A Study on People Skills Enhances Learning Outcomes and Peps up Job Placement using Combined Overlap Block Fuzzy Cognitive Maps (COBFCMS)

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ABSTRACT

The imperative effect of people skills that enhances learning outcomes and peps up the job prospects using Combined Overlap Block Fuzzy Cognitive Maps (COBFCMS) defined by W. B. Vasantha Kandasamy is analyzed in this paper. The combined overlap block FCM's defined in this method become effective when the number of concepts can be grouped as they are in large numbers. This paper discusses the concept of people skills and the results obtained by incorporating the people skills through teaching strategies in the classroom that resulted in better learning outcomes of the students. This paper has six sections. The first section gives the information about the development of fuzzy cognitive maps. The second section gives preliminaries of fuzzy cognitive maps and combined overlap block fuzzy cognitive maps. In section three is an explanation of the people skills components. Section four discusses the method of determining the hidden pattern, in section five; the concept of the problem is explained. The final section is dealt with the conclusion based on the research study.

Index Terms— FCMS, COBFCMS, People Skills.

1. INTRODUCTION

Political scientist R. Axelrod[1] introduced cognitive maps for representing social scientific knowledge and describing the methods that are used for decision making in social and political systems. Then B. Kosko[2,3] enhanced the power of cognitive maps considering fuzzy values for the concepts of the cognitive map and fuzzy degrees of interrelationships between concepts. FCMs can successfully represent knowledge and human experience, introduce concept to represent the essential elements and cause the effect relationships among the concepts to model the behavior of any system. It is a very convenient, simple and powerful tool, which is used in numerous fields such as social economic and medical etc. the purpose of study is to identify risk groups. English has emerged as a global language and the demand for the language is universal and youngsters from around the globe have realized that mastery in English would result in world wide recognition and better job prospects. According to Sherine, in the paper titled, "A Perspective on Communicative Competence and Soft Skills Among Engineering Students",

states that young engineers in the campuses have become fully conscious of the need for mastering English . . . the awareness that in addition to getting better grades in technical subjects, the importance of communicative competence and soft skills in present day context has dawned on them [4]. This research paper attempts to portray the importance of Personal Ethics and Intercommunication that are components of people skills or soft skills as the most vital skills to excel in academics, workplace and life. This study gives a wide scope for research work in all fields of study and provides a platform for bridging the skill gap requirement of the employers from the employees. The University offers programmes to improve communication skills, guided by qualified and experienced faculty. The role of language teachers in imparting people skills training apart from communication skills that is the most sought after skill by employers is dealt in this paper. According to Hofstrand, some people refer to employability skills as "core skills," "key skills," transferable skills," "general skills," "non-technical skills," and/or "soft skills" today's college students are expected to learn work related content at a faster rate than ever before[5]. They are expected to quickly develop job related technical skills and the people skills necessary to succeed on the job. The paper also discusses the teaching strategies and the dire need for the implementation of people skills program as part of the curriculum. In "The Study Skills Handbook" Stella Cottrell highlights the fact that skills can be developed by the learners through practice. A continued study and a reflective, active, self-evaluating approach to learning can develop a deeper understanding in the longer run. Cottrell exhorts the learners to be largely responsible for their own learning[6]. Gardner Brenda and Sharon quotes (Jenkins, 1992; Southerst, 1993) in their article, "Classroom Strategies That Facilitate Transfer of Learning to the Workplace" regarding the skill requirement of organization and the role of educational institutions. Organizations want people with "people skills," who can be effective team members and team leaders. . . However, they feel that academic programs have not been providing employees with these skills and abilities and need to fundamentally change their way of preparing students for the workplace[7] According to Chadha regarding the demands of the employers from graduates he opines that 'to meet this demand, students will be required, as part of their course, to demonstrate their communication and team-working abilities on more than one occasion; this is in

addition to the more technical skills required of their disciplines[8]. People skills taught in an explicit manner may be termed as general education for preparing the students for the world of work and for their personal effectiveness According to Bradshaw David in the research paper titled, "Transferable Intellectual and Personal Skills." From 1978 to 1981 the American Society for Values in Higher Education committed itself to the General Education Models (GEM) project. . . emphasis on skills was one of the distinctive factors of the project[9]. The main focus of this study is to analyse and evaluate the people skills needs of the engineering graduates so as to enhance their career prospects and frame a curriculum incorporating the aspects identifying the needs of the learners. The paper highlights the importance of people skills and has identified nine important people skills to be implemented in all institutions of higher learning across the globe. Moreover the data is an unsupervised one and also there is uncertainty in the concepts. Hence fuzzy tools alone have the capacity to analyze these concepts so it is chosen here.

2. PRELIMINARIES

Fuzzy cognitive maps (FCMs) are more applicable when the data in the first place is an unsupervised one. The FCMs work on the opinion of experts. FCMs model the worlds as a collection of classes and causal relation between classes.

Definition 2.1: An FCM is a directed graph with concepts like policies, events etc. as nodes and causalities as edges. It represents causal relationship between concepts.

Definition 2.2: When the nodes of the FCM are fuzzy sets then they are called as fuzzy nodes.

Definition 2.3: FCMs with edge weights or causalities from the set $\{-1, 0, 1\}$ are simple.

Definition 2.4: The edges e_{ij} take values in the fuzzy causal interval $[-1,1]$. $e_{ij} = 0$ indicates no causality $e_{ij} > 0$ indicates causal increase C_j increases as C_i increases (Or C_j Decreases as C_i Decreases). $E < 0$ indicates causal decrease or negative causality. C Decreases as C increases (And or C_j increases as C_i Decreases). Simple FCMs have edge values in $\{-1, 0, 1\}$. Then if causality occurs, It occurs to a maximal positive or negative degree. Simple FCMs provide a quick first approximation to an expert stand or printed causal knowledge. If increase (Or decrease) in one concept leads to increase (or decrease) in another, the value 1 is given. If there exists to relation between the two concepts, The value 0 is given. If increase (or decrease) in one concept decreases (or increases) another, then we give the value -1. Thus FCMs are described in this way. Consider the or concepts $C_1, ..., C_n$ of the FCM. Suppose the directed graph is drawn using edge weight $e_{ij} \in \{0, 1, -1\}$. The matrix E be defined by $E = (e_{ij})$, Where the e_{ij} is the weight of the directed edge C_i, C_j. E is called the adjacency matrix of the FCM, also known as the connection matrix of the FCM. It is important to note that all matrices associated with an FCM are always square matrices with diagonal entries as zero.

Definition 2.5: Let $C_1, C_2,.... C_n$ be the nodes of an FCM. Let $A=(a_1, a_2,...., a_n)$, where $a_i \in \{0,1\}$. A is called the instantaneous state vector and it denoted the on off position of the node at an instant

$a_i = 0$ if a_i is off=1
$a_i = 1$ if a_i is on, where $i = 1, 2, ..., n$.

Definition 2.6: Let $C_1, C_2, ..., C_n$ be the nodes of an FCM. Let $C_1 C_2, C_2 C_3, ..., C_i C_j$, be the edges of the FCM ($i \neq j$). Then, the edges form a directed cycle. An FCM s said to be cyclic if it possesses a directed cycle. An FCM is said to be a cyclic if it does not possess any directed cycle.

Definition 2.7: An FCM with cycles is said to have a feedback.

Definition 2.8: Where there is a feedback in an FCM, i.e., When the causal relations flow through a cycle in a revolutionary way, The FCM is called a dynamical system.

Definition 2.9: Let $C_1 C_2, C_2 C_3,..., C_i C_j$, be a cycle when C_i is switched on and if the causality flows through the edges of a cycle and if it again causes C_i, the dynamical system goes round and round. This is true for any node C_i, for $i = 1, 2, ..., n$. The equilibrium state for this dynamical system is called the hidden pattern.

Definition 2.10: If the equilibrium state of a dynamical system is a unique state vector, Then it is called a fixed point. Consider a FCM with $C_1, C_2, ..., C_N$ as nodes. For example let us start the dynamical system by switching on C. Let us assume that the FCM settles down with C_1 and C_n on, i.e. the state vector remains as $(1, 0, 0,..., 0, 1)$. This state vector $(1, 0, 0, ..., 0, 1)$ is called the fixed point.

Definition 2.11: If the FCM settles down with a state vector repeating in the form $A_1 \rightarrow A_2 \rightarrow ... A_I \rightarrow A_1$. Then this equilibrium is called limit cycle.

Definition 2.12: Finite number of FCMs can be combined together to produce the joint effect of all the FCMs. Let $E_1, E_2, ..., E_p$ be adjacency matrices of the FCMs with nodes $C_1, C_2, ..., C_n$. Then the combined FCM [11] is got by adding all the adjacency matrices $E_1,..., E_p$. The combined FCM adjacency matrix is denoted by $E = E_1 + E_2 + ... + E_p$.

Definition 2.13: Let P be the problem under investigation. Let $\{C_1, C_2, ..., C_n\}$ be n concepts associated with p (n very large). Now divide the number of concepts $\{C_1, C_2, ..., C_n\}$ into classes $S_1,..., S_t$ where classes are such that

(1) $S_i \cap S_{i+1} \neq \phi$ where $(i = 1, 2, ..., t-1)$
(2) $\cup s_i = (c_1, ..., c_n)$
(3) $(s_i) \neq s_j$ if $i \neq j$ in general

Now the FCM is obtained associated with each of the classes $S_1, ..., S_t$. The relational matrix associated with each S is determined. Using theses matrices $n \times n$ matrix is obtained.

This n × n matrix is the matrix associated with the combined overlap block FCM (COBFCM) of blacks of same sizes.

Definition 2.14: Suppose A= $(a_1, ..., a_n)$ is a vector which is passed into a dynamical system E. Then AE = $(a'_1, ..., a'_n)$. After thresholding and updating the vectors $(b_1, ..., b_n)$ is obtained. It is denoted $(a'_1, a'_2, ..., a'_n) \rightarrow (b_1, b_2, ..., b_n)$. Thus the symbol $\rightarrow$ means that the resultant vector has been threshold and updated. FCMs have several advantages as well as some disadvantages. The main advantage of this method it is simple. It functions on experts opinions. When the data happens to be an unsupervised one the FCM comes handy. This is the only known fuzzy technique that gives the hidden pattern of the situation. FCM is a well known theory, and the strength of the data depends on the number of experts opinions we can use combined FCMs with several experts opinions. At the same time the disadvantage of the combined FCM is when the weightages are 1 and -1 for the same C_i C_j. The sum is added to zero, thus at all times the connection matrices $E_1, ..., E_k$ may not be comfortable for addition. This problem will be easily overcome if the FCM entries are only 0 and 1.

3. PEOPLE SKILLS

A Study on People Skills enhances learning outcomes and peps up job placement using Combined Overlap Block Fuzzy Cognitive Maps(COBFCMS)[10,11,12].

In this research paper the tools used are the linguistic questionnaire and the expert's opinion taking into account the following nine concepts that pertains to people skill components { $C_1, C_2, ..., C_9$ }.

The following concepts are taken as the main nodes for our problem.

C_1- Adjusting to Change/ Adaptability
C_2- Sensitive to others/Tact
C_3- Self motivation/ Initiative
C_4.Dynamic expression/ Intercommunication
C_5-Self discipline/Hallmark of Leadership
C_6-Positive Ethical behavior/Personal Ethics
C_7- Dealing Impartially/ Objectivity
C_8-Earning trust/ Credibility
C_9-Convincing with Credibility/Persuasiveness

George W. Fotis in the book titled, "9 Most Powerful ways to Improve Your People Skills" explains that the nine people-skills namely personal ethics, adaptability, tact, credibility, intercommunication, persuasiveness, objectivity, initiative and self-discipline contribute most to winning confidence, respect and cooperation - whether within a family , or in a community, business or employment environment[13].
This research paper employs the concept of people skills in academic environment and incorporates the same in classroom as a teaching strategy to develop the confidence among the students to do well in academics and make them readily employable. The concept of adaptability is emphasized to help the students accommodate in the new environment of learning as it is evident that students from various cultural and academic environment after the completion of schooling finds it an herculean task to adjust to the education system in the university. The tact refers to the ability of students to deal with others in different circumstances especially in classroom sessions when a project is assigned or it requires teamwork to complete an assignment, or a group discussion and debates. Initiative is an important component of people skills which is essentially a quality of leadership skills. Motivation is the key to take initiative it helps the students to move up the ladder of success in academics and also career. Intercommunication involves the ability of the students to express their views to others, it helps the students develop the language skills and also gain confidence to express and share the knowledge. Self-discipline is essentially a very important component of people-skills. Self-discipline develops the character of an individual and it would reflect in their performance in all the three worlds namely the world of academics, the world of work and the real world. Personal Ethics involves ethical behavior and it is a universal concept of people skills applicable not only to the students and employers it is essentially the most important people skill that develops a person as a wholesome personality to lead a quality life. Objectivity another important component of people skills need to be practiced in several circumstances in real life by people in all walks of life. It helps in decision making and also solving problems in varied situations with ease without the interference of emotions, beliefs and personal preference. Credibility is an essential component of people skills that depends on the elements of integrity, reliability, veracity, competence and commitment. The ability to persuade people to accept the view points is an important people skill and it develops the interpersonal skills and capabilities of students and it also gives the confidence to present ideas of individuals in a comprehensive and effective manner that would result in acceptance of viewpoints.

4. METHOD OF DETERMINING HIDDEN PATTERN

Let C_1, C_2, …, C_n be the nodes of an FCM, With feedback. Let E be the associated adjacency matrix. Let us find the hidden pattern when C_1 is switched on. When an input is given as the vector A_1= (1, 0, 0, …, 0), the data should pass through the relation matrix E. this is done by multiplying A_1 by the matrix E. Let A_1 E= $(a_1, ..., a_n)$with the threshold operation that is by replacing a_i by 1 if $a_i > k$ and a_i by 0 if $a_i < k$ (k is a suitable positive integer). We update the resulting concept, The concept C_1 is included in the updated vector by making the first coordinate as 1 in the resulting vector. Suppose A_1 E $\rightarrow$ A_2 then consider A_2 E and repeat the same procedure. This procedure is repeated till a limit cycle or a fixed point is obtained.

5. CONCEPT OF THE PROBLEM
Using the linguistic questionnaire and the expert's opinion we have taken the following nine concepts {C_1, C_2, ..., C_9}
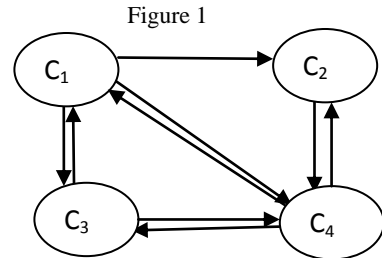
C_1- Adjusting to Change/ Adaptability
C_2- Sensitive to others/Tact
C_3- Self motivation/ Initiative
C_4.Dyamic expression/ Intercommunication
C_5-Self discipline/Hallmark of Leadership
C_6-Positive Ethical behavior/Personal Ethics
C_7- Dealing Impartially/ Objectivity
C_8-Earning trust/ Credibility
C_9-Convincing with Credibility/Persuasiveness

Now we proceed on to apply the effect of combined overlap block. FCM of equal length. Let us consider the eleven

concepts $\{C_1, C_2, ..., C_9\}$. These concepts are divided into cyclic way of classes, each having just four concepts in the following way.
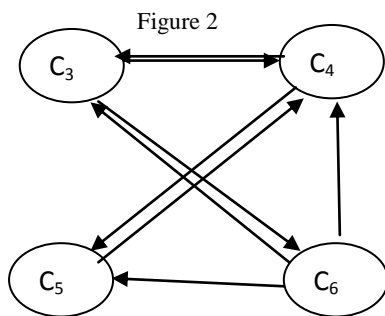
1.The directed graph and the relation matrix for the class C = {C_1, C_2, C_3, C_4}. the expert opinion of corporate officer is given as follows:

:

Figure 1

$$
\begin{array}{c}
\\
C_1 \\
C_2 \\
C_3 \\
C_4
\end{array}
\begin{array}{cccc}
C_1 & C_2 & C_3 & C_4 \\
\left[\begin{array}{cccc}
0 & 1 & 1 & 1 \\
0 & 0 & 0 & 1 \\
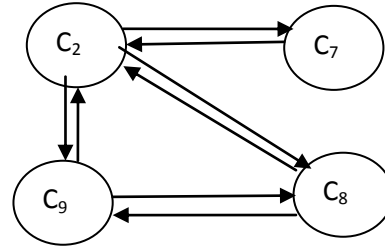1 & 0 & 0 & 1 \\
1 & 1 & 1 & 0
\end{array} \right]
\end{array}
$$

2. The directed graph and the relational matrix for the class C = { C_3 , C_4 , C_5 , C_6 }. Given by the expert is as follows: (faculty)

Figure 2

$$
\begin{array}{c}
\\
C_3 \\
C_4 \\
C_5 \\
C_6
\end{array}
\begin{array}{cccc}
C_3 & C_4 & C_5 & C_6 \\
\left[\begin{array}{cccc}
0 & 1 & 0 & 1 \\
1 & 0 & 1 & 1 \\
0 & 1 & 0 & 0 \\
1 & 1 & 1 & 0
\end{array} \right]
\end{array}
$$

3.The directed graph and the relation matrix for the class C ={C_2, C_7, C_8, C_9} Given by the expert is as follows: employer
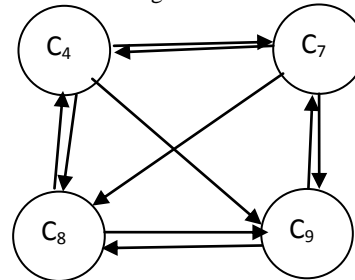
Figure 3

$$
\begin{array}{c}
\\
C_2 \\
C_7 \\
C_8 \\
C_9
\end{array}
\begin{array}{cccc}
C_2 & C_7 & C_8 & C_9 \\
\left[\begin{array}{cccc}
0 & 1 & 1 & 1 \\
1 & 0 & 0 & 1 \\
1 & 1 & 0 & 1 \\
1 & 1 & 1 & 0
\end{array} \right]
\end{array}
$$

The directed graph and the relational matrix for the class C = {C_4 , C_7 , C_8, C_9 }. Given by the expert is as follows: A student

Figure 4

$$
\begin{array}{c}
\\
C_4 \\
C_7 \\
C_8 \\
C_9
\end{array}
\begin{array}{cccc}
C_4 & C_7 & C_8 & C_9 \\
\left[\begin{array}{cccc}
0 & 1 & 0 & 0 \\
0 & 0 & 1 & 1 \\
0 & 0 & 0 & 1 \\
1 & 1 & 1 & 0
\end{array} \right]
\end{array}
$$

The combined direct graph and combined overlap block FCM of equal sizes as follows

Figure 5

$$
\begin{array}{c}
\begin{array}{cccccccccc}
C(m) & C_1 & C_2 & C_3 & C_4 & C_5 & C_6 & C_7 & C_8 & C_9
\end{array} \\
\begin{array}{c}
c_1 \\ c_2 \\ c_3 \\ c_4 \\ c_5 \\ c_6 \\ c_7 \\ c_8 \\ c_9
\end{array}
\left(
\begin{array}{ccccccccc}
0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 1 & 1 & 1 \\
1 & 0 & 0 & 2 & 0 & 1 & 0 & 0 & 0 \\
1 & 1 & 2 & 0 & 1 & 0 & 1 & 1 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 2 \\
0 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 2 \\
0 & 1 & 0 & 1 & 0 & 0 & 2 & 2 & 0
\end{array}
\right)
\end{array}
$$

Now using the matrix A of the combined overlap block FCM, We determine the hidden pattern. Suppose the concept S_1 is in the on state and another nodes are in the off sate.

Let the initial input vector be X={ 0 0 0 0 0 1 0 0 0 }

X C(m)   =   {0 0 1 1 1 0 0 0 0 }=X1

X1 C(m) =   {2 1 2 3 1 1 1 1 0 } $\rightarrow$ {1 1 1 1 1 1 1 1 0 }=X2

X2 C(m) =   {2 4 4 8 2 1 3 2 5 } $\rightarrow$ (1 1 1 1 1 1 1 1 1 }=X3

X3 C(m)=   {2 5 4 9 2 1 5 4 5} $\rightarrow$ (1 1 1 1 1 1 1 1 1 }=X3

Where $\rightarrow$ Denotes the resultant vector after thresholding and updating.

X3 is the hidden pattern which is the fixed point

6. IMPLEMENTATION OF PEOPLE SKILLS

A sample of 71 students of Electronics and Instrumentation Engineering students of Hindustan University, of Batch 2008-

2012, the Pilot Study Group were administered specific training in People Skills with emphasis on Personal Ethics and exposure to experiential learning in language classroom by the research scholar*, the first author of this research paper, as part of the research study on the effect of People Skills training on engineering students. The Main Study Group representing other engineering streams were not exposed to people skills training. The interpretation of the survey questionnaire related to the importance of the various components of people skills indicated that 99.8% of the employers opined that Personal Ethics as the most important people-skills. 97.5% employers claimed importance for intercommunication skills and this indicates the importance of language skills that students should possess before entering the world of work as shown in Figure 6. Personal Ethics was given the maximum priority over other people skills such as adaptability, tact, initiative, intercommunication, self-discipline, objectivity, credibility and persuasiveness. A marked improvement in the percentage of each component of people skills by the Pilot Study Group over the students with traditional teaching practice namely the Main Study Group (MSG) proved that people skills need to be taught in an explicit manner. Table 1 indicates the pass percentage of the engineering students of various courses that represents the learning outcomes of the students after the first year English exams. The PSG, Electronics and Instrumentation Engineering (EIE) students shows the highest pass percentage of 92.96% after exposure to People Skills training module in the language classroom during the first year.
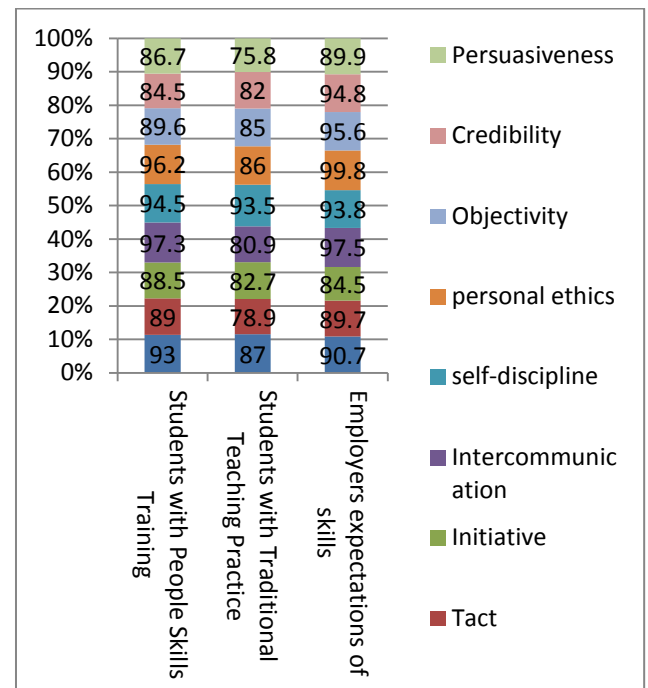

Figure 6: Comparative account of the people skills possessed by students and expected by employers

Table 1: Pass Percentage of engineering students
Batch 2008-2012 in the first year English exams

Engineering Courses	Number of students	Pass percentage
Mechanical	229	85.17
Aeronautical	209	95.52%
Automobile	60	77.59%
Civil	74	89.47%
Information Technology	154	83.77%
Electronics and Communication Engineering	224	91.96%
Electrical and Electronics Engineering	65	83.78%
Electronics and Instrumentation Engineering	**71**	**92.96%**
Computer Science Engineering	129	88.32%

7. CONCULSION

While analyzing FCM, When the concept C_6 "Positive Ethical Behavior is in the on state, the other concepts C_1, C_2, C_3, C_4, C_5, C_7, C_8, C_9, are in the on state. The necessity of imparting people skills training such as developing Personal Ethics or Positive Ethical Behaviour represented as C_6 has become inevitable for the engineering students. Positive Ethical Behaviour and Intercommunication will help the students to be trained as industry ready graduates with good Personal Ethics and a sufficient command over language. According to Weegar Anne Mary, in the article, "Promoting Ethical Practices within Institutions of Higher Education", views that the concept of teaching of Ethics , many would agree that students should have learned values and ethics before they entered college. For the most part, students have learned their values in the home, school, church, and through their interaction with members of the society in which they live.[14] Robert D. Brown and LuAnn Krager states in the article , "Ethical Issues in Graduate Education Faculty and Student Responsibilities" that, if higher education is to fulfill its ethical obligations to society, a logical starting place is the day-to- day interaction between professors and students.[15] This circumstance is particularly true for graduate education, in which the relationship between student and advisor is especially important.

Therefore Personal Ethics is the Golden Rule and above all the People skills. Personal Ethics develops the Personal Effectiveness of the students and it results in effective learning outcomes and peps up their job prospects. The placement record of 91.8% of the PSG students the highest when compared to rest of the students of varied engineering streams of the University proved that people skills training enhanced learning outcomes and placement record. The research study has proved that Personal Ethics is the most vital people skill to excel in the world of work and academics.

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