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CURRICULAR GAPS ANALYSIS AND REMEDIAL MEASURES FOR PROBLEMS IN EDUCATION SYSTEM, WITH SPECIAL REFERENCE TO PERFORMANCE OF ENGINEERING STUDENTS IN THE PRIVATE SECTOR INSTITUTION IN THE STATE OF WEST BENGAL, INDIA

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Abstract

This paper attempts to identify the skills gap among the budding engineers in the state of West Bengal and also tries to develop some practical remedial methodology in improving the state of affairs in Engineering Education. It is well known in the academic circles that our country needs skilled technical man-power in both IT and core engineering sector. But the skills required to learn Engineering or applied sciences are more or less the same set of skills or competencies everywhere and at all times of human history. Understanding of Elementary Mathematics, Elementary Physics and Chemistry, basics of English Language lays the foundation for gaining knowledge of the Engineering systems. We have focused upon student performance in Mathematics and Physics at both 10th standard and 12th standard and correlate such performance with that in some most important core Engineering subjects up to the end of third year of degree Engineering curriculum in West Bengal. Once these are under-developed, there will be only limited scope for further improvement of skills in the Engineering disciplines. With this aspect in mind, a study has been undertaken to identify the gap areas of education and training at the elementary level and such a study will help us develop teaching methodologies as well as up gradation of curricular contents at the elementary level. Our educational system needs a continuous process of Quality Improvement. This paper is the outcome of survey-based study among the budding engineers of today.

Introduction
Objectives of the study
The primary objective is to identify the curricular gaps at 10th and 12th standard so that such gaps could be bridged through introduction of new curricula at the 10th standard itself, so that the students opting for engineering courses are well-equipped with basic skills required for being a competent Engineering professionals in later life. It's also a long-standing issue of an outdated syllabus at the 10th level in the state of West Bengal.

Theoretical background
Through long experience of teaching at the undergraduate Engineering students, the author tried to delve into the facts lying behind poor employability skills among the Engineering students in many of the private sector Institutes of West Bengal. Through this survey study, certain facts on the above subject will be revealed only to raise awareness among the decision-makers in our educational system so that in course of time a special syllabus could be introduced at the 10th and 12th standard. 10th standard (general), 10th standard (Bio-sciences), and 10th standard (Mathematical Sciences) could be thought of and similarly for the 12th standard. If such a thing happen, waste of talent would definitely be reduced to a great extent. For implementing such a scheme, we could easily introduce the techniques of Educational Technology from 10th standard onwards, so that increasingly digital society could find innovative solutions to the problems of Indian educational system which is heavily theory-and –memory-oriented rather than being a practical one that could withstand global competitions in the truest sense of the term.

Research Design, sampling and research methodology for this study
In this case study, the author has done convenience sampling by selecting one private Engineering   papers up to 3rd year have put on a ordinal-type numerical scale. Combined score of Mathematics and Physics at both 10th and 12th standard, and that of a number of core engineering papers that require high level logical, analytical and mathematical skills have been taken up for

Data-Analysis & Major Findings and conclusions from the survey based study
- From the analysis of data, as displayed in the following set of figures clearly shows that there is a huge curricular gap between 10th and 12 th standard syllabi of science and Mathematics. The performance of 12th standard has a definite positive correlation with that in the core engineering subjects. Hence for raising the standard of education in Engineering

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and Technology, we must emphasis on the quality of education at the 12th level, especially understanding of the fundamentals of Mathematics and Physics along with basics of Chemistry and Biology.

- Figure-2 clearly shows that the 10th level students display very high performance in the form of combined score of Mathematics and Physics 8.22, compared with mean of the same at 12th standard being 5.76. Hence it can be concluded that the curriculum at 10th level is really a sub-standard one, in comparison with that of the 12th level. Therefore a thorough revision of 10th level syllabi is required for all Indian students. To solve problems of general education at the elementary level, we could think of having 10th standard (General), 10th level (Science), 10th level (Commerce), 10th level (Humanities and Arts), 10th level (Sports Science), 10th (Music and Entertainment) etc., as categories of students with specialized talents exist in large numbers.

- Figure-3 explains the standard of engineering graduates we are producing from private sector educational systems. Mean score of 2.31 out of 5.00 explains, the quality of engineering professionals who would be leading various Engineering organizations in manufacturing, research and global competitions. In comparison with the performance of such students at 10th standard, performance in core Engineering subjects is quite frustrating and hence a huge waste of human resources. Hence up-gradation and specialization of curriculum at the 10th level is really a great necessity in the larger interest of the society. Only such students should take up Engineering and Technology, who could display high performance in Engineering. An aptitude test at the 10th level could decide about the future prospects of a students, without blindly following the set trends of choosing Engineering and Medicine as profession.
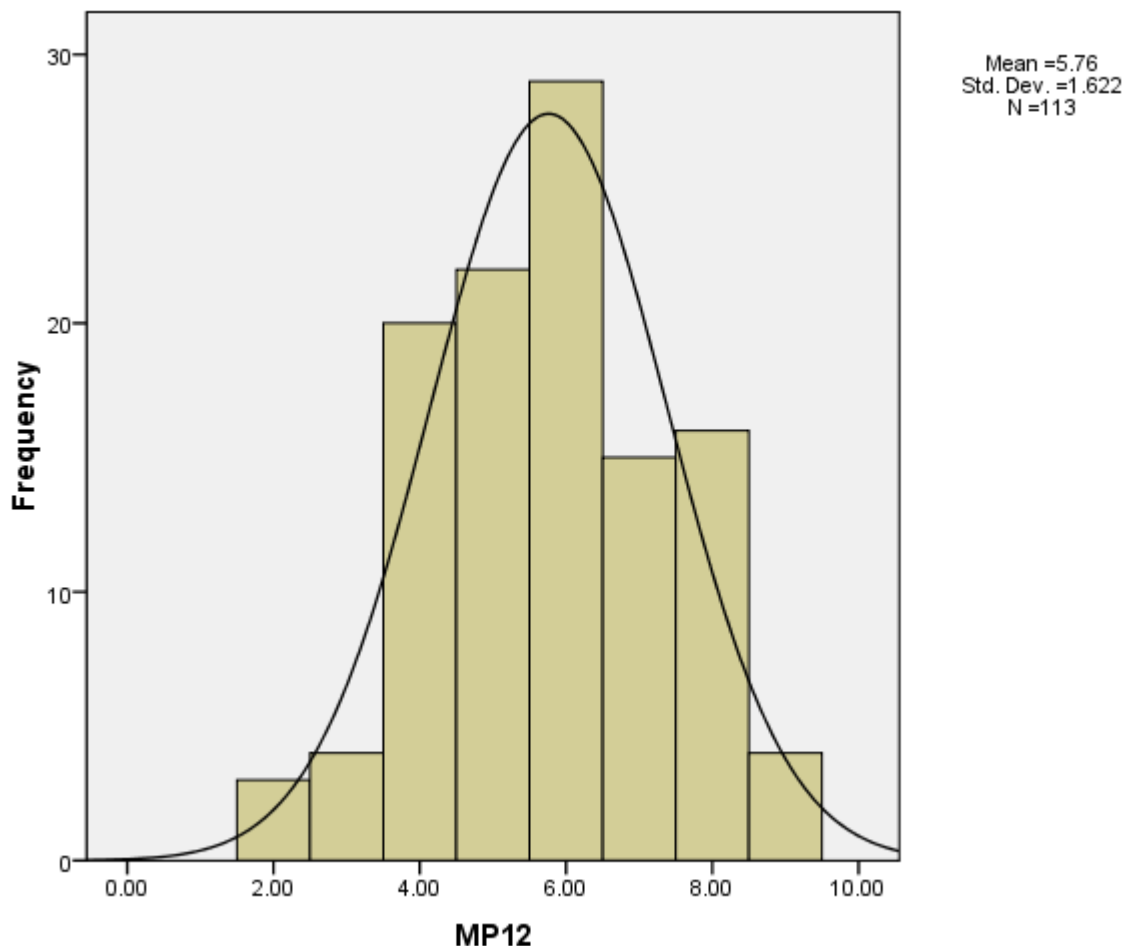

Mean =5.76
Std. Dev. =1.622
N =113

FIGURE-1

Observations made: Combined mean score of Mathematics and Physics, out of total 10 points, is 5.76. It shows that the general academic performance in analysis-based subjects is not quite encouraging in respect of development of high-standard Engineering professionals from such institute, if special grooming and development sessions are included in the University Curriculum. We need

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to develop such a curriculum and special content-delivery system that would be able to elevate the standard of education for the poor performers at the 12th standard. Special care and preparatory course need be included in the University curriculum so that these young learners become employable at the end of the four-year B.Tech. Courses. Otherwise, it would be a sheer national waste of human resource in the form of producing Engineering professionals who would not be able to compete with the best professionals in their respective field of specializations.

Graph: The following histogram clearly shows that the performance of
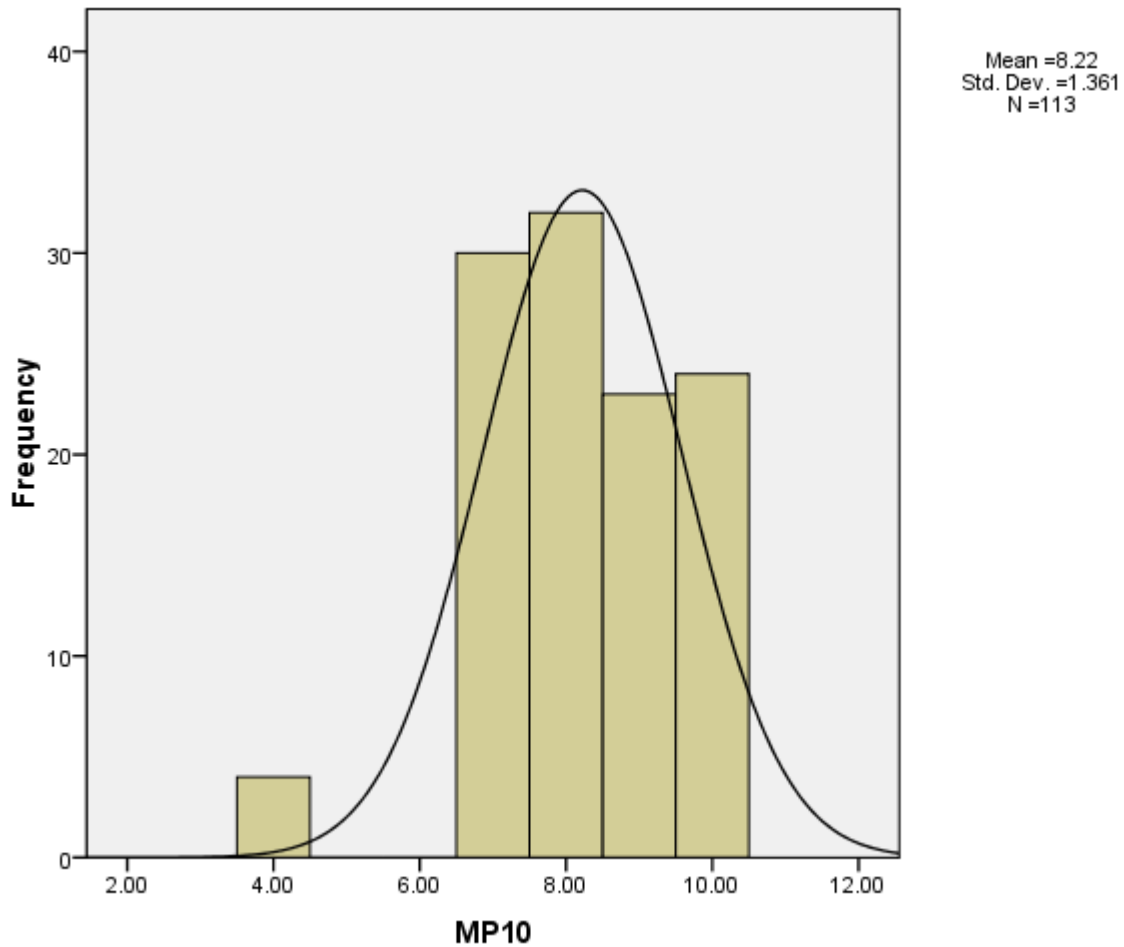
FIGURE-2

Observations made: 10th level performance of the present Engineering students being extremely good and comparatively poorer performance of these same group of 113 number of students, clearly indicate that the curricular design at the 10th standard for the aspiring Engineering students might be faulty, in the sense that there must have a huge gap between the contents at 10th and 12th standard. Hence there could be two or three different types of courses at the 10th level itself, so that the candidates desirous of becoming Engineers or having special interest in Physical Sciences could be specially groomed for the future courses in a more organized manner.

Graph: Per subject mean score for 7 number of core engineering subjects has been found to 2.31 out of 5 points. The mean score is indicative of poor performance of the Engineering students for the most vital subjects that define the core engineering skills. The basic question that remains to be answered is 'Why is performance so poor? And what are the major reasons for such a situation? And finally one more question: Will these budding Engineering professionals be able to be employed in high-tech environment that are expected to deliver efficient solution to the technological problems of modern times?
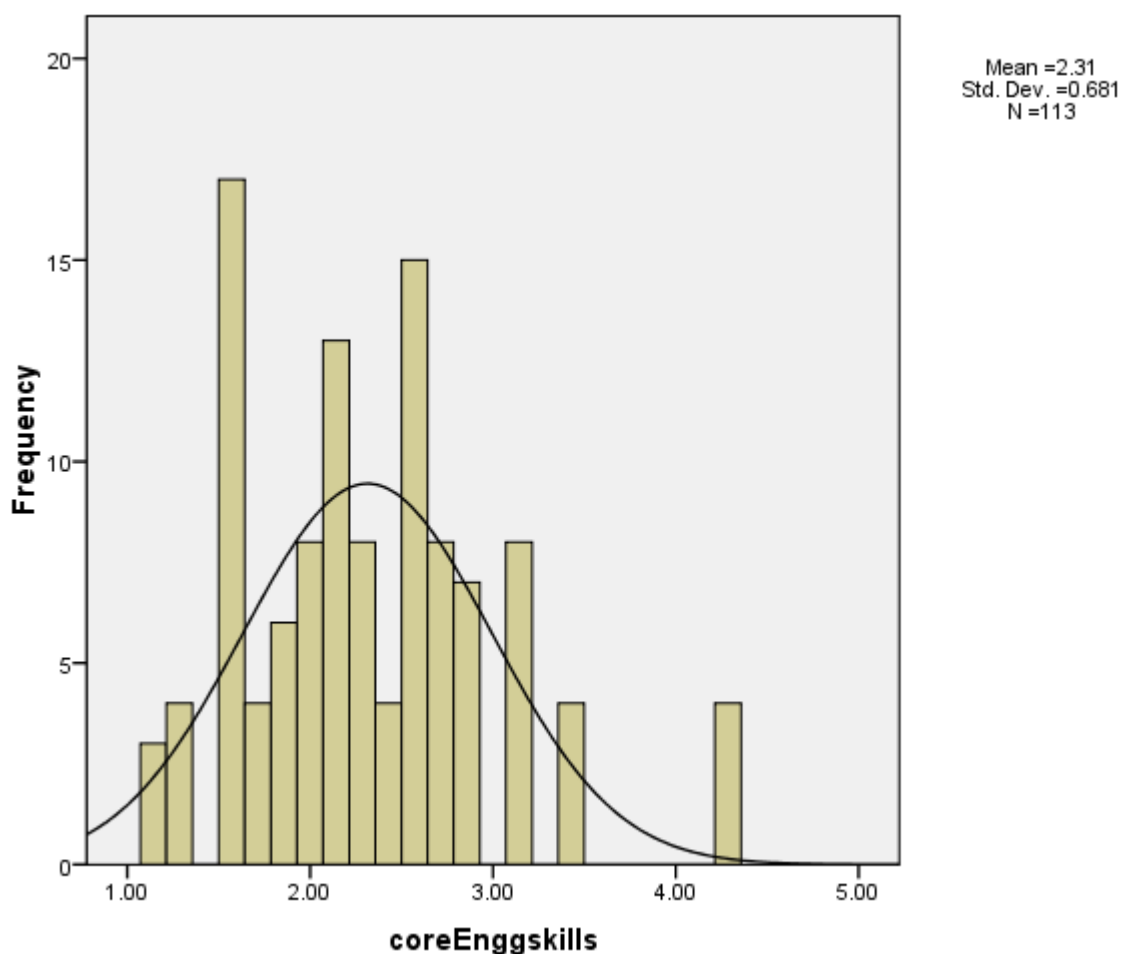
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FIGURE-3

NPar Tests

One-Sample Kolmogorov-Smirnov Test

		coreEnggskills
N		113
Normal Parameters[a]	Mean	2.3135
	Std. Deviation	.68135
Most Extreme Differences	Absolute	.086
	Positive	.086
	Negative	-.076
Kolmogorov-Smirnov Z		.910
Asymp. Sig. (2-tailed)		.379
a. Test distribution is Normal.		

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NPar Tests

Test Statistics

	coreEnggskills
Chi-Square	34.743[a]
df	14
Asymp. Sig.	.002

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 7.5.

Correlations

Correlations

		MP12	MP10
MP12	Pearson Correlation	1	.081
	Sig. (2-tailed)		.395
	N	113	113
MP10	Pearson Correlation	.081	1
	Sig. (2-tailed)	.395	
	N	113	113

Correlations

Correlations

		coreEnggskills	MP12
coreEnggskills	Pearson Correlation	1	.573[**]
	Sig. (2-tailed)		.000
	N	113	113
MP12	Pearson Correlation	.573[**]	1
	Sig. (2-tailed)	.000	
	N	113	113

**. Correlation is significant at the 0.01 level (2-tailed).

Conclusions from the study

- Curricular development at the 10th level is an urgent necessity for Indian Educational Systems
- Specialization from the 10th standard in variety of subjects and profession will definitely national wastage of human resources
- As the 12th standard performance in science and Mathematics is closely related to performance in core engineering subjects, admission in Engineering courses should be linked to 12th level performance in Sciences and Mathematics. Special Aptitude Test should be devised to select learners for courses such as Engineering, Medicine, Management, Economics, Political Science, Sociology, Psychology etc.
- B.Tech. level course should be categorized in to at least two divisions such as B.Tech. (Industry-oriented) and B.Tech. (Higher Education & Research) to really address the national and international requirements for trained Technical man-power, otherwise mediocrity will reign supreme in various spheres of activity.

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