



# Overview of Agricultural Education in India: A Review

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## Abstract

The present article is a review of works by different authors; inclusive education system during ancient period and development takes place thereafter. It includes the historical invasion, transformation as well as existing situation of agricultural education in India. As a matter of fact, present system of education in India needs certain reforms, which address the social, economic and regional issues relevant to local demands. Such, policy definitely will help the particular country as well as other countries. Therefore, efforts being made to bring out the present situation of education in India and its scope and importance in the development of society.

**Keywords:** Agricultural, Education, Demands, Ancient period.

Reference to this paper should be made as follows:

Chaudhary, A. P., & Chaudhary, H. A. (2017). Overview of Agricultural Education in India: A Review. *International Journal of Scientific Research in Education*, 10(3), 271-289. Retrieved [DATE] from <http://www.ij sre.com>

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## INTRODUCTION

Agrarian economy of the country is backbone of the rural India, where agricultural sector is providing employment to the 45.1% population of the rural area, which constitute about 51 % of total work force of India and contributed only 13.9% to the GDP (Anonymous, 2014), which was 59.0% of the total GDP during 1951. This decline trend of the agricultural sector in GDP raised the eyebrow of every intellectuals of the country and forces to rethink about the policy and plans as well as existing agricultural education system in the country. It is also important that there were only 27 Universities during 1950 and presently we have about 799 Universities governed 39,071 colleges inclusive 213 agriculture colleges, enrolled about 3,32,72,722 students,

which includes 79.90%UG students in the country (Anonymous, 2015,a and Anonymous, 2016a).

Looking towards the scenario of colleges and students, the situation of farmers is reverse. Considering these facts and existing global situation, we have to rethink about our agricultural policy including course curriculum, marketing system, market intelligence, export / import of agricultural produce, use of e-tools in agriculture and IPR related issues, where issues relevant to farmers as well as local needs of the population should be address. The conservation of natural resources like water and ITK adopted in cultivation of crops, animal husbandry practices and post-harvest technologies in the country shall be given proper place and existing agricultural education system must focus on these issues and shall be revitalized considering the issues relevant to climate change, productivity of our animals and crops, post-harvest technologies and activities of entrepreneurship development in this sector. Therefore, existing agricultural education system required necessary modifications, should be incorporated accordingly in the policy as well as in the syllabus.

## **Education System during Pre-independent India**

### **(a) Ancient Period**

The historical evidence shows beginning of civilization in India at around 6500B.C. and is the earliest urban site of the period in the world. This also shows the earliest site of domestication of animals, evolution of agriculture, arts and crafts. The education system in ancient India was based on *shishya guru parampara* and shishya (pupils) and guru live together in the ashram known as “*Gurukul*” and taught the different subjects free of cost, but after completion of education, shishya have to give guru dakshina. At the same time shishya help the guru for all day to day chores of ashram. The age of coming to ashram was around 6 to 8 years and shishya remains in the ashram (away from the house / village) and imparted knowledge of religion, scriptures, philosophy, literature, warfare, statecraft, medicine, astrology and history by the *guru* i.e.brahmin or *guruvandini* to the selected boys and girls of higher caste (varn or social groups i.e.kshatriya or brahmin) of the society and rest has to learn from the parents about their traditional occupation and remains “Brahmachari” till the age of 25 years, thereafter they enter into grasth ashram followed by vanprasth and sanyas ashram.

During this period India was the main centre of learning, where most important universities of ancient India were Takshshila / Taxila (being the first university of world established in seventh century B.C.), Vikramshila University and Nalanda University (built in 4<sup>th</sup>A.D).These institutions were considered to be the best of its time in the subcontinent and an honour to ancient Indian educational system. The students from countries like China, Japan, Korea, Jawa, Sumatra, Mongolia, Bokharo and Tibet used to come here for higher studies. The education of this time were either vedic or buddhist have its own type of teaching and learning.

The vedic education system and budhist education system remains from 1000 BC to 600 BC and 600 BC to 1200 AD, respectively in India, where objectives of vedic education were development of physical, moral and intellectual powers of individual, consequentlyBuddhist education spread in other countries also and remains continue till Islamic invaders.During this perioddifferent universities were developed / established in the country in addition to Taxshila, Nalanda and Vikramshila, which are given below and there were 4,003 pupils and 600 teachers at Nadia during the year 1618 (Purnima (2016).

- » Ballabhi University
- » Nadia University

- » Jagadalla University
- » Odantpuri University

### **(b) Education System during Gupta Empire**

It is evident from the literature that during the period of Gupta empire (320 to 550 CE), centers of learning increased in the cities like: Taxshila (now in Pakistan), Varanasi and Nalanda (Buddhist centre), due to increasing the population. At that time Taxshila and Nalanda centre of education were popular among the students of China and Central Asia and these Buddhist institutions of higher learning continued to function well into the common-era and attended by students from these countries.

### **(c) Education system after invasion of Muslim ruler in India**

Historical evidence suggested that Islam has its origin between 570 A.D. and 632 A.D. and first Muslim state was founded in India during 711 and Mohammad Bin Qasim, was the first invader. He attacked on India in Sindh during 715 A.D. and thereafter such attacks were continued in the different parts of India, but severity of such invasion were very low, which increased during 11<sup>th</sup> century and thereafter. During this period Hindu education was continued on the pattern of ancient period and some of the established Universities like Taxshila, Nalanda and Vikramshila, suffered a decline on account of the onslaughts of Muslim invaders, while other important institutes were established, are given in Plate 1.

However, during 10-11<sup>th</sup> centuries India established proper system of science and technology, while, during 12<sup>th</sup> century, invasions from India's northern borders disrupted traditional educational institutes, along with other establishments. Similarly, after introduction of Islam in India; the traditional method of education increasingly came under Islamic influence also and students from Bukhara and Afghanistan came to India to study the humanities and science. Education system as foreign armies raided During the journey of transformation and invasion in India, first college named as Saint Paul's College, Goa was established in 1542, where variety of the subjects were taught free of charge. They used the printing books and established one of the biggest libraries of Asia, and first Printing Press was mounted over there. In this direction Banaras Sanskrit College, was established in 1791 to impart education relevant to Hindu religious and other subjects, where medium of instruction was Sanskrit. The Hindu learning center were (i) Pathshala ( here students send at the age of five years for learnt reading, writing and arithmetic along with their religious instructions); (ii) Private School and (iii) College (places of higher learning and students taught Sanskrit language and literature, while other subjects included in the curriculum were poetry, grammar, astrology and astronomy, philosophy, medicine, history, geography, puranas and vedas).

Sr No	Milestone in Education in Pre Independent India	Year of Establishment
1	Saint Paul's College, Goa	1542
2	Jesuit College, Chaul, Goa	1580
3	Established East India Company	1599
4	Laid Foundation Stone of Madrasa at Calcutta by Warren Hastings (1 <sup>st</sup> Governor General of India)	1780
5	Banaras Sanskrit College	1791
6	Fort William College, Calcutta	1800
7	Introduced English Education in India	1835
8	Madras Medical College	1835
9	Madras Veterinary College	1835
10	Council of Education was formed	1842
11	Thomason College (now IIT Roorkee) was established	1847

Plate 1: Period of Establishing the Institutes of Learning in India

However, Muslim rulers started different types of educational institutes like (i) Primary Schools (*maktabs*), where students were taught reading, writing and basic Islamic prayers; (ii) Secondary Schools (*madrasas*), where advanced language skills, Koranic exegesis, prophetic traditions, Islamic law (*sharia*) and related subjects were taught and usually attached to mosques. These Islamic schools were for boys only, while Muslim girls of affluent families studied at home. However, Mughal empire ruled India since 1526 and remains until the end of their political presence in 1848. During this period court language was Persian, and elite boys could attend Persian schools to learn literature, history, ethics, law, administration and court protocol. Other subjects, such as medicine, mathematics and logic were also part of the curriculum of Islamic learning centers during this period.

#### (d) Education system after invasion of British ruler in India

The British rule established in India during 1848, after Mughal period and remains till 1946. During this period educational activities given priority and different institutes were established in the colonial India. The University of Bombay / Madras / Calcutta were established in 1857 and number of centre of learning / education were established are given in Plate 2. Gradually, traditional system of education i.e. "*gurukuls*", were replaced by number of English medium schools by Britishers' and literacy rate in India rose from 3.2 percent in 1881 to 7.2 per cent in 1931 and 12.2 per cent in 1947. At that time, there were 21 universities and 496 colleges in the country, while there were only 4 universities and 67 colleges in 1882 (Anonymous, 2016).

Sr No	Milestone in Education in Pre Independent India	Year of Establishment
1	St. Anne's College, Bandra, Bombay	1855
2	University of Bombay / Madras / Calcutta were established	1857
3	Government College, Lahore	1864
4	Islamic School DarulUloom, Deoband was founded	1866
5	University of Punjab, Lahore	1882
6	Indian Education Commission	1882
7	Women's Christian Medical College, Ludhiana, Punjab	1894
8	University Education Commission	1902
9	Indian University Act	1904
10	Resolution of Education Policy passed by GoI	1912
11	Muhammadan Anglo-Oriental College founded in 1875 and became the Aligarh Muslim University	1920
12	Medical College, Calicut, Kerala	1942-43

Plate 2: Establishing the Institutes of Learning in India during British period

## Education System in Post-independent India

The existing education system is based on the pattern of 10+2+3 system of education, which was recommended by Kothari Commission in 1965 and till now, we are following it. Higher education system in India is imparted through 39,071 colleges affiliated to / constituent of 799 universities and 11,922 stand-alone institutions in India (Anonymous, 2015a; Anonymous 2016a). In addition to these, there are several institutions imparting specialized knowledge and technical skills. Since education is a state subject and state governments are free to open new university, while University Grants Commission (UGC) is an authority, which dispenses grants to the universities, but its formal sanction is not necessary to open a university. Since independence, higher education sector has witnessed a tremendous increase in the number of Universities / University level Institutions and Colleges. However, number of Universities has increased 30 times from 27 in 1950 to 799 in 2016. The sector boasts of 119 Central Universities + Institute of National Importance and Others 334 State Universities, 177 State Private Universities, 124 Deemed to be Universities, 51 Institutions of National Importance (established under the Acts of Parliament) under the Ministry of Human Resource Development (inclusive 16 IITs, 30- NITs, and 05-IISER) and four Institutions (established under various State legislations).

Sr No	Milestone in Education in Pre Independent India	Year of Establishment
1	Appointment of University Education Commission (Radhakrishnan Commission)	1949
2	Establishment of University Grants Commission	1953
3	Passing of UGC Act	1956
4	National Council of Educational Research and Training (NCERT)	1961
5	National Policy on Education	1968
6	National Service Scheme enforced	1969
8	National Policy of Education	1992
9	National Knowledge Commission was constituted	2005
10	Prof. Yash Pal Committee	2009

Plate 3: Establishing the Institutes of Higher Learning / Land Mark Event in India after Independence

Source ; Anonymous (2016) History of education in the Indian subcontinent. Web-site: [https://en.wikipedia.org/wiki/History\\_of\\_education\\_in\\_the\\_Indian\\_subcontinent](https://en.wikipedia.org/wiki/History_of_education_in_the_Indian_subcontinent)

[http://content.inflibnet.ac.in/data-server/eacharya/documents/548158e2e41301125fd790cf\\_INFIEP\\_72/79/ET/72-79-ET-V1-S1\\_\\_1\\_.pdf](http://content.inflibnet.ac.in/data-server/eacharya/documents/548158e2e41301125fd790cf_INFIEP_72/79/ET/72-79-ET-V1-S1__1_.pdf)

The number of colleges has also registered 79 times with just 500 in 1950 to 39,071 during the year 2016. Taking the advantage of constitutional provision many state governments in the country have opened a large number of universities during the recent past. These degree granting institutions are classified here as below:

- (i) Central Universities
- (ii) State Government Universities
- (iii) Deemed Universities
- (iv) Affiliating Universities Other Universities
- (v) Independent University
- (vi) Open Universities
- (vii) Specialized Universities

The state wise number of Universities established in India are depicted in Table 1, which shows that Rajasthan and Uttar Pradesh each have (64) highest number of Universities, followed by Tamil Nadu (58) Karnataka (51) and Gujarat (49), while the rest of the Universities are spread in other states of the country.

Table 1: State wise list of Universities in India (as on 31<sup>st</sup> Dec., 2015)

State	Central Universities / Institute of National Importance / Others	State Universities	Deemed Universities	Private Universities	Total
Andhra Pradesh	2	21	5	0	28
Arunachal Pradesh	2	0	1	5	8
Assam	4	11	0	3	18
Bihar	5	16	1	0	22
Chandigarh	1	1	1	0	3
Chhattisgarh	3	12	0	7	22
Delhi	12	6	12	0	27
Goa	1	1	0	0	2
<b>Gujarat</b>	<b>3</b>	<b>26</b>	<b>2</b>	<b>18</b>	<b>49</b>
Haryana	2	13	5	16	36
Himachal Pradesh	3	4	0	17	24
Jammu & Kashmir	3	8	0	0	11
Jharkhand	2	9	2	2	12
<b>Karnataka</b>	<b>2</b>	<b>26</b>	<b>15</b>	<b>8</b>	<b>51</b>
Kerala	4	12	2	0	18
Madhya Pradesh	7	18	3	13	41
Maharashtra	4	20	21	0	45
Manipur	3	0	0	0	4
Meghalaya	2	0	0	8	10
Mizoram	2	0	0	1	3
Nagaland	2	0	0	2	4
Odisha	4	12	2	3	21
Puduchery	3	0	1	0	4
Punjab	5	8	2	8	23
<b>Rajasthan</b>	<b>4</b>	<b>20</b>	<b>8</b>	<b>32</b>	<b>64</b>
Sikkim	2	0	0	5	7
<b>Tamil Nadu</b>	<b>9</b>	<b>21</b>	<b>28</b>	<b>0</b>	<b>58</b>
Telangana	5	13	2	0	22
Tripura	2	0	0	1	3
<b>Uttar Pradesh</b>	<b>8</b>	<b>26</b>	<b>10</b>	<b>20</b>	<b>64</b>
Uttarakhand	4	9	3	8	24
West Bengal	6	23	1	0	30
<b>Total</b>	<b>119</b>	<b>334</b>	<b>127</b>	<b>177</b>	<b>757</b>

Source: Anonymous (2015a)

All these Universities are running different higher educational programmes, which are classified here as below:

<b>Post-secondary Education:</b>	B.A. / B.Sc. / B.Com	3 years
<b>Professional UG Courses</b>	Professional Courses viz : B.Sc. (Agri), B V Sc. & AH, B Sc. (DT), MBBS, BDS, BHMS, BAMS, B Tech, BE etc.	4 to 5.5 years
<b>Professional UG+PG Courses</b>	Integrated Bachelors and Master's programs	5 years
<b>Post-graduate Education</b>	Master's programs viz : M Sc (Agri), M V Sc, MD,MS, M Tech, ME, etc M.Phil. + Ph.D.	2 years 2 - 5 years
<b>Post Bachelor's and Master's Diploma / Certificate programs</b>		1 -3 years

### Status of Agricultural Education

The need of agricultural education and research in India arise before independence, where Report of the Famine Commission-1880, suggested that agricultural laboratories should be established in each province of the country (Singh, 2012 *locit*). Thereafter report of the Dr. J. A.Voelcker's from UK on Improvement of Indian Agriculture (1891), suggested the role of agriculture chemist in India, while organized agricultural research systems in India was initiated with the establishment of a camel and ox-breeding farm at Karnal in 1829, a bacteriological research laboratory for veterinary science at Poona in 1889 and the Imperial Agricultural Research Institute (IARI) at Pusa in 1905. While fact is that before all these developments Imperial Department of Agriculture was established in 1881 and thereafter teaching of agriculture was started in some schools in the country and some of these were converted into colleges. In continuation to this journey of development of modern agriculture in India began with the establishment of Agriculture Colleges in the important province of the country, having modern laboratories, class rooms, and agriculture farm, where these agriculture colleges were established at Saidapet in 1878, Kanpur in 1893, Coimbatore and Lyallpur in 1906 and Poona and Nagpur in 1907, with a mission to develop the education and research related activities in agriculture, in the areas of Botany, Chemistry, Entomology and Agronomy. In the beginning, these colleges were affiliated to the traditional universities and running the diploma course and later on introduced the degree courses.

Sr No	Milestone in Agricultural Education in India	Year
1	Established Department of Agriculture	1871
2	Established Agriculture Colleges at Kanpur, Nagpur, Pune and Coimbatore	1893-1907
3	Established Veterinary Colleges : Bombay, Madras and Calcutta	1886-1903
4	Established Pusa Institute	1903
5	Royal Commission was constituted	1926
6	Established Indian Council of Agricultural Research, New Delhi	1929
7	First Education Commission was set up	1948
8	First Indo-American Team on Agriculture Education ( Damale Committee)	1955
9	Second Indo-American Team of Agriculture Education (M.S.Randhwa Committee)	1959
10	Established First Agricultural University	1960
11	Ralph W. Cummings Committee	1960
12	Approved Model Act for SAU	1994
13	Fourth Dean's Recommendations were implemented	2004

Table 2: State wise list of Agricultural Universities in India (as on 31<sup>st</sup> Dec., 2015)

Sr No	State	Agricultural Universities	Sr No	State	Agricultural Universities
1	Andhra Pradesh	3	13	Madhya Pradesh	2
2	Assam	1	14	Maharashtra	6
3	Bihar	2	15	Manipur	1
4	Chhattisgarh	1	16	Nagaland	1
5	Delhi	1	17	Odisha	1
<b>6</b>	<b>Gujarat</b>	<b>5</b>	18	Punjab	3
7	Haryana	3	<b>19</b>	<b>Rajasthan</b>	<b>5</b>
8	Himachal Pradesh	2	<b>20</b>	<b>Tamil Nadu</b>	<b>4</b>
9	Jammu and Kashmir	2	21	Telangana	2
10	Jharkhand	2	<b>22</b>	<b>Uttar Pradesh</b>	<b>7</b>
<b>11</b>	<b>Karnataka</b>	<b>7</b>	23	Uttarakhand	1
12	Kerala	3	24	West Bengal	4
<b>Total</b>					<b>69</b>

Source: [https://en.wikipedia.org/wiki/List\\_of\\_universities\\_in\\_India](https://en.wikipedia.org/wiki/List_of_universities_in_India)

By the year 1947, India had 17 colleges of agriculture with annual enrollment of about 1500 students, while at present we have 213 agriculture colleges in the country having about 37,955 students of UG and 10,999 students of PG under different courses in the universities. However, first agricultural university was established at Pantnagar in 1960 and at present there are 69 SAU's (inclusive agriculture and allied sciences (composite) – 16, agriculture alone – 32, animal science universities-13, horticulture universities – 04, fisheries alone – 03 and dairy alone – 01) working in the country. These SAU's includes four SAU's of Gujarat viz: SDAU, AAU, JAU and NAU.

However, earlier there were eleven colleges including all faculties of agricultural science in the state, while presently we have 30 colleges running the UG and PG degree courses and 20 colleges running the diploma courses in the state. This journey of agricultural development initiated in Gujarat during 1938 by establishing the Institute of Agriculture Science at Anand, which became constituent of Gujarat Agricultural University in 1972 after its establishment. Further, it is said that states have established a Veterinary University also during recent past. All these SAU's were established on the Land Grants College of USA and this existing system needs to be redefined, considering the present global situation inclusive: climate change, marketing intelligence, application of ITK, issues relevant to IPR and clean energy, conservation and utilization of water, conservation of biodiversity, empowerment of farm women, farm size and cropping pattern system etc. in the country.

The contribution of private institutions in agricultural sector in developing the trained human resources is also significant, which is visualized from the number of agriculture colleges in the country, that earlier there were 51 agriculture colleges affiliated to general universities and now these are about 54. These colleges functions outside the SAU system and turn out the graduates and post graduates. The majority of these colleges are in the state like Uttar Pradesh (32), Rajasthan (05), Uttarakhand (3), West Bengal, Tamil Nadu, Madhya Pradesh Tripura and Gujarat have 02 each and Punjab, Puducherry, Andhra and Goa have one each, while 159 non grant / private colleges are affiliated various SAU's, which are spread in the state of Maharashtra (123), Chattisgarh (16), Rajasthan (14), Tamil Nadu (05), Gujarat (02) and Uttar Pradesh (01). Some of these private colleges don't have proper infrastructure and easy admission process, caused concern for providing quality higher agricultural education. Since, it is a state subject, as



enshrined in the constitution of India and become challenging for policy makers to maintain uniform standards. Then possibilities of setting up accreditation system to improve the quality of education will help us in future.

### **Modernization of Agricultural Education System**

The Famine Commission -1880 suggested that every province of the country should have agriculture labouratory, was the real beginning of development of this sector, thereafter country made steady progress, which might be further speedup after its evaluation and new module of agricultural education shall be developed considering various factors viz: climate change, marketing intelligence, application of ITK, issues relevant to IPR and clean energy, conservation and utilization of water, conservation of biodiversity, empowerment of farm women, farm size and cropping pattern system etc., to make this occupation profitable and farmers of the country feel proud rather than they should suicide. The steady declining in the population of farmers from 71.9 % in 1951 to 45.1% in 2011 (Table 3) shows that our system or present situation is not favorable for farmers of the country.

Table 3: Population and Agricultural Workers (in million)

Year	Total Population	Average Annual Exponential Growth Rate (%)	Rural Population	Agricultural Workers		
				Cultivators	Agricultural Labourers	Total
1951	361.1	1.25	298.6 (82.7)	69.9 (71.9)	27.3 (28.1)	97.2
1961	439.2	1.96	360.3 (82.0)	99.6 (76.0)	31.5 (24.0)	131.1
1971	548.2	2.20	439.0 (80.1)	78.2 (62.2)	47.5 (37.8)	125.7
1981	683.3	2.22	525.6 (76.9)	92.5 (62.5)	55.5 (37.5)	148.0
1991	846.4	2.16	630.6 (74.5)	110.7 (59.7)	74.6 (40.3)	185.3
2001	1028.7	1.97	742.6 (72.2)	127.3 (54.4)	106.8 (45.6)	234.1
2011	1210.6	1.50	833.5 (68.8)	118.7 (45.1)	144.3 (54.9)	263.0

Source: Anonymous (2014)

Hence, existing system required modifications, to make this occupation economically viable, by considering different modules of farming, where existing global situation shall be taken into consideration rather than country alone, while in education system, we shall have more skilled development courses to make this occupation more skilled orientated rather than traditional. The situation of farmers in the country is very panic, which is to be given a new shape.

Hence to change the existing conditions of the stakeholders in the country, we must have new education policy as well as market policy, where we must have more skilled development courses separately for lower level as well as higher level, so that students in future can established their own enterprises and stakeholders should not have any market restrictions throughout country. Therefore, existing courses as well as skilled development courses along with other courses for agriculture, veterinary and home science faculties.

### **Enrolment of Students in India**

#### **(a) Enrolment of students according to field of study**

The status of higher education in India is visualized from the number of students and infrastructure facilities. Presently, India is the third largest country of the world in education after USA and China, where 2,96,29,000 students were enrolled during 2012-13, which includes regular students (2,60,96,292), students under distance learning mode (35,32,730) and foreign national students' about 35,178 (Anonymous, 20156,a) However, details of the students according to the subject of study reported by Choudaha (2012) is depicted in Table 4, under the different courses, which shows that maximum number of students were enrolled in Arts (37.09%) and minimum were in Agriculture (0.45%) and Veterinary Science (0.14%). At the same time observations of Tiwari (2014) about students v/s teacher ratio in higher education was another important aspects of education which was only 24:1, respectively under different colleges. Hence, our efforts must be, to make agriculture occupation as profit making as well as eco-friendly. At the same time carbon conservation in the soil must be improve to maintain the environment conducive for biodiversity conservation in the country.

Table 4: Enrolment of students in India according to field of study, 2012-13

Sr No	Field / Subject of Study	No of Students Enrolled (000)	Percent of Total
1	Arts	7,539	37.09%
2	Science	3,790	18.65%
3	Commerce & Management	3,571	17.57%
4	Engineering & Technology	3,262	16.05%
5	Education	733	3.61%
6	Medicine	716	3.52%
7	Law	373	1.83%
8	Agriculture	97	0.45%
9	Veterinary Science	28	0.14%
10	Others	218	1.07%
	<b>Total</b>	<b>20,327</b>	<b>100%</b>

Source :Choudaha (2012)



### (b) Overall enrolment of students in India

It is a matter of consideration that total students enrolled during the year 1950-51 were only 4.0 lakhs including 50,000 girls, whereas corresponding value during 2010 were 275 lakhs including 120 lakhs girls. The corresponding estimated values would be about 320.17 and 139.92 lakhs respectively during the year 2020-21; and 365.33 and 159.83 lakhs respectively during the year 2030-31 (Table-5). These estimated values are based on the number of students enrolled in 1950-51 and annual growth attained till 2010-11. Therefore, we have to manage the resources by considering these values, where we have to increase the number of institutes, as well as intake capacities of existing institutes.

Table 5: Number of Students (lakh) Enrolment in Higher Education

Sr No	Year	Boys	Girls	Total
1	1950-51	3.5	0.5	4.0
2	1970-71	26.0	7.0	33.0
3	1990-91	34.0	15.0	49.0
4	2010-11	155.0	120.0	275.0
5	2020-21 (P*)	180.25*	139.92*	320.17*
6	2030-31 (P*)	205.50*	159.83*	365.33*

Source: Tiwari (2014)

### (c) Requirement of College and Universities

It is natural that increasing in population, leads to increase the demands of resources, where in education we have to consider that existing institute should increase their capacity without compromising the quality and new institute should be established. Under present circumstances, it is necessary that we will require about 47,234 colleges and 940 Universities till 2030-31 (Table 6), if growth of these institutes remains same as that it was since 1950-51 to 2016. Based on these realities, we have to mobilize our resources to face the future challenges to meet the requirements of our growing population in the country.

Table 6: Number of recognized College / Universities in India

Sr No	Year	Number of Colleges	Number of Universities
1	1882	67	04
2	1901	145	05
3	1922	167	14
4	1847	496	21
5	1950-51	578	27
6	1970	3277	82
7	1990	5748	184
8	2010	32974	621
9	2016	39,071	799
10	2020 (P*)	41,404*	820*
11	2030 (P*)	47,234*	940*

Source: Tiwari (2014); Anonymous (2015a); Anonymous (2016) and Anonymous (2016a)

At the same time, we have to consider the global changes and we have to make modifications in our education system. Therefore, after considering these aspects, we realized that knowledge of education system in India and abroad is must. Considering these facts and we all must know these realities, a brief comparison of the *Indian Standard Classification of Education: Fields of Education* (In SCED-F) 2013 and *International Standard Classification of Education: Fields of Education and Training* (ISCED-F) 2013 is summarized for the subjects relevant to agricultural education, which will be helpful for the students as well as educationists of our country. The brief of these fields of education is given here as under (Table 7)

Table 7: As International Standard Classification of Education: Fields of Education and Training (ISCED-F) has been revised from 2013; the comparison has been done with ISCED-F 2013 instead of ISCED-F 2011

Sr No	Indian Standard Classification of Education: Fields of Education (In SCED-F) 2013		International Standard Classification of Education: Fields of Education and Training (ISCED-F) 2013	
	Code	Broad Field/ Detailed Field	Code	Broad Field / Narrow Field / Detailed Field
1	51	Agriculture	08 081	Agriculture, forestry, fisheries and veterinary Agriculture
2	5101	Agriculture	0811	Crop and livestock production
3	5102	Forestry	082 0821 081 0811 0811	Forestry Forestry Agriculture Crop and livestock production Crop and livestock production
4	5103 5104 5507	Horticulture Sericulture Dairy Technology	0721 071	Food processing Engineering and engineering trades
5	5510	Food Technology	0721	Food processing
6	58	Fisheries Science	08	Agriculture, forestry, fisheries and
7	5801	Fisheries Science	081 0831	veterinary Agriculture Fisheries
	59	Home Science	07,09,1 0	Engineering, manufacturing and construction, Health and welfare, Services Manufacturing and processing, Health, Personal services
	5901 5902 5903	Food Technology Home Science Nutrition	072,091 ,101 0721 1011 0915	Food processing Domestic services Therapy and rehabilitation
	13	Science	05 051	05 Natural sciences, mathematics and statistics 051 Biological and related sciences
	1301 1302 1303 1304 1307 1308 1311	Bio-Chemistry Bio-Science Bio-Technology Botany Environmental Science Genetics Life Science	0512 0511 0511 0511 0521 0511 0511	Biochemistry Biology Biology Biology Environmental Science Biology Biology
	61 6101	Journalism and Mass Communication Journalism and Mass Communication	03 032 0321	Social sciences, journalism and information Journalism and information Journalism and reporting
	64	Management	04 041	Business, administration and law Business and administration

6401	Agri-Business Management	0413	Management and administration
6409	Human Resource Management	0413	Management and administration
6411	Marketing Management	0414	Marketing and advertising
65	Marine Science/ Oceanography	07	Engineering, manufacturing and construction
6501	Marine Science/ Oceanography	071	Engineering and engineering trades
		0716	Motor vehicles, ships and aircraft
68	Veterinary and Animal Sciences	08	Agriculture, forestry, fisheries and veterinary
6801		084	Veterinary
6802	Dairy Science		Veterinary
	Veterinary and Animal Sciences	0841	Veterinary
		0841	Veterinary

### Status of Students and Indebtedness of Agriculture Households

The students coming from rural area have back ground of farming, ease them to study in the farm university, resulted that about 50% students in SAU's are coming from rural area across the country (Joshi,2011), where proportion of girls students in farm universities is about 25% and under SDAU it was about 21.93% during 2012-13 under UG courses. These students are supporting the farmers directly or indirectly to continue their occupation. However, looking towards the status of farmers, it is realized that their numbers are declining and students coming from rural area are also not interested in doing the farming, where one of the major reason might be indebtedness of the farmers, which is shown in the Table-3 and 8. It shows that 42.6% agricultural households in Gujarat are indebted as against 51.9% in India.

Table 8: Number of Agricultural Households in India and Gujarat during the year – 2014

State / All India	Estimated No of Rural Households (00)	Estimated No of Agricultural Households (00)	Agricultural Households as % of Rural Households (%)	Percent of Agricultural Households Indebted
Gujarat	58719	39305	66.9	42.6%
India	1561442	902011	57.80	51.9%

Source: Anonymous (2014)

This indicates that existing farming system is not suitable for the stakeholders of the country in terms of economically viability. More over this situation is more panic for landless, small, marginal and medium farmers, might be due to limited resources and higher cost of input, lack of storage facilities and poor purchase power (Table 9).

Therefore, our system of agricultural education as well as farming should be change and it must be skilled oriented rather than job finders, where suitable entrepreneurship programmes shall be introduced. If these entrepreneurship programmes are supported by financial institutions, than this sector can provide better livelihoods security to more households in the rural area of the country, where existing problems of the transport of goods as well as other costs could be minimized and students of farm universities should be trained to have their own entrepreneurship and should became job provider rather than job seeker. It will help to improve the social status of the farmers as well as to make agriculture as economical viable occupation. The financial conditions of the farmers in the country are very poor, which is realized from the Table 9 also,

where about 51.9% agricultural households are under indebtedness. This situation becomes more panic, when we have to face the situation of drought, floods or erratic rainfall, where some times farmers lost whole crops. Similarly, declining the contribution of agricultural sector in our GDP raised our eyebrow, that we must change our strategies, which have direct impact on the enrolment of students, particularly in agricultural sector, which is also lowest in the country as compare to other field of study.

Table 9: Indebtedness of Agricultural Households (all-India) in Different Size / Classes of Land Possessed

Land Possessed (Hectare)	Estimated No of Agricultural Households (Lakh)	% to Total in each Class	Estimated No of Indebted Agricultural Households (lakh)	% to Total in each Class	% of Indebted Agricultural Households to Total	Average outstanding Loan Amount (Rs)
< 0.01	23.89	2.65	10.02	2.1	41.9	31100
0.01 - 0.40	287.66	31.89	135.97	29.0	47.3	23900
0.41 - 1.00	314.81	34.90	152.16	32.5	48.3	35400
1.01 - 2.00	154.58	17.14	86.11	18.4	55.7	54800
2.01 - 4.00	84.35	9.35	56.10	12.0	66.5	94900
4.01 - 10.00	33.02	3.66	25.21	5.4	76.3	182700
> 10.00	3.71	0.41	2.92	0.6	78.7	290300
<b>All India</b>	<b>902.01</b>	<b>100.00</b>	<b>468.48</b>	<b>100.00</b>	<b>51.9</b>	<b>47000</b>

Source: Anonymous (2014)

Another, important point of consideration is the poor response of students in doctorate programmes, where only one percent students are involved, which is very poor (Table 10). Therefore, we shall change our strategies to attract more and more students for research programmes of all Universities in the country, by providing them either part time internship of long duration, more attractive fellowships / scholarships and fair dealing with freedom of work, which sometimes is not given to the faculty as well as to the students, due to many reasons. The situation of SAU's is also more or less similar, where about 0.61% of total students in higher education during the year 2014-15, enrolled in SAU's, which includes UG students (Agriculture-21,286; Dairy Technology-562; Marine / Fish / Oceanography-866; Veterinary Science-2526; Home Science-10,964 and Agriculture Engineering-1949) and PG students (Agriculture-6328; Dairy Technology-111; Marine / Fish / Oceanography-500; Veterinary Science-970; Home Science-2770 and Agriculture Engineering-320) (Anonymous, 2015a).

Table 10: Enrollment of students according to level of education in India (2012-13)

Sr No	Level of Education	Number of Students	Percent of Total
1	Graduate (Bachelor's)	1,74,56,000	86%
2	Post-Graduate (Master's)	24,92,000	12%
3	Research (Doctoral)	1,61,000	1%
4	Diploma/Certificate	2,18,000	1%
	<b>Total</b>	<b>2,03,27,000</b>	<b>100%</b>

Source: Choudaha (2012)

## Mechanization in Farming System

Another important aspect of agricultural education is mechanization of farm operations, where we required skilled workers, but cost of labour is increasing day by day due to increasing the wages, which were as. Rs 348.00, 385.00 and 423.00 for unskilled, semi-skilled and skilled workers during the financial year 2015-16 in the country (Anonymous, 2015), while for ploughing the field wages rates were about 78.47 to 100.83 during 2008-09 (Chalam-2010). The same were Rs173.90 for unskilled and Rs 213.58 for skilled workers during the year 2013 (Anonymous, 2013). Here, it is very interesting to note that labour cost in total operational cost of paddy, arhar and groundnut was 48.4% , 44.2% and 29.6% respectively in Gujarat during the year 2010 (Nadhanael, 2010). It shows that farmers shall adopt mechanization rather than labour dependent operations in agriculture. But real problem with them is the size of land holding, where farmers having small holdings are not able to maintain the machines / equipments required for different agriculture operations. Therefore, our focus in agriculture education as well as in cultivating the crops shall take into consideration this reality and proper modules for different categories of farmers shall be developed on priority basis.

Looking towards the landholdings in the country, it is indicated from the Table 11 and 12 that proportion / percentage of landless and marginal farmers is increasing, while number of farmers of other categories is declining and overall size of operational land holdings is also declining. Therefore, our future education programmes or course curriculum should consider these facts and realities; and opinion of these stakeholders should be taken into consideration before finalizing the future course curriculum in the country.

Table-11: Operational Land Holdings in Rural Area of Gujarat and India

Land holding category		Distribution of household operational holdings in percentage			
		1971-72	1981-82	1991-92	2002-03
Landless	(≤ 0.002 ha)	27.4	26.1	21.8	31.94
Marginal	(0.002 –1.00 ha)	32.9	41.1	48.3	47.1
Small	(1.01 – 2.00 ha)	16.4	14.5	14.2	11.2
Semi medium	(2.01 – 4.00)	12.9	10.6	9.7	6.2
Medium	(4.01 – 10.00)	8.1	6.3	4.9	2.9
Large	(> 10.00)	2.2	1.4	1.1	0.5
<b>Estimated households operational holdings (No in million)</b>		<b>56.9</b>	<b>69.4</b>	<b>93.4</b>	<b>101.4</b>

Source: [www.nddb.org.in](http://www.nddb.org.in)

Similarly, study papers of IMA, Ahmedabad (Table 12) shows that there are only 4.3% farmers in the country having land holding more than 5.0 hectares. Therefore, owners of this category can go for mechanization, while 32.82% may go for partially mechanization and 62.89% farmers can't go for mechanization. Hence, we must plan our strategies, considering these facts and reality.



Table 12: Fragmentation of Agriculture Land

Percent share of farmers by land holding size (ha)	Year	
	1995-96	2000-01
< 1.00 ha	61.60	62.89
1 to 5 ha	33.50	32.82
> 5.00 ha	4.9	4.3

Source: Anonymous (2009)

### Faculty Positions / Status

The status of faculty in majority of institutes shows that on an average about 50 percent strength of total faculty positions are vacant, whereas in SDAU we have about 40% posts as vacant (n=206) and only 60% are filled (n=306). Further, it is said that there is a problem of inbreeding and about 51 per cent of faculty members have the degree from the same university. However, in agriculture universities, only 17 per cent recruits are new and 46 per cent faculty has served the same university for more than 15 years. (Joshi, 2011). It is very much interested that under SDAU, the ratio of faculty and students is very much comfortable for UG and PG students, which shows that our institute have scope to run more courses than the existing situation.

Realizing the national situation, it was reported by the MHRD in its Annual Report of 2014-15, that there are 38056 Colleges and 757 Universities in the country enrolled about 14,18,389 students in UG and PG courses and 38,056 faculties are running all the programmes of higher education. On the basis of these value, it is estimated that by the year 2020 we required about 40,021 colleges and 14,81,583 teachers for higher education and corresponding figures for the year 2030 will be 45,656 colleges and 17,01,599 teachers in the country (Table 13).

Table 13: Number of College per lakh population (18-23 years), Average Enrolment per College in India and Number of Teachers Required in India

Sr No	Year	Number of College	Number of College per lakh population (18-23 years)	Average Enrolment per College	Ratio of Students to Teacher	Number of Teachers available /required
1	2011-12	34852	25	703		----
2	2014	38056	"	NA		38,056 @ total students = 1418389, ie. 37 teacher per College
3	2020 (P*)	41,570*	"	800 @ total students = 320.17 lakh	24	14,91,583*
4	2030 (P*)	47,426*	"	800 @total students = 365.33 lakh		17,01,599*

Note: \* Estimated figure: the number of college per lakh population (18-23 years) is assume that it is unchanged.

At the same time, looking towards the requirements of the universities in the country, and considering the same growth pattern as we have till now, than we must have about 795



Universities by the year 2020 and 905 Universities by the year 2030. Accordingly, we have to manipulate the resources for budgeting and infrastructure development in the country.

### **Future Strategies**

- The dropout rate from 1<sup>st</sup> to 12<sup>th</sup> as well as in the higher education, shall be decline to increase the enrolment in higher education, which is very low i.e. 21.1% in India as compared to China (26%) and Brazil (36%). However, to meet the future demand for higher education, India should achieve about 30% gross enrolment rate by 2020 (Richard, 2014).
- The system of education is to be beset by addressing the issues of poor quality teaching, outdated and rigid curricula, poor accountability and quality assurance and separation of research and teaching methodology.
- The constraints face by the students / researchers should be addressed and improve the enrolment rate, to do the high quality research and industry engagement for improvement of skill of students.
- Fragile eco-system of India needs multidimensional approach, where inequalities in enrolment across population groups and geographies should be taken into consideration.
- Higher education is to be reorganized and remodeled, where accountability, funding, relationship with industry, international collaboration and improvement in teaching and research shall be given priority and funding of state universities / higher education should be through federal system.
- The syllabus of all Institute / Universities should be same and in twoparts i.e. (i) compulsory /common syllabus for all Institutes / Universities of the country and (ii) supplementary syllabus based on regional resources / requirements.
- Similarly, recruitment in all recognized Institutes / Universities must be through UPSC or state public service commission or other separate board, which must be applicable to all types of institutes managed by government / semi-government / public / private sector in the country.
- The entrepreneurship programme should be more intensive and more frequent (means at least one entrepreneurship programme every year, commencing from the third year onwards till completion of degree by the student.
- Opinion of stakeholders should be taken into consideration, before finalizing the course curriculum of SAU's in the country.
- The course curriculum of SAU's should be modular credit-based with flexibility of entry and exit and certificate course of one year and diploma course of two years with the options to transfer to regular degree programs.
- Any student coming from farmers' family should be given some weight-age in admission under UG as well as PG courses under SAU's.

### **CONCLUSION**

The reports of MHRD and views expressed by different experts and policy planners, it is suggested that quality of education must be improve, which is deteriorating over the period. The private as well as government / semi-government institutes must be governed by a registered body of well-known experts of the country and all these institutes must be accredited at a

particular interval. The Accreditation Board should be a constitutional body having some regulated powers to maintain the proper standard of education in the country.

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