Chapter VII

SUMMARY, CONCLUSION AND AREAS OF FURTHER RESEARCH

"I don’t know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me"

- Isaac Newton
CHAPTER VII

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7.1 FINDINGS AND CONCLUSION

The study has led to several findings and conclusions, which are systematically presented in this chapter. The findings point to a clear preference for e-content such as NPTEL. Questions that relate to the features that could be integrated into the e-content were also posed to respondents. These lead to some clear conclusions. Some of these were drawn upon to evolve and develop the OHE model based on a multiversity in the last chapter. Based on the data analysis, the overall findings of the research work are now seen.

7.1.1 Awareness

The need to increase the awareness of NPTEL is very loud and clear! While both students and faculty members articulate the need for greater awareness of NPTEL using college level workshops, cable TV and newspaper advertisements, there is some difference in their order of preference of these modes to increase awareness.

7.1.2 Knowledge Enrichment

The study unequivocally indicates that NPTEL does lead to enrichment of knowledge and that it also helps pass examinations. However, the former is more emphatically evident than the latter. The response to overall rating of NPTEL reflects a very high rating. 85.21 percent of the respondents are of the opinion that NPTEL enriches the knowledge. In terms of the overall rating of NPTEL based on quality, faculty,
curriculum and presentation, 91.49 percent of respondents rate it as excellent or good. Interestingly, no respondent rated NPTEL on these dimensions as ‘Low’. 64.53 percent of the respondents are also of the opinion that NPTEL should become a standalone programme of study offered by a virtual university.

7.1.3 Need for new features in NPTEL and such e-content

There is a clear indication of the preference for a wide range of standardized choices with international and national benchmarks, on a standalone or blended mode. This is a clear vindication of the need for less rigidity and more flexibility in curricular choices as well as modes of learning such as films, animation, and interactive sessions in addition to the lecture mode. This is a trend that reflects the value that students and faculty assign to their freedom to choose what they study.

7.1.4 Articulated need for research as a part of course

It is emerging that students and faculty members would like to engage in research as a part of their course. This augurs very well in the current world context and Indian need for more attention and focus on research. The willingness of students working with researchers across the country as a part of their course work is articulated. Similarly, the readiness of faculty members to engage with students from various geographical locations of the country in collaborative research is also endorsed. This single finding could prove a great step forward, if it is acted upon.

7.1.5 Need for laboratory or hands on experience

The study reveals that students need laboratory experience as a part of such e-content, which could be a virtual, simulated or actual experience that can be tied with the courses that they get on NPTEL and such e-
content. This may be possible with partnership with the private sector and Industry participation too.

7.1.6 Provision for assessment and student evaluation

The research demonstrates the preference of students for assessment, assignments, practice quiz, tests as a part of the course framework with provision for an end course evaluation of the type of ‘on-demand on-line examination’ and certification by NPTEL or such a body. The portability of such credits and certification into a blended mode of learning is also expressed in the qualitative interviews.

7.1.7 Industry linkage

The research points to the need for employability enhancing modules related to industry that the students can choose from. The provision for internships and apprenticeships in industries of choice and the need to have faculty from industry as mentors with online facilities for job fairs and placement emerges from the study.

7.1.8 Extension and community links

The research brings out the need felt by students to engage with the local community as an extension activity. The aim of education of living in harmony with other human beings and the physical surroundings is emphasized. The possibilities of higher and technical education straddling across the learned researchers and the common people of the local community with greater sensitivity and understanding are brought out during the qualitative study too. This can pave the way for the creation of real, learning and knowledge societies.
7.1.9 Mentoring and guiding needs

The responses of students and faculty members reflect the need on the one hand and willingness on the other to participate in the OER framework as a coach or mentor. These findings point to the constructionist\textsuperscript{107} approach which states that the process of learning gets strengthened by actually teaching or being actively involved in project work etc. This is a very important finding and may well be the key for current challenges of staff shortage that plague higher education in India. If this constituency can be roped in to teaching in a structured, planned manner, this may release a great deal of freshness, energy and quality in Higher Education.

7.1.10 Education of various dimensions of life

The research has found that students and faculty members value the development and nurture of other dimensions of life, in addition to the professional dimension. There is a clear need articulated for the physical, ethical and spiritual dimensions. This finding is of key importance as it, perhaps, provides leads for making education sustainable, integral and creating humane professionals who can be responsible and sensitive members of the learning and knowledge society.

7.1.11 Pedagogical methods

The research throws lights on the preference of students for various pedagogical methods and teaching / learning modes. They prefer learning through films, lectures, internships, projects and conversations with eminent people. The inadequacy of the predominantly ‘chalk and talk’ method currently prevalent in most institutions is clearly brought out. These are definitely possible, now with the advent of OERS. Immense potential is now thrown open with OERS and the pooling and sharing of films, animations, lectures, notes, books, interviews and other resources worldwide.

\textsuperscript{107} http://docs.moodle.org/en/Constructionism
7.1.12 Values of nationalism and internationalism

The research solicits the views of respondents on modes of introducing the values of nationalism and internationalism to students. The order of choices for mode of learning is mass media (print and electronic media), lectures, screening of films and dramas. The study further finds that the story of India's freedom struggle, according to respondents, should be presented through films, lectures and dramas. This becomes particularly important for nation building and globalization. Young citizens who understand the values that their country stands for as well as universal values would be better poised to lead the world in its advance to a knowledge society.

7.1.13 Preference for autobiographies and biographies

In the course of this study, it emerges that students do find biographies and autobiographies as great sources of inspiration and over 65% of the respondents would like these to be 10% or more of their course. Similarly, there is a clear preference for biographical sketches of the struggles, accomplishments, beliefs, faith and achievements to be presented as multi-media presentations. Further, there is a preference for understanding the life sketches of scientists, sportspersons, technocrats and thinkers and philosophers, in that order. This is an area that is almost unrepresented in the formal curriculum of most engineering colleges.

7.1.14 Intrinsic values

This study tried to gauge the understanding and perceptions of students and faculty members in respect of intrinsic values. There is a great deal of importance given to truth, hard work, sincerity, intelligence and character, as enunciated by the respondents. This is particularly interesting to note. There is, at times, a tendency to underestimate the students of higher education.
There is often a tinge of cynicism in whether young people are interested in value education or orientation. This is a clear affirmation of that need or preference. There is a preference for such values to be underlined in the course through films, lectures and dramas. Thus, there is a need to free students from the rigid suffocation of the lecture system alone, and bring in freshness and light in the form of other modes of presentation, which ICT and OER can easily provide.

7.1.15 Social networking

This study shows the inclination of students to network with other students, mentors, faculty members and researchers across the country and, perhaps, world to share ideas, experiences, understanding and knowledge. The study of various OER experiments in the world also points to the emerging paradigm of 'boundarylessness' across various dimensions. These range from geographical, political, disciplinary dimensions. It also refers to the blurring of boundaries across research, education, training and extension as also the gaps between the 'learned' and the common people. Slowly, it appears, a paradigm of integral education can be ushered in by the Open Education revolution, which could be the single most powerful contribution of OER, if crafted and designed well.

7.1.16: Faculty rating and need for training

Not surprisingly, there is an articulation of the need for faculty training. The ratings of faculty do indicate that there are ‘poor’ teachers- as many as 3% in terms of content, 4% in terms of technical knowledge, 6% in terms of presentation and 8% in terms of mentoring. This is to be seen in the context of significant vacancy levels in various colleges. Students possibly find that a teacher present is far better than no teacher at all. Also, the possible dysfunctional, hierarchical relationship in most
traditional colleges may have led to very mild, constrained responses on this dimension. This leads to two findings. A massive program of educating and preparing teachers (with pedagogical inputs on the lines of B Ed or M Ed) for engineering institutions ought to be initiated across India; similarly, there is a need to put in place a massive training program for quality improvement for building the capability of teachers.

7.1.17 Educational services using ICT

The study shows a clear need for providing online educational services related to student management and governance such as leave applications, enrolment in courses, scholarship grant, admissions and examination enrolment, and so on. The Times Higher Education report also talks of the need to address student management issues, given the large student strengths in most universities of the country. These may be provided in a transparent, fair, effective and accountable manner. The SOA model in the previous chapter incorporates this and suggests ways of doing this seamlessly across the country.

7.1.18 Findings of factor analysis using NPTEL users

Factor Analysis was carried out to understand the common perceptions of the respondents towards e-learning through OER like NPTEL. The following points emerged from this analysis:

- The respondents appear to associate open learning through NPTEL with ‘Interaction & Networking with students.’
- The students and faculty members appear to prefer ‘on demand, online mode of exams and educational services’.
- The respondents seem to indicate a demand for ‘E-content with simulated and actual laboratory experience’.

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The responses possibly express a need for ‘Mentoring, Research and Industry Orientation’.

There is, perhaps, a preference for ‘E-content with choices of international and national standardized courses’.

The respondents appear to articulate the need for a ‘Comprehensive Virtual University with syllabus based e-content and local language’.

7.1.19 Findings of factor analysis using general e-content users

Factor Analysis was carried out to understand the common perceptions of the respondents towards e-learning through OER and general e-content including NPTEL. The following points emerged from this analysis:

- Respondents seem to demand comprehensive services related to assignment, examination and interaction with the faculty to be integrated on e-content.
- E-content fortified with interaction with students and future employers will add value to the current community interaction.
- E-content with provision for actual and simulated laboratory experiences would make it more useful.
- E-content that provides for faculty development and compensation by mentoring, extension by students is preferred.
- Respondents seem to demand standalone program of study in local language supported e-content.
- Respondents seem to expect more standardised choices of courses from e-content.
- Respondents want to have active participation in IT enabled teaching, examinations, applications and services on e-content.
7.2 SUMMARY OF INTERVIEWS AND DISCUSSIONS WITH STUDENTS AND FACULTY MEMBERS

The gist of the findings of the interviews and unstructured interactions are presented below. These reflect the views of students or faculty members:

1. There is a clear articulation for introduction of courses on research methodology and current trends.

2. The need to involve industrial experts and experts for other technical institutions in the design of courses is felt.

3. A standard format for different courses and study notes to aid easy references are needed.

4. There is an overwhelming need to make NPTEL more effective by being interactive and adaptive.

5. As articulated, the course ought to cover basics of life such as role towards parents, society as well as physical health and spiritual aspect.

6. There is a need for the course to help understand oneself and work on one’s inherent strengths in all dimensions of life.

7. There is a demand for more group activities that inculcate group behavior and leadership.

8. Students reveal that there ought to be two way and open communications between students and faculty, which is currently often missing.

9. The need for a more meaningful way of assessing students by having better system of examination is articulated.

10. The readiness and openness for an on-demand examination in the online mode is expressed.
11. The need for student mentoring is expressed.

12. Need for education on social awareness, their role towards society, country and the present needs of country is also expressed.

13. The need for videos on human values and ethics as a part of NPTEL is articulated.

14. There is a clear need for spaces that will facilitate discussions in class or on line as the most effective mode of learning.

15. The need for an atmosphere of innovation with no competition, but sharing of ideas and encouragement of improvisations and applications by NPTEL is expressed.

16. The need for automated student services is expressed by students. This will make processes transparent and will help save a lot of time.

17. Faculty members opine that automation will relieve them of many avoidable paper work and chores that drain their time and take them away from teaching, research and mentoring.

7.3 BASIC PRINCIPLES OF GOVERNANCE

The aspects of the NPTEL program related to parameters like participation, fairness, transparency, decency and effectiveness were also studied in the course of the quantitative and qualitative study. The following were observed.

7.3.1 Participation

E-content from NPTEL and other sources is accessed by students and faculty members across different institutions that represent rural, urban areas, different castes, economic backgrounds and gender to indicate that there is good participation in partaking of these OERs. Similarly, faculty members from a state run college and an IIT located in the state were
involved in preparing NPTEL course ware. This shows that NPTEL is able to solicit participation from students and faculty members in the generation and use of OER.

7.3.2 Fairness

The responses indicate that the NPTEL program fulfils the principle of fairness as indicated by the fact that students from national and state institutions as well as those from different backgrounds of caste, gender or economic status are all free to access NPTEL and avail the services in a fair manner. In the course of the analysis, it was observed that even from colleges located in backward and tribal areas like Dahod, the number of respondents was fairly high and the faculty members and students did perceive NPTEL as a program which was fair in terms of giving access and inputs to all students. The non availability of content in the local language may be seen as a barrier to local users. NPTEL may have to work on this to bring in greater fairness.

7.3.3 Transparency

In the current context, access to the material and course ware of NPTEL is transparent. This has been articulated both in the quantitative and qualitative study. There has been an articulation for content in the local language during factor analysis, which may further add to transparency and access. There may be a need to compile online ‘technical terminology glossaries’ to help students grasp basic concepts. Issues like authenticity, more contemporary inputs and content ownership may warrant more transparency.

7.3.4 Decency

During the interviews, it was clear that the content was not found offensive or indecent by the respondents. Similarly, the interviews with
the NPTEL academic team also revealed that due care and diligence is being taken for review and quality Assurance. These have ensured that decency is maintained and nothing that offends students or is harmful for them is served as a part of NPTEL. NPTEL should not be perceived as being elitist or induce an inferiority complex in the students of local and backward regions. Similarly, there ought to be no access to offensive, vulgar, violent and objectionable content on the internet in the OHE model, which would have to be strictly enforced. This would be requiring special care when the model proposed in the next part of this chapter is rolled out. Checks and balances would have to be instituted to ensure that as more and more students participate actively as mentors or participants in discussions, there is no tendency for behaviour that is offensive or insensitive.

7.3.5 Accountability

The response of the students which has given a high rating for NPTEL in both the online survey as well as the interviews are all an indication of accountability of NPTEL. The teams that prepare the material have built in processes for accountability too. Evaluation studies such as this study and a system of Academic and Administrative Audit (AAA), as detailed in the next section would further make NPTEL even more accountable, once they are institutionalised. The lack of large scale awareness of NPTEL is a weakness that ought to be rectified immediately. This is a national program funded by MHRD to the tune of about 20.5 Crores and should be propagated so that the usage goes much above the present level of about 9.61% of the engineering colleges of the country.
7.3.6 Effectiveness

The responses have clearly voiced the perceived effectiveness of NPTEL in terms of enrichment of knowledge. 85.21 percent of the respondents are of the opinion that NPTEL enriches the knowledge. Similarly, as clarified in Chapter V, NPTEL is rated fairly high in terms of passing examinations, the quality, content and presentation of content. Further, in the interviews with students, NPTEL is perceived as being more effective than books, which endorses its effectiveness.

7.4 Areas of further Research

The following paragraphs indicate the possible areas of further study and research. They cover aspects related to making the study a National one to focusing on specific areas like research and extension.

1 This study has focused on the specific program of NPTEL and attempted to study it across Gujarat. There have been limitations in the number of colleges and students that have responded to the survey. Similarly, for a national program of this scale and age, an all India evaluation may be very useful and throw light on regional differences in preferences and needs.

2 Such a study could be carried out across institutions of vocational, higher and technical education as these constitute tertiary education, which can contribute to the demographic dividend and push up the GER.

3 Similar studies ought to be carried out at schools of primary and secondary level too, to get the pulse of the stakeholders.
Based on the study and the findings, the questionnaire may be further refined and administered to the same cohorts for a three year window to also see the patterns as a function of time.

The current study has incorporated questions and inputs related to integral education that can produce human and humane professionals. These dimensions could be tested for a control group and another group with the intervention to assess the efficacy of the method and quality of education.

A similar evaluation could be done exclusively for teachers and for those employed in industry. These findings could be compared and contrasted with those of students.

In the context of more and more private players entering higher education, similar evaluations could be done for figuring out what are the problems and challenges specific to private institutions. The specific interventions by government may also emerge from these studies.

This study has analysed the responses of respondents who have used NPTEL and/or other e-content. A similar study of the various aspects of such e-content prepared by private players alone could be carried out. This could be analysed from the pricing and 'return on investment' perspective to see how sustainable it is, the features demanded as well as the willingness of the market to pay for it and so on.

Based on this study, specific studies and research could be carried out to assess and evaluate various aspects of faculty attributes and projections in the context of higher and technical education.
A study of various research efforts in online mode for higher and technical education can be studied. The inputs of the leading research centres of the country to evolve a model for promoting research can be arrived at.

Extension efforts and the implications for a full cycle approach for skill provision, training, internship and job fairs can be studied in the context of Higher and technical education. Similarly, a study of extension activities with the local communities can also be taken up for studying the impact of research findings at the field level.

A study of various innovative efforts in the space of online higher and technical education can be documented. These may give a lot of insights into the road ahead.

A study related to those institutions which are providing education for various dimensions in addition to the professional dimension can be carried out. This may include different systems, approaches or methods of educating the self and leading to harmony with the self and the world around. These findings can throw light on the efficacy of various approaches, methods including student needs, choices and perceptions.