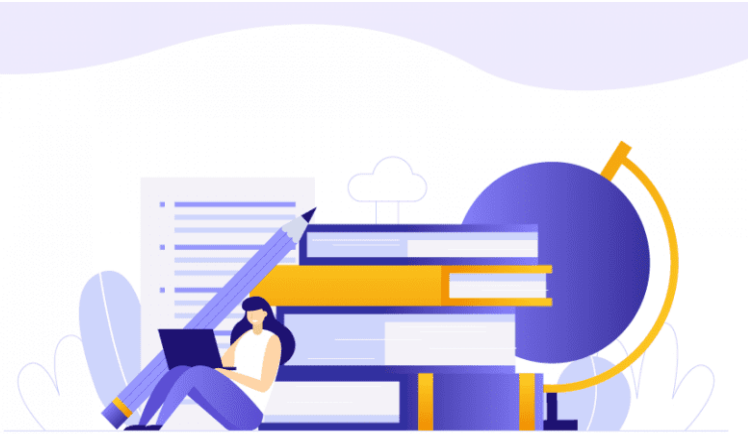

Quality in Textile Engineering Education: A Comparative Analysis

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29th Symposium on "Quality of Engineering Education in Pakistan.

The Pakistan Academy of Engineering

Contents

- Quality Education
- Engineering
- Textile and Mankind
- Textile and Pakistan
- Textile Engineering Education in Pakistan
- OBE
- Textile engineering Education in India and Bangladesh
- Take –away messages

Application of Engineering Principles

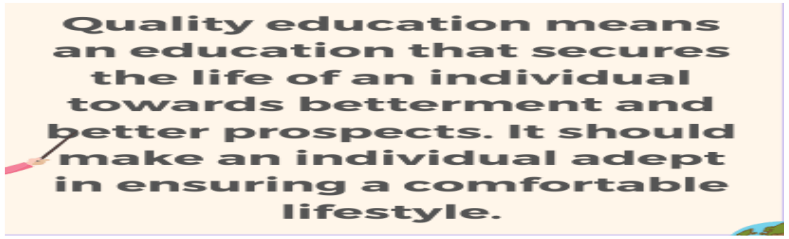
The Pyramids

The Great Wall of China

Quality Education

- In the technological era, ***development depends on education.***
- Quality education is the only source for survival in the globalization. If a country does not provide adequate access to quality education, its survival in the 21st century will be very difficult.
- Quality is not a concrete that can be presented to someone. Quality education depends upon teachers, learning materials and basic facilities.
- Quality cannot be attained if one of these elements is missing

> "*Quality education as one ,that focuses on the social, emotional, mental, physical, and cognitive development of each student regardless of gender, race, ethnicity, socioeconomic status, or geographic location.*"



<u>Dimensions of a Quality Education</u>

- Equity
- Sustainability
- Contextualization and Relevance
- Balanced Approach
- Child-friendly Teaching and Learning
- Learning Outcomes

- In 2012, the United Nations for the first time included 'Quality Education' in their Sustainable Development Goals (SDG).
- Ensure inclusive and equitable **quality education** and promote lifelong learning opportunities for all.

Engineering

- Engineering represents the backbone of any country aspiring to migrate t knowledge economy. Engineering has a wide range of effects on human society and nature.
- Engineering contributes significantly to the economic well-being, social stability, and cultural development of society. The strengthening of engineering, education and research leads to national self-reliance, as it creates the necessary strengths in many fields.
- Engineers are expected not only to solve technological problems, but also social and economic problems in sustainable ways. For this they must acquire themselves with modern engineering concepts, theoretical principles and their practical applications.

Engineering also plays an important role in global human development, sustainability, and preservation of the environment. ***The importance of high-quality engineering education is therefore self-evident.***

World Federation of Engineering Organizations (WFEO), "*to meet the future challenges of society, engineering graduates must possess relevant knowledge and proper skills*"

- Grear, B. "The Future of Global Engineering - APersonal View". Engineers Australia, Sydney Division Fellows Luncheon. Sydney (2006).
- FUTURE CHALLENGES IN ENGINEERING EDUCATION IN PAKISTAN (A CASE STUDY

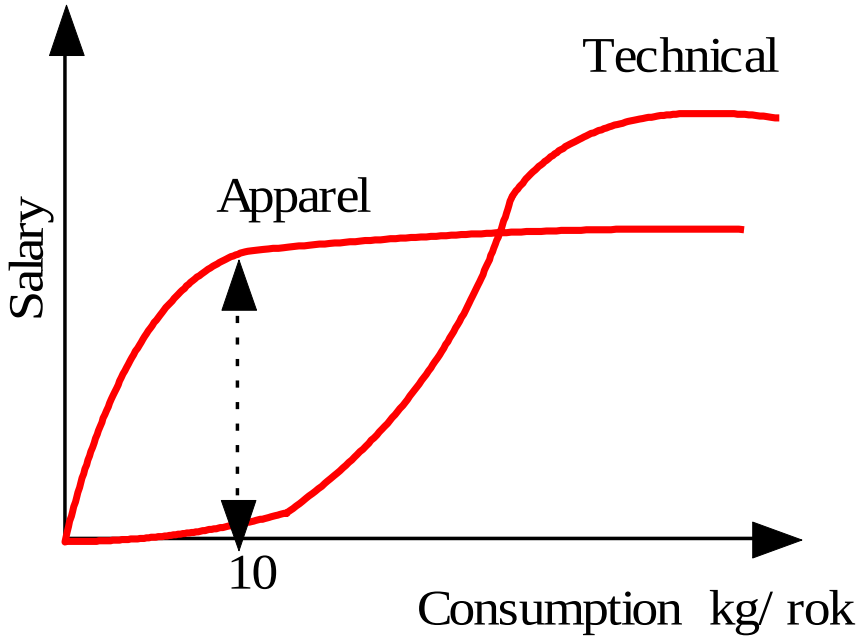
Development of Engineering Education

- 1800s – formal engineering education on disciplinary knowledge with grounding in mathematics and sciences
- 1900s – continued to be practice-oriented, with many experienced engineers engaged in teaching & sharing engineering practice
- Since late 1900s – expansion of scientific and engineering knowledge
  - Early specialization in narrow disciplines
  - Increase in teaching of engineering sciences

Year	Event
1914	First patent on air-jet weaving
1922	Rapier loom (Gabler loop transfer)
1926	Publication of Peirce's weak-link theory
1937	Publication of Peirce's geometry of cloth structure
1941	Discovery of polyester (Terylene) fibre
1946	Publication of van Wyk's theory of compression of fibrous materials
1955	Publication of Leaf and Glaskin's geometry of a plain knitted loop
1963	Invention of Rotor spinning machine
1965	Discovery of Kevlar® fibre
1980s	Air-jet spinning
1990s	Air-jet weaving with profile reed and relay nozzles

Textiles and Mankind

- **Textile products are accompanying humans during their whole life.**
- **Apparel – number of humans(5-10 kg per year)**
- **Technical – dependent on the state of knowledge**

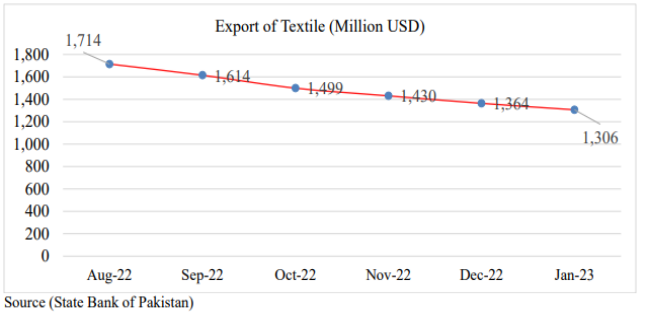


Global Textile Market

- The global textile market stood at a value of around USD 1094.65 billion in 2022. The market is further expected to grow at a CAGR of 4.5% in the forecast period of 2023-2028 to attain a value of around USD 1425.53 billion by 2028.
- The Textile Industry is expected to grow from USD 723 billion in 2023 to USD 859 billion by 2028, at a CAGR of 3.52% during the forecast period (2023-2028).
- The textile industry has been a crucial part of Pakistan's economy since its inception, contributing significantly to the country's GDP, employment, and exports.
- Pakistan has a rich history of textile manufacturing, dating back to the pre-partition era when it was a cottage industry.
- Since then, it has undergone tremendous growth and development, becoming a vital sector for the country's economic development.
- Today, Pakistan is one of the leading textile producers and exporters in the world, with a diverse range of products that cater to various markets and segments.

https://www.expertmarketresearch.com/reports/textile-market#:~:text=Global%20Textile%20Market%20Outlook,USD%201425.53%20billion%20by%202
https://www..com/industry-reports/global-textile-industry---growth-trends-and-forecast-2019---2024

Textiles and Pakistan



Source (State Bank of Pakistan)

- Biggest industrial sector in Pakistan
- It is to be note that textile is Pakistan's largest manufacturing industry, contributing significantly to the country's GDP and employment.
- After Bangladesh, Pakistan is 2nd most dependent country on Textile with respect to exports.

Exports

58%

Textile contributes 58% to the total exports of Pakistan.

GDP

8.5%

Textile contributes 8.5% to the GDP of Pakistan.

Employment

45%

Textile contributes 45% to the total employment of Pakistan.

The exports of textiles contributed 59.50 per cent in Pakistan's total goods exports of $27.734 billion during the last fiscal. The share was 60.89 per cent in the total exports of $26.246 billion during fiscal 2021-22

- Textile is one of the most ancient engineering disciplines . It started alongside the first industrial revolution (1750–1840)which saw the invention of the flying shuttle loom in 1747 and spinning jenny in 1770.
- Science-driven textile education started in the UK during the first industrial revolution. The University of Manchester was at the forefront and textile was one of its original depart
- During the 1990s, production of commodity textile and clothing shifted to Asian countries largely due to the low labour cost and abolishment of Multi-Fibre Agreement. This resulted in gradual closure of textile industries in the western world including the USA and UK.

Year	Event
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1963	Invention of Rotor spinning machine
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1980s	Air-jet spinning
1990s	Air-jet weaving with profile reed and relay nozzles

M. D. Araujo, The incorporation of textile education in the global European education system, in 37th International Symposium on novelties in Textiles, June 15–17, 2006, Ljubljana, Slovenia

Textile Engineering Education

- Pakistan was created in August 1947 with the partition of British India and had a population of about 30 million . The British rule in regions that became Pakistan was considered the periphery of the British Raj in India. The overall literacy rate at the time of independence was less than 10%, and more than 85% of the population lived in villages.
- There was only one university, a few colleges, and there was no other engineering institution. The only university, Punjab University, existed as a state institution established in 1882 in Lahore. There were two engineering colleges called "**Mughal Pura Technical College**" which started in 1921 and later became **Maclagan Engineering College** in 1923. It was named NED College after its main donor Nadirshaw Edulji Dinshaw (NED). NED College later became NED University.
- Over 65 engineering programs are offered at the Undergraduate level in Pakistan. All of these programs are 4-years degree programs. Universities offer BSc Engineering, BS, or Bachelor of Engineering degrees. The status of all of these degrees is the same as long as these are recognized by Pakistan Engineering Council.
- This is pertinent to mention here that a Degree accredited by Pakistan Engineering Council u is recognized by the Washington Accord, which means the degree is recognized all over the v countries that are the signatory of the Washington Accord

Textile Engineering Education

National Textile University	Faisalabad
Mehran University Of Engineering & Technology	Jamshoro
Ned University Of Engineering & Technology	Karachi
Bahauddin Zakariya University, Multan	Multan
Balochistan University Of It & Management Sciences	Quetta
University Of Engineering And Technology[fiasalabad ampus]	Faisalabad
National Textile University Faisalabad, Sub Campus	Karachi

The nation should have a clear vision in every sector and accordingly, the education sector should be built.

- The country takes pride in the sector that has been fetching billions of dollars as export earnings and creating jobs for millions of people in the country .
- It is true that textile education is already playing an important role to enhance the textile and apparel industry. And the current system is producing a good number graduates every year.

National Textile University

Federally Chartered Public Sector University

Established in 1959 as institute

Named as National College of Textile Engineering in 1979

Upgraded to National Textile University in 2002

Offering BS, MS and PhD programs

Students = 3500

Faculty = 195

Leading Textile University in the world

National Textile University ranked 37th for Engineering in Pakistan
QS Asia University Rankings: Southern Asia 2023 : 145 position

https://ntu.edu.pk/index.php

https://www.pec.org.pk/accredition/programs-under-level-1/

Survey

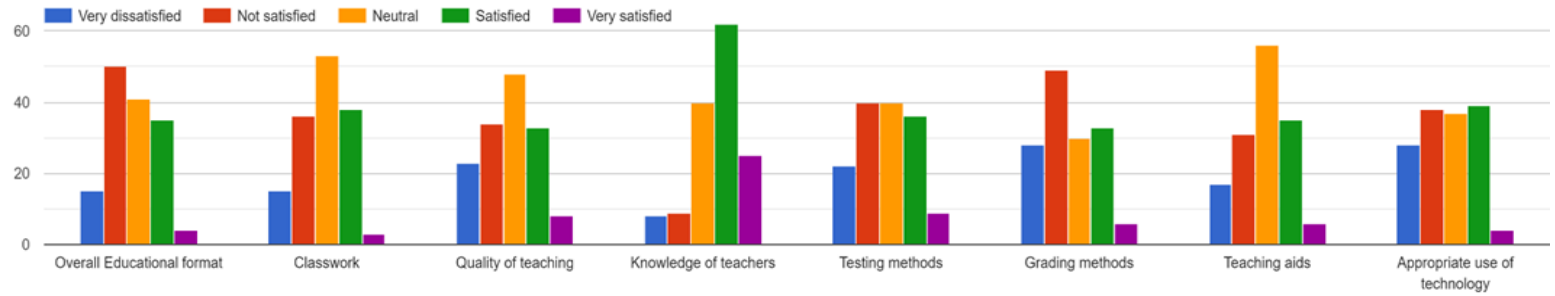
- The result of study found that employers from industries ranging from IT, oil & gas, glass & ceramics, banking, food, cement, and automobile were unanimously dissatisfied with the graduates possessing these skills.
- This result is attributed to the state of teaching and learning in Pakistani universities where students learn by rote memory and lack problem solving skills that could lead to creativity and innovation.
- It also argues that the curriculum is inadequate and lacks the ability to teach competently in teaching, professional and structured skills.
- Skilled talent is leaving the country due to a lack of quality research resources.
- This shortage combined with the new challenges of engineering education makes the state of engineering education in Pakistan more complex and demanding.
- These challenges include, among other things, the extension of engineering education to address global problems such as energy, health care, environment, food, poverty alleviation, security, disaster recovery, and conflicts etc. come together by finding engineering solutions.

- Major challenges currently facing like all engineering education are related to **curriculum, teaching and learning, and the educational environment**.
- As to quality, the balance needs to be maintained between general excellence and targeted areas of excellence.
- In terms of pedagogy, the focus should be on the improvement of *students' problem solving and learning skills, the ability for continued learning throughout their careers, and soft skills (leadership qualities, teamwork, communication skills, and an understanding of economics, business, management, and innovation and entrepreneurship).*
- Good support should be available in terms of qualified technical personnel and well-equipped workshops, laboratories, and computing facilities.

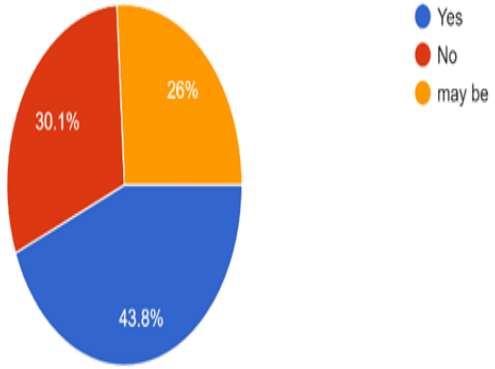
Some of the emerging trends in engineering education include hands-on learning labs, industry-centric curriculum, upgradation of classroom environment and facilities (to support active learning and group-based learning), and use of interactive learning technologies (such as adaptive learning software, e-learning, distance learning, etc.).

Survey

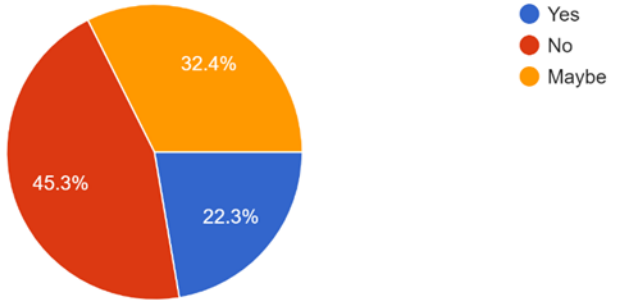
- Students Satisfaction with the Class and Practical Tasks



- Is curriculum more of a conceptual based?



- Is class providing right amount of theoretical and practical experience?



Problem Identification /Concerns

- The state of teaching and learning in Pakistani universities where students learn by rote memory and lack problem solving skills that could lead to creativity and innovation.
- The curriculum is inadequate and lacks the ability to teach competently in teaching, professional and structured skills
- The gap in knowledge between the manufacturing sector, educational institutions, and current international standards.
- Industries and educational institutions have different meanings . The industry is looking for solutions whatever the concept behind it, and academics are looking for theory, whether a solution is found or not. Therefore, the focus is very different.
- Faculty became more dominated by researchers who had little real industrial experience.
- Curricula were often packed with course modules proposed and taught by professors.
- Many of these courses were related to the professors' own areas of expertise and were offered without a critical evaluation of the requirements of an integrated curriculum.
- Graduates from engineering programs were often found lacking in competencies required in real-world engineering employment.

Khawaja, A. (2019, July 28). Education: The problem with manufacturing. Dawn, EOS. https://www.dawn.com/news/1496634

Traditional Education System

- The premise that good raw materials (the students) plus good production system (institution resources) will automatically produce good products (the graduates).
- Evaluation of the quality of the graduates is based on comparative student grades and rankings.
- The curriculum is structured mainly based on the available expertise and preferences of the faculty. The system is content-based and teaching-centric.
- The emphasis is on the input and output of the education system. The important input parameters are the available resources, the number of qualified teachers and the student intake quality.
- The output quality is based on measuring the student's mastery of the defined body of disciplinary knowledge and their performance with the defined curriculum.
- The mastery is based on content acquisition and retention.

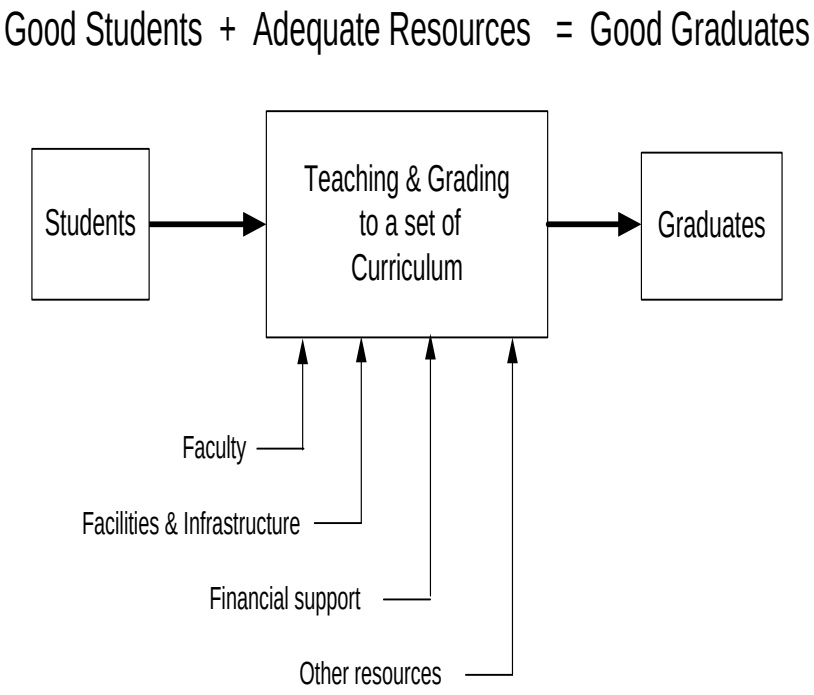
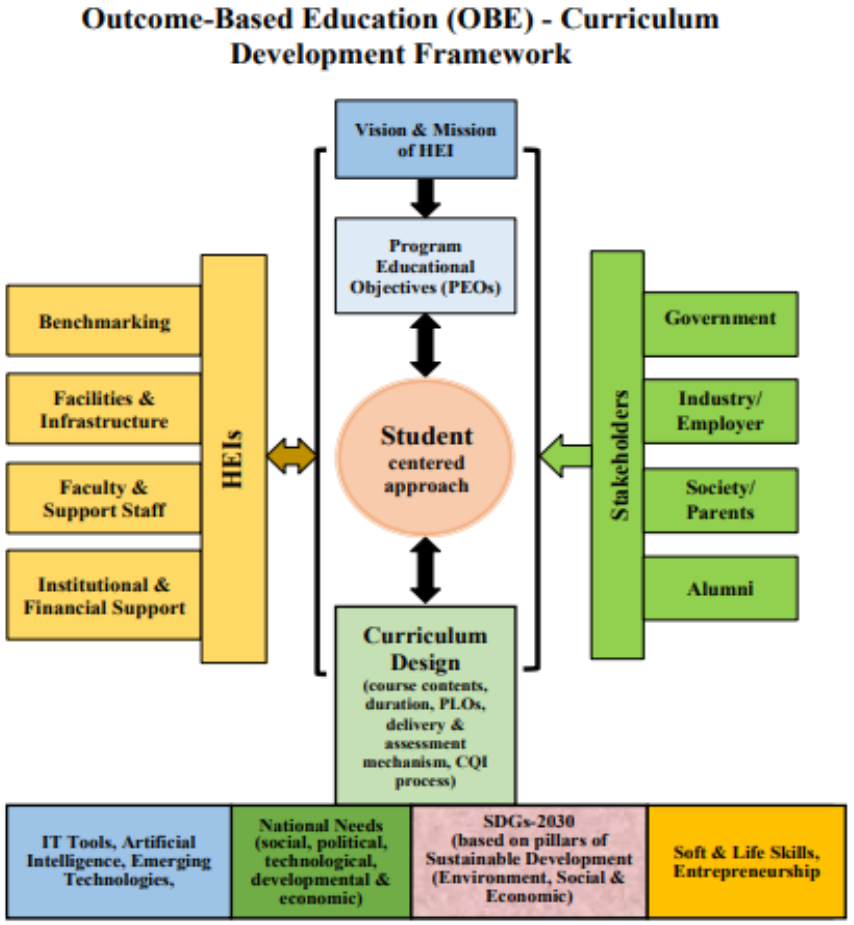


Figure 1 – Premise of traditional education system



https://www.pec.org.pk/wp-content/uploads/2021/03/Textile-Engineering.pdf

CURRICULUM

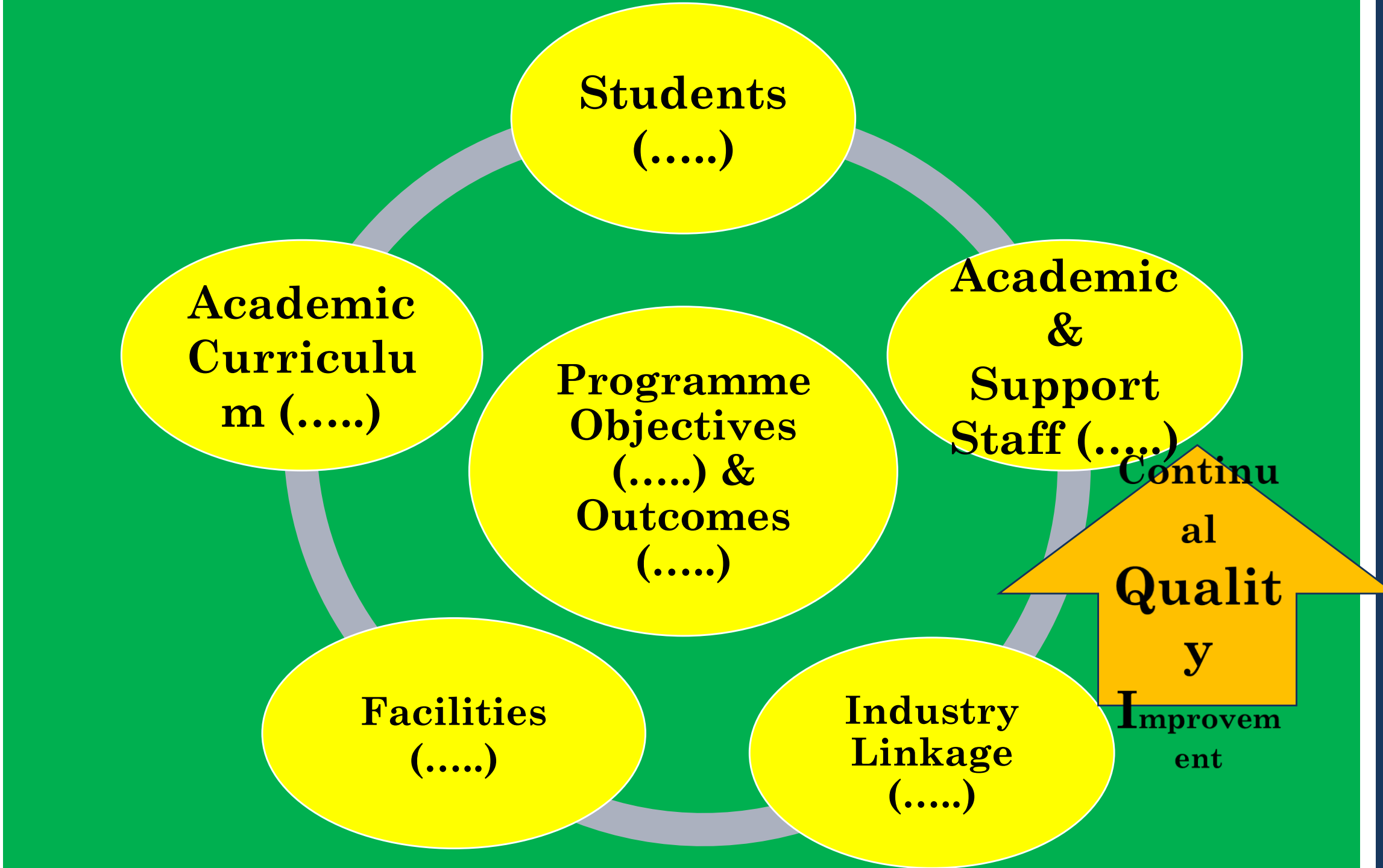
OF

TEXTILE ENGINEERING

Bachelor of Engineering Program

2020

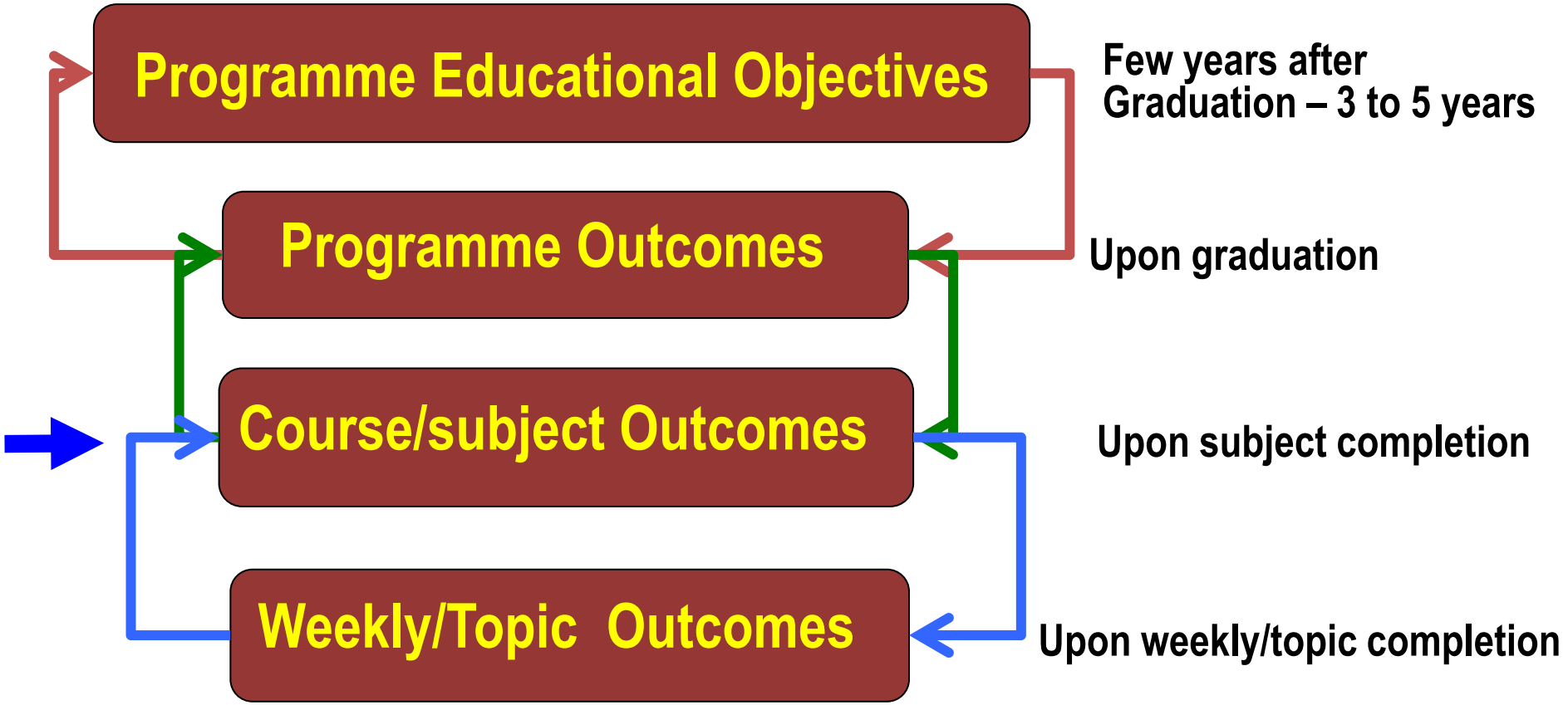
Pakistan Engineering Council
&
Higher Education Commission
Islamabad


Students (.....)
Academic & Support Staff (.....)
Industry Linkage (.....)
Facilities (.....)
Academic Curriculum (.....)
Programme Objectives (.....) & Outcomes (.....)
Continual Quality Improvement

Purpose of an Education Program

- The purpose of an education program is broadly articulated in the accreditation jargon as Program Educational Objectives (PEOs).
- PEOs are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.
- These objectives are periodically reviewed based on feedback of the program's various constituencies.
- For this purpose, there should be in place a process to identify and document relationships with constituencies (who are expected to include students) and their needs which have to be adequately addressed when reviewing the curriculum and processes.
- Published PEOs should be consistent with the mission of the educational institution and the stipulated student learning outcomes and the curriculum and teaching processes that lead to the attainment of these objectives.
- The objectives should be assessable and realistic within the context of the committed resources.

Different Levels of Outcomes



Directed & Coherent Curriculum
Graduate Relevant to Industry

Accountable

PEC's 12 PLOs are identical to WA GAs

Constituent Agreements

Washington Accord	International Professional Engineers Agreement
Sydney Accord	International Engineering Technologists Agreement
Dublin Accord	APEC Engineer Agreement

Graduate Attributes and Professional Competencies

Version 3: 21 June 2013

This document is available through the IEA website: http://www.ieagreements.org.

Program Learning Outcomes (PLOs)

Accreditation criteria which require institutions to demonstrate the achievement of stipulated students learning outcomes which are common to all engineering disciplines, apart from discipline-specific criteria which are more content-based.
The student learning outcomes are statements that describe what students are expected to know and be able to do by the time of graduation.
The outcomes related to the skills, knowledge and behaviors that students acquire going through the program.

No.	Attributes
1	Engineering Knowledge
2	Problem Analysis
3	Design/Development of Solutions
4	Investigation
5	Modern Tool Usage
6	The Engineer and Society
7	Environment and Sustainability
8	Ethics
9	Individual and Team Work
10	Communication
11	Project Management
12	Lifelong Learning

Slave

Master

Attitude/Behavior

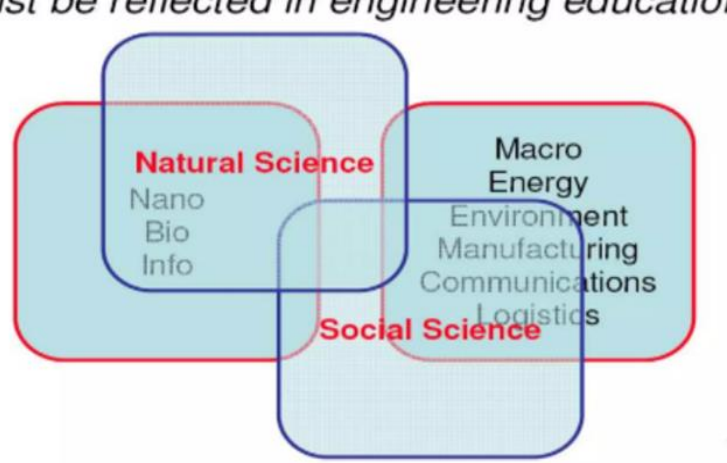
C4-C6

Ability to predict consequences of solution,
From various types of solution select a sustainable solution,
Use of engineering codes and standards to become a responsible engineer

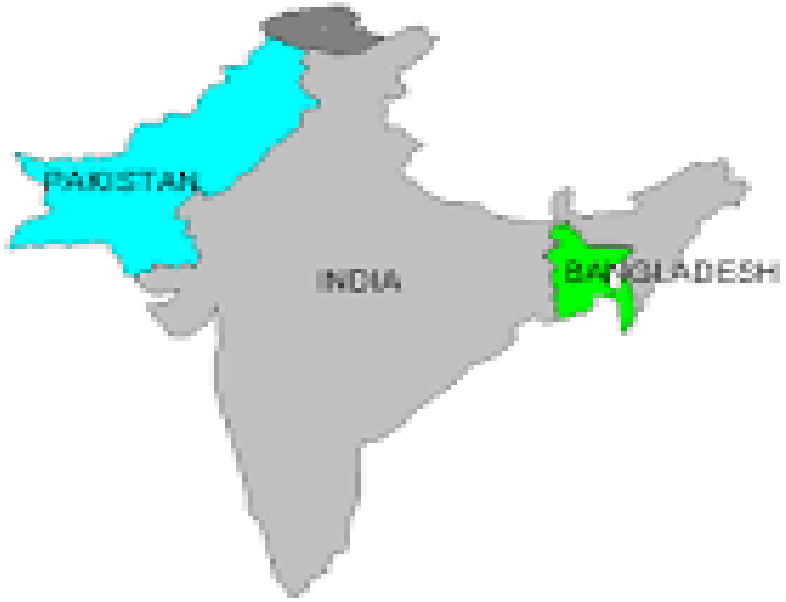
OBE in a nut shell

- **What** do you want the students to have or able to do?
  - **Knowledge, Skill, Affective**
- **How** can you best help students achieve it?
  - **Student Centred Delivery**
- **How** will you know what they have achieved it?
  - **Assessment**
- **How** do you close the loop
  - **PDCA**

Textile Engineering Education



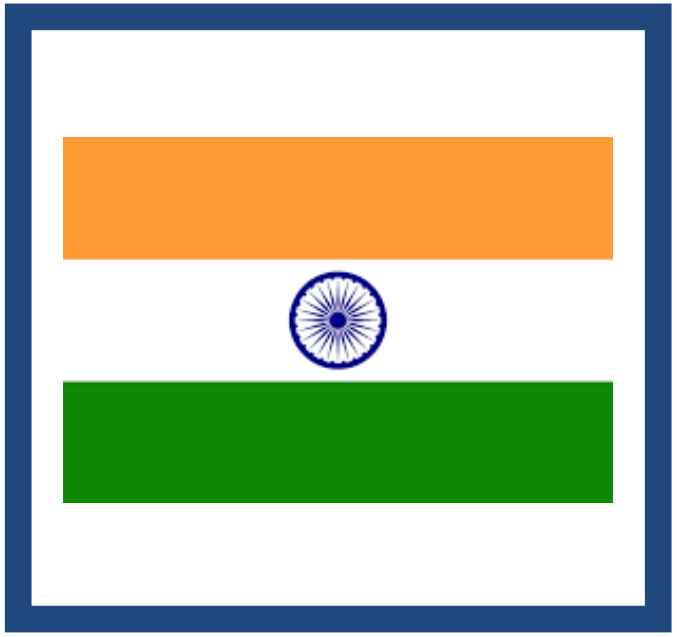
- The curriculum, the skill sets the graduates are getting and their quality has been questioned by many from the industry. And most cases the outgoing graduates can't fulfill the expectations of the industry.
- Perception that Textile education is fundamentally different from other engineering disciplines. This may stem from the fact some of the legacy textile colleges in Pakistan and other South-Asian countries were established standalone and they were not part of multidisciplinary engineering institutes. This might have precluded free exchange of knowledge with other engineering fields and learning from them.
- Due to a mindset, that textile is a technical subject and students hardly need to develop soft skills. And professionals are coming out from major textile schools without efficiently developing personal skills, communication skills, and people management skills.

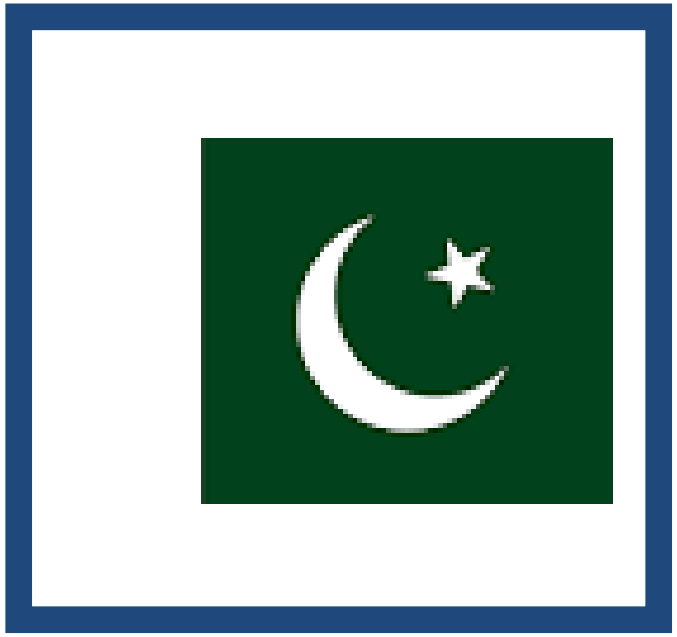


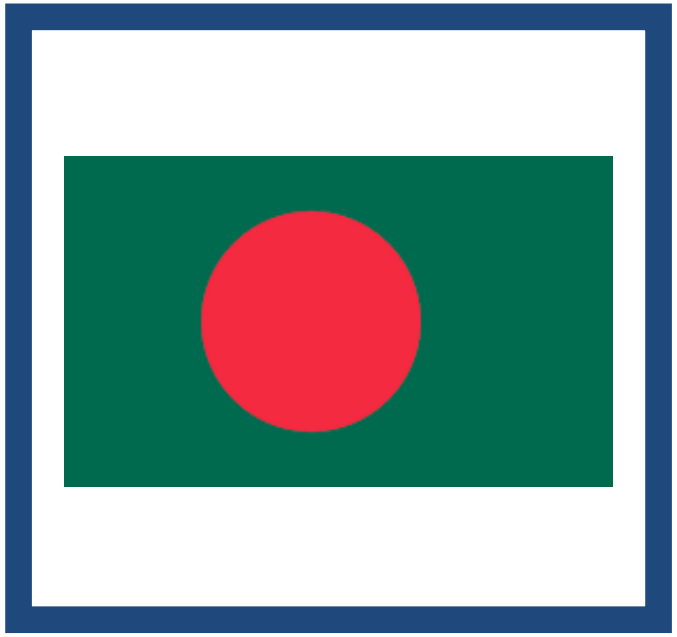
Data were collected from the three countries including Bangladesh, India and Pakistan.

Pakistan Bangladesh and India were considered because they are similar in different aspects.

For example, they are categorized as developing countries, having the same weather conditions, sharing almost similar culture and importantly, having a textile industry that plays a significant role in their economies.







- The Human Development Index or HDI depicts the quality of human resource development.
- It is based on relative weightage assigned to education, health, standards of living, and gender inequality of the people living in a country, region, or area.
- .

Pakistan presently ranks 161 out of 192 states.

India ranks 132

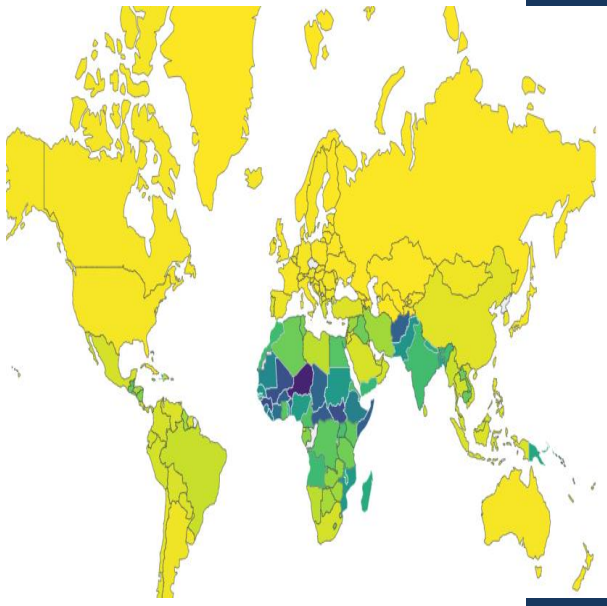
Bangladesh ranks 129

- Bangladesh has the highest increase in the human development index, and Pakistan the lowest.
- However, India has the highest number of years of schooling, that is, 12.2 years, while Pakistan's is the lowest, being 8.3 years; Bangladesh is 11.6 years despite only gaining independence in 1973.

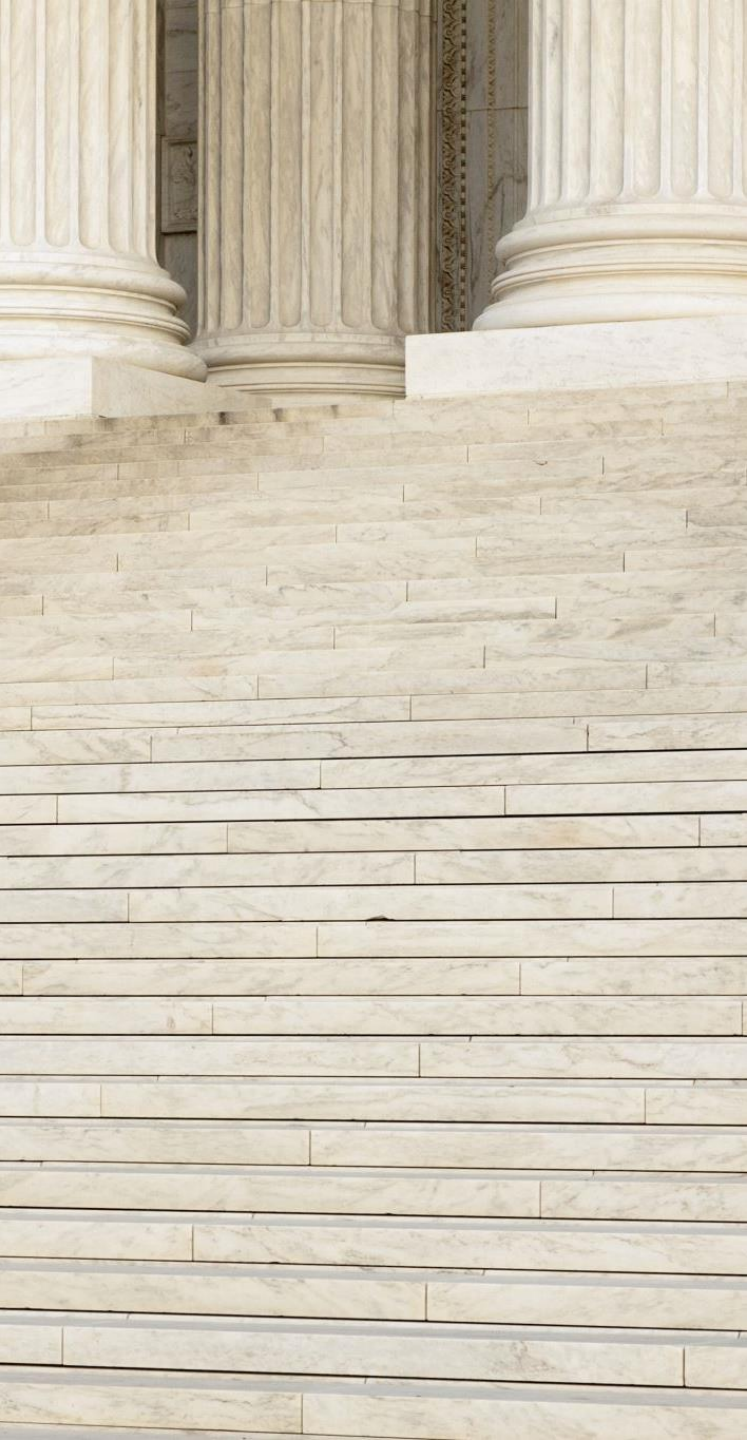
Country	Rank*	Literacy**
India	135	71.2% *(Male: 81.3%, Female: 60.6%)*
Bangladesh	142	61.5% *(Male: 64.6%, Female: 58.5%)*
Pakistan	146	57.9% *(Male: 69.5%, Female: 45.8%)*

**Rank from UNESCO Institute for Statistics*
***Literacy rate from CIA World Fact Book (2015 Estimate)*

India =74.04%
Bangladesh= 74%
Pakistan =58.9%



https://www.undp.org/human-development-report-



- The Pakistan engineering council (PEC), established in 1976, is a legal entity that can approved and modified an effective system for assessing the quality of engineering systems .PEC was representing the country to attain full signatory status of WA since 2010. On 21 June 2017 Pakistan attain full signatory status.
- The National Board of Accreditation (NBA) of the All-India Council for Technical Education (AICTE) becomes a member of the prestigious Washington Accord on June 21, 2007. It was established in 1994 by the AICTE and became autonomous in 2010. Since June 2014, it has been a member of the Washington Accords.
- The Board of Accreditation for Engineering and Education (BAETE), the Institution of Engineers, Bangladesh (IEB), Dhaka. BAETE was established in 2003 by the Institution of Engineers (IEB). In 2017, BAETE switched to Outcome Based Education (OBE) accreditation. Bangladessigned in 1989 inWashington, USAh has been a provisional signatory member of the Washington Accord since 2011.

The formal textile education in India started in the year 1887 at Ripon Textile School of VJTI, Mumbai. It was soon followed by establishment of textile colleges at Serampore (Government Weaving Institute) and Berhampore (Government Silk Weaving and Dyeing Institute) in 1909 and 1927, respectively.
At present, there are around 40 colleges and universities offering textile degree programmes in India .
Textile undergraduate (UG) degree programmes are offered in India under various names as given below.

- Textile Technology
- Textile Engineering/ Textile Plant Engineering
- Textile Cchemistry
- Manmade Fibre Technology etc

Table 1. Engineering universities (adapted from Bangladesh Bureau of Statistics 2010).

SN	Name of the University	Founded	Location	Yearly BSc engineering intake
1	Bangladesh University of Engineering and Technology	1962	Dhaka	885
2	Chittagong University of Engineering and Technology	2003	Chittagong	431
3	Dhaka University of Engineering and Technology	2003	Dhaka	480
4	Khulna University of Engineering and Technology	2003	Khulna	480
5	Rajshahi University of Engineering and Technology	2003	Rajshahi	485
6	Islamic University of Technology	2004	Dhaka	170
			Total	2931

V. K. Kothari, R & D needs of Indian textile industry, in Report prepared by Indian Institute of Technology Delhi under Technology Information

Public Universities for Textile Engineering	Private Universities for Textile Engineering
Bangladesh University of Textiles (BUTEX)	Ahsanullah University of Science and Technology (AUST)
Mawlana Bhashani Science and Technology University	BGMEA University of Fashion & Technology
Dhaka University of Engineering & Technology (DUET)	Daffodil International University
Khulna University of Engineering & Technology (KUET)	Southeast University
Jashore University of Science and Technology (JUST)	Green University of Bangladesh

- IIT Delhi, New Delhi. ...
- Anna University, Chennai. ...
- ICT Mumbai, Mumbai. ...
- National Institute of Technology - [NIT], Jalandhar. ...
- Visvesvaraya Technological University - [VTU], Belgaum. ...
- PSGCT, Coimbatore. ...
- VFSTR, Guntur. ...
- JNTUK, Kakinada.

Harun Chowdhury & Firoz Alam (2012) Engineering education in Bangladesh – an indicator of economic development, European Journal of Engineering Education, 37:2, 217-228, DOI: 10.1080/03043797.2012.666515

Abhijit Majumd , **Rejuvenating the Textile Engineering Education in Indian and South-Asian Universities,** J. Inst. Eng. India Ser. E https://doi.org/10.1007/s40034-023-00273-9

Table 1. Total number of publications of the top 31 schools textile related (2014–2019).

Ranking	Institutions	Total publications
1	DONGHUA UNIVERSITY	2,829
2	ZHEJIANG SCI TECH UNIVERSITY	1,574
3	HONG KONG POLYTECHNIC UNIVERSITY	1,532
4	WUHAN TEXTILE UNIVERSITY	1,524
5	SUZHOU UNIVERSITY	1,252
6	TIANGONG UNIVERSITY	1,195
7	QINGDAO UNIVERSITY	1,139
8	JIANGNAN UNIVERSITY	1,094
9	ISLAMIC AZAD UNIVERSITY	913
10	SICHUAN UNIVERSITY	896
11	SHINSHU UNIVERSITY	806
12	AMIRKABIR UNIVERSITY OF TECHNOLOGY	794
13	NORTH CAROLINA STATE UNIVERSITY	793
14	INDIAN INSTITUTE OF TECHNOLOGY IIT DELHI	697
15	GHENT UNIVERSITY	564
16	NATIONAL RESEARCH CENTRE NRC	557
17	SEOUL NATIONAL UNIVERSITY SNU	551
18	ISFAHAN UNIVERSITY OF TECHNOLOGY	501
19	NATIONAL TEXTILE UNIVERSITY PAKISTAN	439
20	CORNELL UNIVERSITY	433
21	UNIVERSITY OF ZAGREB	430
22	HANYANG UNIVERSITY	411
23	UNIVERSITY OF MANCHESTER	409
24	RWTH AACHEN UNIVERSITY	400
25	CHUNGNAM NATIONAL UNIVERSITY	390
26	IOWA STATE UNIVERSITY	390
27	DEAKIN UNIVERSITY	388
28	GEORGIA INSTITUTE OF TECHNOLOGY	373
29	LODZ UNIVERSITY OF TECHNOLOGY	364
30	TECHNICAL UNIVERSITY LIBEREC	362
31	YONSEI UNIVERSITY	348

Ziqi Li, Hosana Poon, Wei Chen & Jintu Fan (2021) A comparative analysis of textile schools by journal publications listed in Web of ScienceTM, The Journal of The Textile Institute, 112:9, 1472-1481, DOI: 10.1080/00405000.2020.1824434

- It should be noted that job role of textile engineers is not limited to process management, testing and quality control which were considered to be the main functions in the past. Thus, the textile curriculum should be transformed accordingly so that the professional need of the engineers is fulfilled.
- Being the second most polluting industry, fulfilment of circularity and sustainable development goals (SDGs) have become extremely important for the textile and clothing industry.
- Therefore, green technologies involving reduced water and energy consumption, energy recovery, recycling, etc., have become crucial for the competitiveness of textile industry.
- Some of the manufacturing process-related skillsets which were useful in the past have become redundant due to the development of automated machines which have eliminated the manual interventions to a great extent.
- On the other hand, textile graduates are supposed to possess some new skill sets to cope with the challenges posed by new textile manufacturing systems and business models


HEC
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Effective from
Fall 2023

- Excel sheet

Credit Hours	PEC course Name	PEC CrH	NTU Courses	NTU Credit Hours		HEC UG 2023			
Non-Engineering Domain						Name of Courses	Cluster Name	No. of Courses	CrH
						Arts and Humanities	Gen Ed	1	2
12-15	Calculus and Analytical Geometry	3	1. Calculus and Analytical Geometry	3	12	Quantitative Reasoning	Gen Ed	2	6
	Linear Algebra	3	2. Linear Algebra	3					
	Differential Equations	3	3. Differential Equations	3					
	Probability and Statistics	3	4. Statistical Methods in Engineering	3					
6-9	Applied Physics	4	1. Applied Physics	4	8	Natural Sciences	Gen Ed	1	3
	Applied Chemistry	4	2. Applied Chemistry	4					
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4-7	Technical Writing and Presentation Skills	3	1. Technical Writing	3	5	Expository Writing	Gen Ed	1	3
	Functional English	2	--	-		Functional English	Gen Ed	1	3
	Communication Skills	2	2. Communication & Presentation Skills	2		--	--	--	--
2	Islamic Studies and Ethics	2	1. Islamic Studies	2	2	Islamic Studies	Gen Ed	1	2
2	Pakistan studies and Global Perspectives	2	2. Pakistan Studies and Global Perspective	2	2	Ideology and Constitution of Pakistan	Gen Ed	1	2
2-6	Elective-I (Sociology for Engineers, Psychology, Professional Ethics, Organizational) Behavior/ Community Service)	2	1. Personality Development & Character Building	3	6	Civics and Community Engagement	Gen Ed	1	2
	Social Science-II (Engineering Economics)	3	2. Social Intelligence and soft skills	3		Social Sciences	Gen Ed	1	2

Take -Away message

- Need to ensure that textile programmes do away with data-information centric delivery and embrace the principle-centric teaching–learning process.
- Process focus should be reduced and material/structure focus should be augmented to produce new-generation textile engineers who can lead the industry towards growth and prosperity through innovation.
- Teachers, academia, industry and government bodies must work in unison to initiate the radical changes needed to rejuvenate the textile engineering education

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Thank You