

## Measuring, Assessing and Ranking Preferential Domain Interest of Engineering Aspirants in Goa across 100 Engineering Streams using Brain Checker Engineering Sorter Test

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### ABSTRACT

An interest inventory is a testing instrument designed for the purpose of measuring and evaluating the level of an individual's interest in, or preference for, a variety of activities; also known as interest test. First designed by Dr. Edward Kellogg Strong Jr. and popularly referred to as the Strong Interest Inventory (SII), the thematic structure and conceptual inspiration was used to create The Brain Checker Engineering Interest Inventory known as Brain Checker Engineering Sorter Test (B.E.S.T) which was designed by Dr. Jignesh Prashnani, PhD, Psychology along with Dr. Ashwin Raje, MA-Clinical Psychology and Ms. Keya Raje, MA-Counseling Psychology. The validation of the Test was done at Professional Learning Institute, Margao, Goa on 194 students and 72 parents over a period of one month to try and measure, assess and rank their engineering preferences suitably after cross comparing their responses against 100 Engineering Specialisations to deduce the list to Suitable 7 recommended specialisations.

**Keywords:** *Psychology, Interest Tests, Engineering Assortment, Software Enabled Evaluation, Indian Students, Engineering Career Assessment, Career Self Efficacy, Teenagers, Validity, Strong Interest Inventory (SII), Holland's Theory*

A test that determines a person's preferences for specific fields or activities is known as an Interest Test or an Interest Inventory. Some of the primary methods of assessments include direct observations, self-evaluation test, ability tests or self-reporting inventories pertaining to interests in sports, vocational, social or educational aspects. The first time, Interest Inventories were ever used was in 1927, when American Psychologist Dr. Edward Kellogg Strong Jr. designed his widely acclaimed Strong Interest Inventory (SII).

The 1927 version of the test was specially designed for males whereas in 1933 a second version for female's was launched. Further in 1974, when Dr. Edward Strong's successor Dr.

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Received: July 19, 2019; Revision Received: September 21, 2019; Accepted: September 26, 2019

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David S Campbell revised the Strong Interest Inventory (SII) to Strong-Campbell Interest Inventory. The original SII contained 325 activities or items on which the subject's likes, dislikes, interest, indifferent attitudes were noted and evaluated with respect to school subjects, occupations, activities etc. Subsequent revisions made to the SCII in 1981 and in 1985. The test takers were asked to choose their favorite set of items from amongst a pair of items highlighting their preference. 162 separate occupational scales were used along with 23 grouping scales to evaluate the test taker's Basic Interest Scales. Dr. John Holland's Occupational codes were also used to further classify the interest scheme into Realistic, Investigative, Artistic, Social, Enterprising and Conventional. In 1985, the longstanding goal of equalizing the number of male and female scales has made substantial progress. Just to explain a case in point, the 1974 scale had 37 matched scales whereas the 1985 revision has around 101 matched scales.

In 1939, Dr. Frederic Kuder while working for the United States War Department, created his most commonly administered interest inventory is the Kuder Preference Record. The test has 168 items wherein 3 choices are presented to the test taker to choose from against each question. The scores are then mapped to 10 interest scales presenting a co-relation amongst them and giving out a broader profile of the test taker. Other interest inventories include the Guilford-Zimmerman Interest Inventory, the G-S-Z Interest Survey, the California Occupational Preference Survey, the Jackson Vocational Interest Survey, and the Ohio Vocational Interest Survey. There are also inventories designed especially for children, for the disabled, and for those interested in the skilled trades.

Interest inventories are widely used in vocational counselling, both with adolescents and adults. Since these tests measure only interest and not ability, their value as predictors of occupational success, while significant, is limited. They are especially useful in helping high school and college students become familiar with career options and aware of their vocational interests. Interest inventories are also used in employee selection and classification.

With the United States Database of Careers recording more than 2100+ Careers with Engineering Specialisation alone having more than 100+ Specialisations, Careers in general and interest assessments in specific have come a long way from 1939. Today, specific interest test assessing a specific set of careers assuming a pre-existing inclination towards a certain subset of careers by the test taker is assumed since forming opinions with the plethora of information available in the market, thanks to the augment of the internet age has become easier.

### ***Objective of The Paper***

The core objective of this research article is to critically evaluate, measure, assess the effectiveness, accuracy and overall suitability of the Brain Checker Engineering Sorter Test administered on 194 students studying at Professional Learning Institute, Goa in lieu of evaluation of their interest using the B.E.S.T to cross compare their preferences as against 100 Engineering Streams to rank and sort the most Suitable 7 specialisations using scientific testing methodology and using principles of psychology while executing the evaluation. The core objective also remains to assess the accuracy and validity of the B.E.S.T Inventory in helping students choose their preferred engineering specialisation.

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### **Engineering in India and The Process of Choosing Specialisations**

India has 1.3 Million Schools serving 315 Million students, which is the highest number of students studying in any country across the world. Each year around 1.2 Million students appear for the prestigious IIT-JEE Entrance examination with around 10,000 students making the final list, which computes to be 0.008% passing ratio, add to this the fact that around 4 Million Indian students appear for varied state wise CET Entrance Examinations to be considered for various Engineering Colleges in their respective states. India is one of the world's highest engineer producing nation with around 1.5 Million Engineers passing out of colleges every year in India. Compare this with the fact that the World's No.1 Economy, United States of America produces 95000 engineers every year.

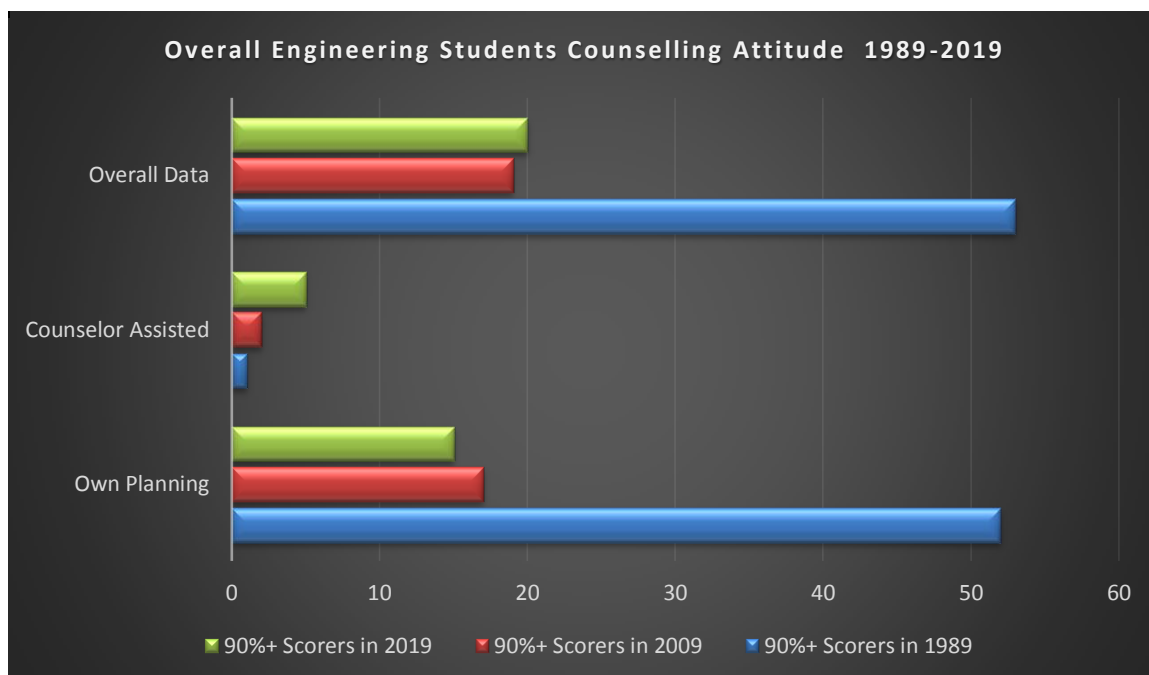
In 2017, around 1.42 Crore Indian students appeared for their 12<sup>th</sup> Standard Examinations, of which around 40 Lakh appeared for their Engineering Entrance Examinations. Evidently around 28% of the students had an over-whelming preference for Engineering. In a recent survey conducted on Engineering Aspirants by Brain Checker, competitive coaching in terms of JEE or CET preparation was undertaken almost by every aspirant but what was shocking to note was:

1. Only 1 in 5 students could write down 30 Engineering Specialisations
2. Almost 9 out of 10 students opted for Professional Coaching for JEE or CET Exams
3. Only 1 in 6 students knew that more than 100 Engineering Specialisations existed
4. Only 1 in 10 students had read about what the job profile of their chosen engineering involves
5. Only 1 in 20 students had made a proper road map with Specialisation Evaluation, College Identification, Future Road Map Planning and Employment Scenario
6. Only 3 in 100 students had taken a Counsellor's help in evaluating his options

These facts were striking and painted a bleak picture of what lay ahead for 97% of the engineering aspirants. While 90% students took coaching for preparing for JEE Entrance Examinations or State CET Engineering Entrance Examinations, less than 3% students actually had a road map, a definite career plan and actionable information about the kind of engineering's that exist in the market, the suitability or personal fitment and the employment outlook of the industry keeping in mind the medium to long term outlook.

With increasing number of students scoring higher percentages academically in their 10<sup>th</sup> or 12<sup>th</sup> examination, far lesser number of students have worked on creating a definite roadmap for ensuring sustained success with respect to their careers. The graph below depicts this in a better way:

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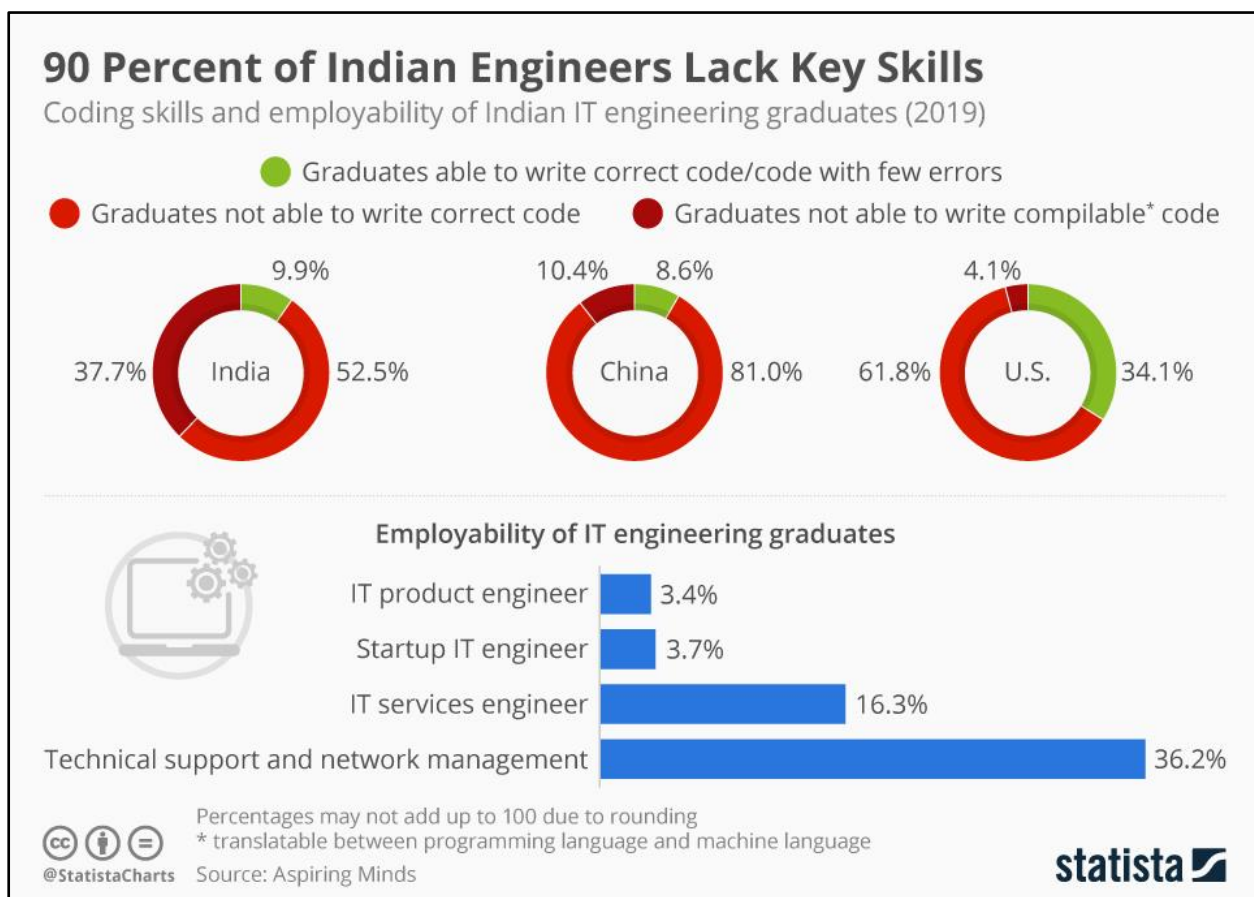


***Fig. 1 Around 85% Students Opting for Engineering did not consult any Professional Counselor or Psychologist before deciding on their career stream. The pattern is more or less similar from 1989-2019, even though the students interviewed belonged to the 90% + scoring category (Total 72 Parents and 20 Students)***

Over the last 30 odd years, the competitiveness has increased multi-fold, however the parental attitude and methodology deployed by parents remains questionable. As highlighted in the image depicted below, around 90% engineers as of 2019, lack key skills. In a survey conducted on Computer Engineering Graduates by Aspiring Minds, the educational void was eye opening when comparing India with China and the United States of America. The key take-aways were:

1. 37% Indian Computer Engineers were not able to write compliable programming codes, compared to 10% in China and 4% in the United States of America
2. About 52% Indian Computer Engineers were not able to write correct codes as compared to 81% in China and 61% in United States of America
3. Only 9% Indian Students were able to code with no or few errors whereas the same in China and USA was 8% and 34% respectively.

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**Infographic1. Employability of IT Engineering Students in India, China and USA.**  
 Source (Statistacharts and Aspiring Minds)

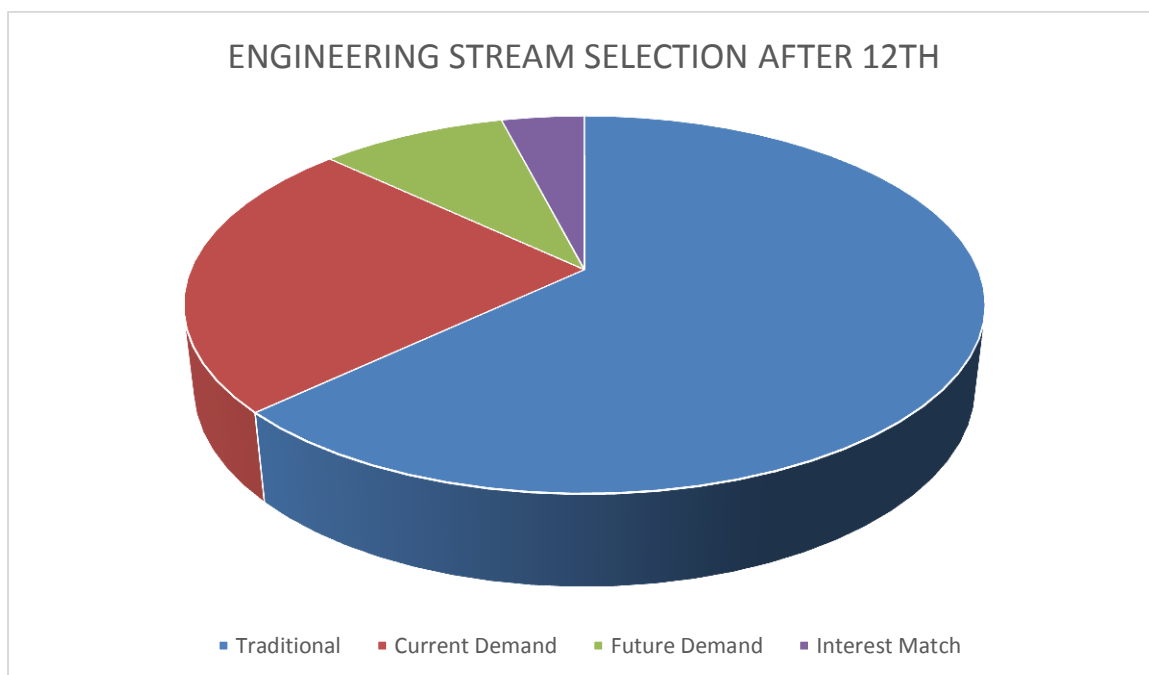
**Pre-Implementation Measurement of Occupational Readiness of Students at Professional Learning Institute, Goa**

In a pre-test survey conducted by Brain Checker, on 29 students in 10<sup>th</sup> standard and 41 students in standard 11<sup>th</sup>, totaling 70 out of the total 194 students planning to appear for the Brain Checker Engineering Sorter Test, it was observed that current process deployed by the students when asked to categorize into 4 broad categories, gave out a deplorable picture of how highly intelligent kids are inevitably making one of the most rookie mistakes while taking probably the most crucial decision of their life. When asked to confirm, what made them fixate on their chosen specialisation, from a list of 4 closed ended options, the answers were:

- Traditional Mindset: 63%
- Current Demand of the Engineering: 24%
- Future Demand of the Engineering: 9%
- Interest Matching: 4%

Except the 13% who either matched their interest to the chosen stream or anticipated a higher demand curve for their chosen engineering in the near future (10 years) around 87% made wrong stream selections. The impact this would bear and the long-term implication this would have on their overall employability is catastrophic.

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**Fig.2 Current Specialisation Selection Process for Engineering deployed by current 10<sup>th</sup> and 11<sup>th</sup> Standard students (Total 70) studying at Professional Learning Institute in Margao, Goa**

The distribution of students and parents was as under:

| SR.NO | STANDARD              | GIRLS | BOYS | PARENTS | TOTAL |
|-------|-----------------------|-------|------|---------|-------|
| 1     | 8 <sup>TH</sup>       | 6     | 11   | -       | 17    |
| 2     | 9 <sup>TH</sup>       | 7     | 14   | -       | 21    |
| 3     | 10 <sup>TH</sup>      | 11    | 18   | -       | 29    |
| 4     | 11 <sup>TH</sup>      | 13    | 28   | -       | 41    |
| 5     | 12 <sup>TH</sup>      | 23    | 43   | -       | 66    |
| 6     | 12 <sup>TH</sup> PASS | 8     | 12   | -       | 20    |
| 6     | PARENTS               | -     | -    | 72      | 72    |
|       | TOTAL                 |       |      |         | 266   |

**Fig.3 Data of Participants of the BEST Pilot Project at Professional Learning Institute, Goa**

Professional Learning Institute is a leading Coaching Academy in Margao, Goa which had agreed to part-take in this pilot program permitting Brain Checker and its team of counselors to execute the Brain Checker Engineering Sorter Test, related pre and post assessments on their 194 Students and 72 parents. The students who participated in the pilot were studying in Standard's 8<sup>th</sup> to 12<sup>th</sup> in various schools and junior colleges across Goa and their parents.

**METHODOLOGY**

**Sample Size**

The sample comprised of 266 participants which included 194 students studying in 8<sup>th</sup> to 12<sup>th</sup> standards and 72 parents who were engineers and had scored 90% and above in their own 12<sup>th</sup>

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standards. In both the groups, children and parents from different socioeconomic classes-low, medium and high were included for procuring a cross-economic-strata result.

### ***Instrument***

The Brain Checker Engineering Sorter Test (B.E.S.T), was used to evaluate the responses of 266 participants. The Test sub-divided in 4 Sections comprising of 155 Questions having multiple choice answered was administered with an overall time frame of 45 minutes. BEST is a system based offline Interest Inventory to be completed in one sitting

### ***Procedure***

The Computer Lab of Professional Learning Institute having 15 Computers (Windows Based), was used for the purpose of administering this test. The Software was installed in all 15 computers and students and parents participating in the pilot program were scheduled to take the test in designated slots of 15 students each. The entire module was completed in 8 working days covering approximately 4-5 batches of 15 students each day and remainder on the 8<sup>th</sup> day of testing.

### ***Post-Implementation Measurement & Assessment of Occupational Readiness of Students at Professional Learning Institute, Goa after attempting the Brain Checker Engineering Sorter Test***

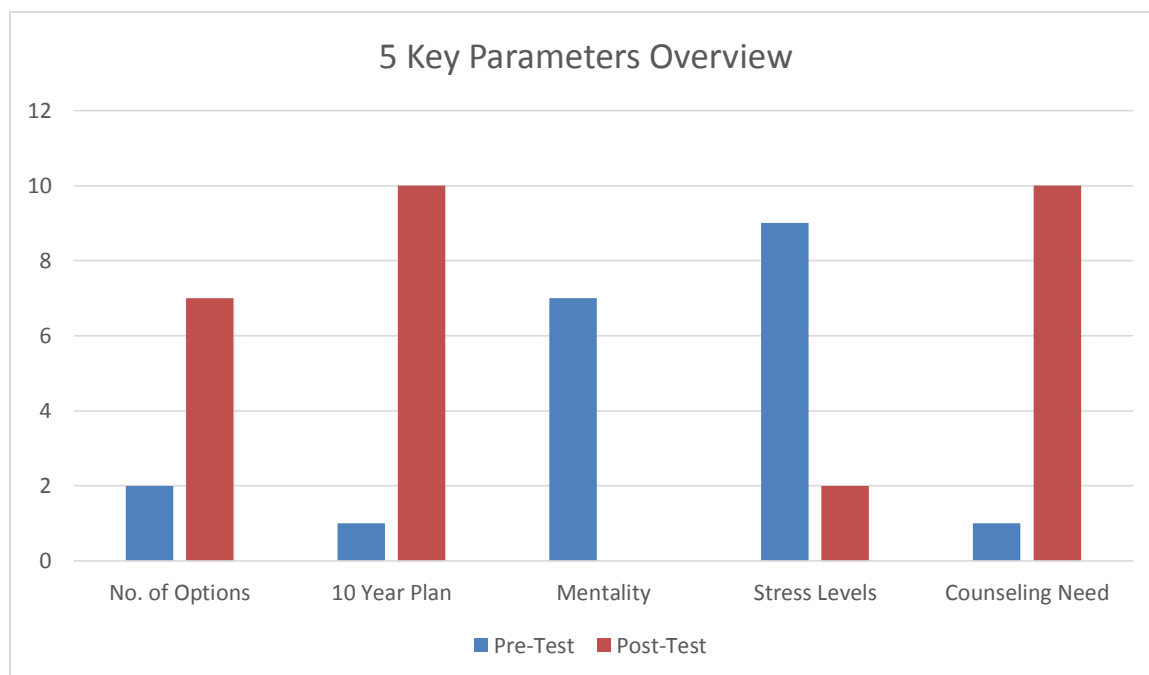
The test having been implemented on 266 participants of which 194 counseling's of students who were in the decision-making phase was completed. The following were the key take-aways from the entire pilot program:

1. Around 87% students agreed that the recommendations made were in their comfort zone and the entire process was helpful in charting out an action plan
2. 92% students stated that at least 3 out of the 7 recommendations were specialisations they had never heard off and were excited to know more about it
3. 91% students appreciated the 10-year medium term employability projection index which helped them filter their choices
4. 94% students agreed that B.E.S.T has been really helpful for them to sort and choose from the various specialisation options available for them in the market
5. 97% parents agreed that Brain Checker's Engineering Sorter has been a eye-opener and has given them enough content to work out on an action plan for their child.

Here is a pre-test and post-test comparative on 5 Key Parameters namely:

1. Number of options that you were considering
2. The 10 Year Action Plan
3. Traditional Mentality
4. Overall Stress for getting into IITs and NITs
5. Need for Professional Counseling a Pre and Post Test Rating

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**Fig.4 Statistical Data of 194 Students evaluated on the 5 Key Parameters Pre and Post Testing**

1. While 2 specialisations were averagely being considered by each student, it jumped to 7 post counseling
2. Whereas 1 in 10 students was planning for the mid-term 10-year view, it increased to 10/10 post counseling. All students wanted to chalk out a 10-year plan before choosing their specialisation from the Suitable-7
3. 7/10 students had a traditional mentality of choosing known or core sectors, this changed to 0/10 post counseling
4. 9/10 students expressed having stress about the JEE or CET Exams which came down to 2/10 students expressing feeling stressed after knowing their overall options in terms of specialisations
5. While 1/10 students felt the need for a counselor to guide them pre-counseling, post counseling 10/10 students agreed that expert services from professional counselors must be sought before making life altering decisions.

### **CONCLUSION**

Interest Tests have been historically used by Psychologists across the world to have a better understanding of the human psyche. It helps the Counselor have a clearer view of the likes and dislikes of the test taker and the weightage to be assigned based on individual responses to the career or vocational recommendations to be made while suggesting career options to the test taker. While Interest Tests are highly subjective and the responses provided are likely to change over a period of time, students of psychology over the years have conducted several studies trying to assess the long term impact of a interest test with respect to job satisfaction, perceived success, overall growth of the individual and have concluded with sufficient proof that those who chose their careers or vocations chosen post interest tests have had higher job satisfaction or overall growth as well as were more successful than the one's to did not opt for such assessments.



## **Measuring, Assessing and Ranking Preferential Domain Interest of Engineering Aspirants in Goa across 100 Engineering Streams using Brain Checker Engineering Sorter Test**

With the increasing competition in getting through to the IITs, NITs or to the likes of BITS, Pilani or similar quality institutions to pursue your Under-Graduation or Post-Graduation in Engineering, reducing success rate in getting into the institution of choice, higher number of STEM Students getting 90% plus marks, having a robust action plan would play the role of a king maker in the longer run. In a recently concluded survey of schools in India, a whopping 93% Principals and educators felt the need for professional counselors and agreed that getting a psychological evaluation done before finalizing one's career would be the most critical factor for success in the days to come.

Of the 194 Students from the Pilot Test Program from the Professional Learning Institute in Goa, the individualized counseling of the Suitable-7 Engineering Options derived from their own preferences and responses helped the students understand what are their realistic options. It also provided the students with sufficient information to choose and evaluate different colleges offering these unique specialisations helping them formulate their Plan-B which acts as a stepping stone for one's success.

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***Acknowledgements***

The author appreciates all those who participated in the study and helped to facilitate the research process.

***Conflict of Interest***

The author declared no conflict of interests.

**How to cite this article:** Prashnani. J, Raje. A & Raje. K (2019). Measuring, Assessing and Ranking Preferential Domain Interest of Engineering Aspirants in Goa across 100 Engineering Streams using Brain Checker Engineering Sorter Test. *International Journal of Indian Psychology*, 7(3), 454-463. DIP:18.01.049/20190703, DOI:10.25215/0703.049