

The Faculty Forum of IIT Kanpur had a general body meeting on 9th July 2010. The following summarizes the discussion that took place in the meeting as well as feedback received from individual faculty over email. At the end we give some suggestions that the faculty would like any new entrance system to have. These suggestions should be thought of as starting points for the design of an entrance system which is arrived at after a thorough study of alternatives backed by the necessary empirical data.

1 Current entrance systems

The following problems are often ascribed to the current entrance examination mechanism.

1. Entrance exams and admission procedures as stressors.
 - (a) The student typically has to write a large number of entrance exams in addition to the board exams. A very large number of students write at least three (JEE, AIEEE, at least one state entrance exam) exams. A significant number end up writing many more - multiple state entrance exams, BITSAT, exams of private colleges like Vellore, Manipal etc.
Some people feel that having multiple exams gives the student more options and fall backs for the same amount of preparation. This acts as a de-stressing device.
 - (b) Each exam is the one and only point of evaluation. If the student has an 'off' day or is sick on the day of the exam he/she does not get another chance except in the following year. No other input goes into determining the rank of a student. Some admissions require a certain minimum percentage at class 12 level (e.g. 60% for JEE based admissions into the IITs).
 - (c) The rank determines the branch of study. Again no other input is used. Branch changes in subsequent years are extremely difficult and very rare. Consequently, many students are stuck in disciplines that do not interest them and this affects not only their academic performance but also impacts the overall quality of life they enjoy during their stay in the institute.
2. Coaching and burn out.
 - (a) Most students appearing for entrance exams go through an intensive schedule of coaching lasting anywhere from two to four years.

This is in addition to their school requirements. Many faculty feel that this leads to ‘burn out’ and students enter the system with low levels of enthusiasm and motivation for academics.

- (b) The coaching system also means that a student neglects subjects other than those required for the entrance exam. Even in subjects like physics and chemistry a student has no feel or understanding for the experimental side of the subject since it is not really examined in entrance exams. This gives a completely distorted picture of what science and engineering are and how they are actually done in the real world. Some students have severe difficulties with English and find it hard to follow lectures once they are in professional courses.
3. Highly negative impact on the school system.
- (a) The entrance exam phenomenon has completely emasculated the school system, especially at the secondary level. Large scale absenteeism is common. The schools generally turn a blind eye to attendance requirements and allow students to write the board exams.
 - (b) The experimental side of science subjects suffers serious neglect. Many schools do not complete the complement of experiments in the syllabus and projects are often copied from earlier reports or are based on cooked up data.
 - (c) Schools have even started using coaching class teachers to teach science subjects to students of classes 11 and 12 on a clock-hour basis thereby putting a final nail in the coffin of science teaching in schools.
 - (d) In some cities of the country that have well known coaching centres the school has been completely virtualized. A student joins a coaching centre and is automatically given a concomitant admission to a school which he/she rarely attends, if at all. The school is used merely for the purposes of writing the board exam.
 - (e) More recently the phenomena of entrance tests for entry into coaching classes has also started with the attendant ‘coaching class’ for this entrance test.
4. The demographic profile of the current population of students who get admission into professional institutions show a strong urban bias.

The rural as well as the socioeconomically disadvantaged students are grossly under represented. There is also a serious gender imbalance, at least in engineering, with the vast majority being boys. In contrast, girls always do better than boys in board exams.

2 Comments on the committee's report

An important prefatory observation is that the terms of reference of the committee have been very narrowly circumscribed. At least some of the ills in the current system have less to do with the entrance exam per se and are more concerned with the post secondary academic system.

Most current academic programs (especially in engineering) have a very narrow disciplinary focus with very little flexibility. Students enter these disciplinary channels right at the start (based on their rank) and most places do not allow any change during the degree. This is particularly unfortunate since at the entry point students are often subject to peer, parental and societal pressure and have a poor appreciation of whether their interests and aptitude go well with the discipline they have chosen. The net result is that they often end up making poor choices with no way to change or correct them at a later stage. In most institutions mechanisms for lateral entry or exit from a program are non-existent so it is almost impossible to apply a mid-course correction.

The real problem of entrance exams is their very existence. It is mandated by the climate of extreme scarcity of good quality institutions in our country. This problem of scarcity cannot be solved by inventing more complicated filters, which is what entrance exams are. The only solution is to increase the number of good quality institutes. In the interim one can only try to design a filter that is as fair as possible to all those who aspire to join the existing institutions.

The recommendations in the report are unlikely to address any of the problems listed in the previous section (a superset of those identified by the report) since the major material cause of those problems is scarcity and not the filter mechanism.

The report qua report has several shortcomings. It is short on detail and does not backup most of its claims (see section 6 of the report) with data. It appears the committee has not taken feedback from two very important stakeholders in the whole entrance exam process - the students who write these exams and their parents/guardians. The committee has also not consulted specialists in education and testing. Considerable work has been

done on the philosophy, psychology and mechanics of education outcomes measurement and testing and the committee should have taken feedback from some experts in these areas.

The report does not explicitly mention the expected outcomes from the suggested changes. It is necessary to be explicit about this so that at a later point it is possible to empirically verify whether those outcomes have indeed been realized.

Below we comment on the more specific recommendations.

1. There is an unsubstantiated assumption that there is something like ‘raw intelligence’ independent of the social, cultural and linguistic context that can be measured by a single test. In a country as diverse as India it is not clear that we can have such a single test which is fair to everyone. At the very least we need more evidence that a single NAT can measure such ‘raw intelligence’. Given the linguistic diversity we will need equivalent tests in a large number of languages (at least for language or verbal ability). Creating testing material of equal difficulty in a large number of languages will be extremely hard.
2. There is no argument or evidence that ‘normalization’ of board marks is possible. Even if a single syllabus for science subjects is agreed upon it does not follow that the examinations in those subjects will be comparable across different boards. The possibility that a single question paper and marking scheme will be adopted throughout the country is wishful thinking. Even assuming it is possible, it is not clear that doing this is a good idea, The syllabi may differ due to local conditions, resources available, teaching methods adopted etc. A priori, there is no evidence that absolute standardization in syllabi is desirable. Pushing for such standardization simply for the purposes of uniformity in testing will be like cutting off the head to cure a cold.

Many earlier attempts at normalization do not seem to have succeeded (GATE, Civil Services exam and attempts by others). The variables are too many and some are hard to measure and quantify.

3. Board exams and their outcomes have too many uncontrolled variables. Amongst others these include the syllabus, type and difficulty of question papers, conduct of exams (the amount of cheating that happens has varied hugely in UP Board exams), grading policies and the degree to which they are implemented. Giving a 70% weight to such a variable in the formula for CWP (even if some kind of normalization is attempted) cannot be justified. It also militates against

the principle stated in the report that a student should have multiple evaluation points. There is no mechanism in place to 'improve' Board examination performance.

4. The proposed 2 tier system for 'elite' institutions completely negates everything and sends us back to square one - acutally minus one since it adds one more entrance exam, the NAT, to the existing set of tests. How does one stop every institute or group of institutes from having their own tier-2 exam?
5. The report observes that objective exams and subjective exams select largely the same set of students (experience of the JEE during the years 2000-2005 is quoted, though again no actual data is presented). Given this do we really need an extra exam to rank order them? The solution seems to lie in having a serious relook at how branches are allotted in the current admission process. There are serious lacunae in the current procedure and the right approach would be to revisit the current branch selection mechanism and find a more fair and sensible alternative.
6. The board exam, for which a weight of 70% is recommended, is a single point one-off exam and so is the tier-2 subjective exam. The aim of multi-point evaluation, therefore, stands largely defeated. Giving upto three attempts at NAT, whose score accounts for only 30% of CWP, counts for little since it is just part of a screening process. The main tier-2 exam is again a single point, one-off exam and suffers from the same deficiencies as any other single point evaluation system.
7. The coaching eco-system that has come up in the country is a symptom of the lack of quality institutions in the post-secondary educational system. There is a huge shortage of good quality institutions in all areas whether they are 3-years degree colleges, engineering or medical institutes, management institutes or even diploma or trade based institutes. This has naturally meant that huge numbers vie for admission to the few colleges, institutes, universities that are perceived to be the 'good' ones. An obvious consequence is the the invention of various kinds of filters to limit admission - like board percentage cut-offs or various entrance tests. A further downstream effect is the pathological concentration, to the exclusion of everything else, on just two variables a) getting a high rank in one or more entrance tests b) getting a high percentage in the board exam. This has spawned the

huge coaching industry that promises to boost your performance on one or both the above variables. Given the above analysis no amount of tinkering with the filters will have a material effect on the coaching industry. The recommended changes to the entrance exam system are unlikely to make any difference to the continued growth of coaching.

8. The emasculation of the schooling system can also be traced to the same root cause. Almost all students and most schools are completely fixated on boosting percentages or on preparation for entrance exams. Schools pay little or no attention to learning and learning based outcomes since their reputations and enrollments are almost exclusively determined by their board results and how their students perform in one or more entrance exams. Many schools bend over backwards to ensure that the ‘coaching needs’ of their students are accommodated. This often means turning a blind eye to attendance. One cannot seriously maintain that this situation will change with the proposed entrance examination reform.

3 Recommendations

We have identified scarcity of good quality educational institutions as the single most important factor that plagues our higher education system. If this analysis is correct then even the best conceived and designed entrance system will do very little to eliminate or reduce the ills of the current educational landscape.

The best that can be achieved by changes to the entrance system is to make it more student friendly, more fair and with outcomes that are more representative of the diversity in our country.

Changes should be brought in only after careful evaluation of alternatives with the aid of data from properly designed empirical studies. The expected outcomes must be made explicit and mechanisms put in place to monitor the actual results so that the system can be better understood and further changes can be made to realise the desired outcomes.

Some suggested points to be kept in mind while designing an entrance system are:

1. The entrance exam should be a subject based (i.e. mathematics/biology, physics, chemistry) exam at an elementary level (upto class 11) administered nationally. A few questions on reasoning, pattern matching etc.

can be part of the exam. The student can take the exam after finishing class 11 and also after class 12.

2. It should be an objective exam that can be graded by a machine. It can contain questions of different structural types and should have a reasonable number of questions where a single question can be differentially graded (e.g. questions with multiple correct answers).
3. A detailed syllabus for each subject should be given along with sample questions that are truly representative of the real exam.
4. The questions should be evenly spread over the entire syllabus. Current JEE papers seem to be highly skewed towards a few topics.
5. The exam should be carefully designed and calibrated for difficulty so that there is a proper spread of marks over the population. The current JEE exams are known to have very poor spread and thus are not good discriminators.
6. It should be possible to take it multiple times and the score can be the average score of the best 2 attempts. A student can be allowed to give it a maximum of 4 times over two years.
7. It should be possible to take it online or using pencil-paper at the same venue.
8. Instead of having the exam throughout the year it can be given during the vacation period May - July/Aug. of each year.
9. In addition to performance in the entrance exam, admission can be based on performance in Board exams at class 10 and class 12 levels. It is best to do this by setting minimum grade levels that must be achieved rather than having marks based cut-offs or weighted formulas like the CWP. Note: Class 10 (for some boards) has already shifted to purely grade based evaluation. Class 12 should also be converted to a purely grade based system. This is a more realistic goal and does not demand complete uniformity in syllabi, question papers and correction policies. It also avoids the need for normalization across Boards.
10. We badly need a thoughtfully designed system for measuring social disadvantage (economic, educational, social, gender, rural-urban etc.) that can be used as a modulating factor in the entrance system. The current reservation policies do not really address all the factors that disadvantage a student.

Some other changes that are not directly connected with the entrance exam system but are likely to help are:

1. Where feasible, as for example in engineering, delay the choice of branch to a later point in the program instead of at the entry level. The end of the first year is one possibility.
2. Introduce much more flexibility in academic programs so that students have a range of options instead of just a few tightly defined streams like Computer Science, Electronics, Mechanical etc.
3. Introduce mechanisms for lateral entry and exit in all degree programs with transfer of partial or total credit where it is at all feasible .