yoga.

## Introduction
Engineering Education has always been competitive, challenging, placement oriented and above all performance related. Today's engineering education demands a multifaceted and versatile candidate with multiple capabilities. The present paper is an outcome of a research conducted among engineering students to identify the different factors that are causing stress to engineering students. The paper has summarized the major stress causing factors among engineering students and has categorized them into institutional, personal and environmental factors. The environmental factors causing stress to hostellers and day-scholars are expected to be different and hence the possible variations are also analyzed.

## Engineering Students
The academic design of arts and science courses are comparatively less cumbersome and less loaded in comparison to professional courses which are characterized by complexity, tough schedules and highly loaded. The present research has focused on engineering courses as they form the largest composition of professional education in India. The engineering students are required to work on an average schedule of 12 to 14 hours a day for their academic requirements. In addition to that they participate in various extra and co-curricular activities like NSS, NCC, Sports and Games. They also have a focus on preparing for competitive examinations like GATE, CAT, GRE, TOEFL, GMAT and the like for getting into higher studies in addition to preparing themselves for a decent employment either on campus or off campus after finishing their graduation. The students are also subject to a heavy peer pressure to perform in all dimensions. Hence it is an observed phenomenon that the engineering students keep themselves tied up round the clock busy with several activities.

**Methodology**
The methodology of research is as explained below.
The stress causing factors for the students have been identified after conducting a pilot study. Based on the findings of the pilot study, the factors have been grouped and categorized and The questionnaire has been constructed. The questionnaire has also been statistically validated. The data regarding the stress causing factors for students were collected from students belonging to various streams of engineering. The Stress was measured for all the students using Fuzzy Logic Decision Making (FLDM) method.

```
        ┌─────────────────────────────────┐
        │          Pilot study            │
        └─────────────────────────────────┘
                         │
                         ▼
        ┌─────────────────────────────────┐
        │     Designing questionnaire     │
        └─────────────────────────────────┘
                         │
                         ▼
        ┌─────────────────────────────────┐
        │   Distribution of questionnaire │
        └─────────────────────────────────┘
                         │
                         ▼
        ┌─────────────────────────────────┐
        │         Data collection         │
        └─────────────────────────────────┘
                         │
                         ▼
        ┌─────────────────────────────────┐
        │      Applying fuzzy logic       │
        └─────────────────────────────────┘

        ┌─────────────────────────────────┐
        │       Summary of findings       │
        └─────────────────────────────────┘
```
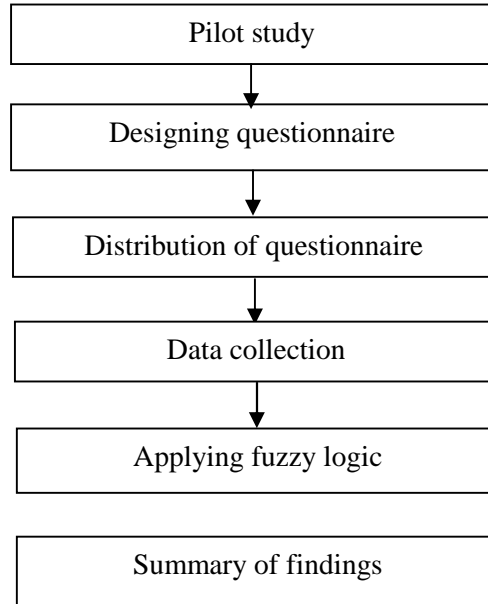
Fig.1 Methodology

The above methodology involves data collection from primary sources, converting into fuzzy sets, giving weightages, finding fuzzy scores and presenting the summary of findings.

**Data collection**
The questionnaires have been designed with Likert's 5 point-scale and they were distributed to all the 84 students from the Departments of Mechanical Engineering and Information Technology. The data collected from all the students were summarized.

**Table 1 Factors Scores for Students**

|  | Day scholars(IT) | | | Hostellers(IT) | | | Day scholars (Mech) | | | Hostellers (Mech) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Student No. | X | Y | Z | X | Y | Z | X | Y | Z | X | Y | Z |
| 1. | 27 | 38 | 27 | 15 | 28 | 20 | 15 | 22 | 10 | 15 | 20 | 16 |
| 2. | 16 | 20 | 10 | 29 | 31 | 30 | 16 | 20 | 10 | 13 | 19 | 16 |
| 3. | 30 | 40 | 28 | 31 | 21 | 24 | 13 | 15 | 9 | 14 | 18 | 17 |
| 4. | 28 | 39 | 26 | 16 | 29 | 30 | 33 | 39 | 29 | 16 | 21 | 19 |
| 5. | 12 | 29 | 20 | 18 | 26 | 17 | 12 | 20 | 20 | 18 | 21 | 16 |

The above table shows the sample data that we have collected from the respondents of the engineering college. Where, X - Institutional Factor Score; Y - Personal Factor Score; Z - Environment Factor Score.

**Fuzzy Logic**
The concept of fuzzy logic [1,3] was first coined by Lofti Zadeh in 1965 (Timothy, 2010). The concept of fuzzy set helps us to unravel the quantum of uncertainty associated with events. These events may be well defined

engineering problems, such as design and development, control system design or fabrication of machine tools. The inputs may be time-varying, interactive in nature leading to multi input, multi output system. Thus each system possesses a degree of uncertainty associated with them. There are different faces of uncertainty: Inexactness, Semantic ambiguity, Visual ambiguity, Structural ambiguity and Unde From the table number 3, it delineates the maximum fuzzy scores (stress) for various departments.

$\mu = \quad W_i \mu_i$
Where i= 1 to n
$W_i$ – weightings
$\mu_i$ – Membership grade for each individual input
$\mu$ – Output membership grade

**Stress**
The present day society has become highly complex, There is a wide spread feeling of insecurity among people due to the change of social and economic structures which have become highly competitive and demanding. The other aspects like desire to live luxurious, industrial revolution and consequential dominance of materialism, the breakup of the joint family system and the emergence of the nucleus family system, migration of rural population to urban areas and deficiency of spiritual strength add to the complexity. The list is endless and as a result of all these issues, a large proportion of the  people are suffering from stress related diseases like Hypertension, Heart ailments, Diabetes, Gastroenterology problems, Obesity and Irregularities in cholesterol level.

**Stress among Engineering Students**
The engineering students may face difficult curricula, longer academic schedules, strenuous carry homework, peer pressure to stay competitive, preparations for employment, preparations for highly competitive examinations to pursue higher studies, problems of sharing limited infrastructure in colleges and hostels, participation in co-curricular and extracurricular activities, longer stay away from home, problems of environmental hygiene in colleges and hostels, problem of quality of food in college canteens and hostels, problems of stay in hostels, problems of student dynamics, lack of adequate time for leisure and entertainment, interpersonal and intrapersonal conflicts, problems of communication and the like. It is needless to mention that some of the factors are relevant for arts and science students. However the factors need to be analyzed in the context of the other factors which are more relevant to engineering students.

**Impacts of Stress**
In simple medical terms, repetitive strain injury (RSI) [4,5] is defined as a Cumulative Trauma Disorder (CTD) stemming from prolonged repetitive, forceful, or awkward hand and other body movements. The result is damage to muscles, tendons, and nerves of the neck, shoulder, forearm, and hand, which can cause pain, weakness, numbness, or impairment of motor control. Cervical spondylitis is a disorder caused by abnormal wear and tear on the cartilage and bones of the neck.. Mental or emotional stress can be just as damaging. In the short term, the physical and mental strain will lead to emotional stress which will subsequently result in a number of life-threatening health disorders primarily the back pain in the short run and a serious back injury in the long run. It is being observed largely among engineering students.

**Suggestions for Reducing Stress**
**Yoga Therapy**
1. Students may practice Pachimothasana daily for 10 minutes.
2. Other asanas like Sirasana, Sarvangasana and Janu Sirasanana [4] may also be practiced. Pranayama is a priority.

**Pranayama**
1. Increases oxygen supply. It is a well-known fact that the energy necessary for cell work and body heat regulation is supplied through the reaction of oxygen and glucose to form high energy phosphate bonds which give incessant energy and mental stability.

2. Pranayama improves the digestive system and cures the diseases related to lungs, brain and heart. Students must practice yoga regularly for a calm, happy, enthusiastic and stable mind.
3. Pranayama develops overall immunity. [4, 5] Pranayama when practiced after Sirasasanam increases memory power.
4. Regular practice of yoga cures all mental and physical diseases and removes negative thoughts like anger, lust, greed, attachment, pride etc.

**Summary of Findings**
1. It was observed that the two major significant factors for the cause of stress are lack of communication skill and the privacy problems. Obviously the maximum privacy loss factor is observed for the hostellers belonging to Mechanical Engineering stream.  Lack of communication is an important problem for day scholars belonging to Mechanical Engineering stream.
2. Students face problems of changes in food habits and due to work pressure they skip food at times which poses a threat to the body metabolism. The students get severe headache and loss of appetite. They face problems of listening and concentration to class lectures.  It is found that a significant percentage of students  have the feeling of inferiority  whenever they make comparisons of their life style, dressing habits and ownership of vehicles with others.
3. A significant percentage of students could not live up to the competition posed by the fellow students and they find it difficult to tolerate and digest the excellence of the other students in both academic and non-academic activities. This phenomenon pushes them further down in their performance and leads to deeper levels of depression instead of motivating them.
4. Students opine that they are being advised and instructed by high performers. This makes them feel that they are not good at decision-making and trouble shooting and they are not a match to them.
5. It is found that the day scholars of Information Technology stream have comparatively larger problems of time management managing the academic tutorials, assignments, class presentations cum seminars and participation in other non-academic activities compared to students of Mechanical Engineering stream.
6. Hostellers have leisure time only on Saturdays and Sundays during which time they might engage in washing clothes, going to temples, visiting relatives or friends, going to   native places for meeting the family members.  Special classes during the holidays disturb their plans and cause a lot of stress.

**Conclusion**
This paper has made an attempt to identify the maximum stressors among the students of information technology and mechanical engineering streams from the perspective of both day scholars and hostellers. The research reveals that Information technology students have more stress compared to mechanical engineering students. Stress is one of the major problems that the students are experiencing. Stress affects the mental acumen of the students and disturbs their academic spirit.  The Institutional, Personal and Environmental factors are responsible for stress.  Stress normally poses a negative impact on the day to day life of the students which is a serious threat to their academic performance. In fact, the findings have revealed that physiological factors like BMI, Fat and the like are also responsible for causing stress to the students.

**References**
1. B.K. Mohanty, "Product classification in Internet business- A fuzzy approach," International Journal in Decision Support Systems, (2005)
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India, Delhi, 2010
3. T.Y.Tseng, "A New Algorithm for Fuzzy Multicriteria Decision Making," International Journal of Approximate Reasoning, 1992; 6:45 – 66
4. Peter R. Vagg, "Effect of Organizational Level and Gender on Stress in the Work Place," International Journal of Stress Management, Vol.9, No.4. October 2002.
5. Sarah J. Cotton, "Stress and Student Job Design: Satisfaction, Performance and Wellbeing in University Students," International Journal of Stress Management, Vol.9, No.3, July 2002, p.147.