NEW CHALLENGES & OPPORTUNITIES IN THE FIELD OF EDUCATION, SCIENCE, MANAGEMENT, COMMERCE, HUMANITIES, AGRICULTURE & TECHNOLOGY IN THE CURRENT SCENARIO

(Book Chapter)

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THE POWER OF VITAMIN D IN COVID 19 MANAGEMENT: A PATH SIMPLIFIED

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Abstract - Recently lot of articles have been published discussing about the role of Vitamin D in the management of Covid 19 and what precautions should be acquired to reduce the risk of getting infected with Covid 19. There have been many drugs and supplements suggested which tend to reduce the risk of Covid 19, one of them is vitamin D. The search of literature has been made for the same to unravel the role of vitamin D in the said management. Vitamin D as a supplement has always been there in the market advised by the clinicians to the patients for increasing immunity and additional benefits. The principle aim of this review is to critically evaluate the literature outcome of benefits of vitamin D and also the role of vitamin D in prevention and cure of Covid 19.

1 COVID 19- A PANDEMIC

Corona viruses are a positive-sense single-stranded RNA viruses that cause diseases in humans and animals. In 1962 the human corona viruses (HCoVs) were first identified as causes of acute upper respiratory infection (URI). Over the last 20 years, two highly pathogenic human corona viruses were identified, including corona viruses associated with severe acute respiratory syndrome (SARS-CoV-2) and the Middle East respiratory syndrome (MERS-CoV) which emerged in different regions of the world[1]. In Wuhan city, China On December 31, 2019, a new strain of coronavirus was isolated and named as severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) by the International Committee on Taxonomy of Viruses (ICTV) from patients with pneumonia of unknown etiology[2].

On March 11, 2020, the World Health Organization (WHO) announced that COVID-19 is a 'public-health emergency of international concern'[3]. The basic strategies for the control of ongoing pandemic are dependent on the control measure policies and human behaviour such as surveillance and isolation, contact tracing, movement restrictions, social distancing, hand washing, and increased awareness in the community.[4]

A research study analyzing 1099 laboratory confirmed patients in Wuhan, has found common clinical features characterized as mild and moderate symptoms which includes fever (88.7%), cough (67.8%), fatigue (38.1%), sputum production (33.4%), dyspnea (18.7%), sore throat (13.9%), and headache (13.6%)[5]. However, some of the patients display gastrointestinal symptoms, with diarrhea (3.8%) and vomiting (5.0%).

2 VITAMIN D DEFICIENCY – A PANDEMIC

Up until 1998 vitamin D deficiency was defined as a blood level of 25-hydroxyvitamin D [25(OH)D]; which represents a total concentration of both 25-hydroxyvitamin D2 and 25- hydroxyvitamin D3] of less than 10ng/mL (25nmol/L)[6].Later according to study carried out by Malabanan et al.[7] The definition for vitamin D deficiency was redefined in 1998 as a blood level of 25(OH) D<20ng/mL. The Endocrine society in 2011 defined vitamin D deficiency as a 25(OH) D<20ng/mL, insufficiency as 21–29 ng/mL and sufficiency as at least 30ng/mL for maximum musculoskeletal health[8].

Pregnant women, people of colour (more overly with increased skin melanin pigmentation), obese children and adults and children and adults who practice abstinence from direct sun exposure are at especially high risk. Europe, China, India, Middle East and South America where foods are not fortified with vitamin D showed high prevalence of vitamin D deficiency and insufficiency[9]

It has been estimated that approximately 30% and 60% of children and adults worldwide are vitamin D deficient and insufficient respectively[10]. The major factor for the vitamin D deficiency pandemic is the lack of exposure to sunlight and continues to be the major source of vitamin D for most children and adults[11,12,13]. One of the factors is lack of consumption of food which naturally contain vitamin D such as oily fish such as salmon, mackerel and herring, mushrooms exposed to sunlight or that are sun-dried and cod liver oil.

3 STANDARDIZED TREATMENT PROTOCOL FOR COVID 19

Huge efforts are made to identify effective interventions for the prevention and treatment of covid-19, which have resulted in almost 1800 trials completed or undergoing still evidence for effective treatment remains limited.[14]Doctors, patients, guideline bodies, and government agencies are also facing the challenges of interpreting the results from studies that are being published at a rate never encountered previously[15]. Because these many uncertain results a standard protocol cannot be set and appreciated in such a less amount of time.

According to a study in 2020[15],Glucocorticoids probably reduce mortality and mechanical ventilation in patients with severe covid-19, Remdesivir probably reduces length of hospital stay of Covid-19 patients and Hydroxychloroquine provided intermediate effect from time taken for symptoms resolution. Wang et al through a study conducted suggested that based on the safety profile and efficacy in other viral infections, chloroquine and remdesivir should be tried in human patients suffering from COVID-19 infection[16].

In another study by Pereira M et al[17] it was stated that there is high prevalence of vitamin D deficiency in people with COVID-19, However vitamin D deficiency is not always associated with covid 19 but

there is positive association between vitamin D supplementation and severity of the disease.

According to a RCT published in 2020 by Liu F et al[18] High dose of intravenous vitamin C is expected to improve pulmonary function and reduce mortality for patients with COVID-19. Prevention of the disease transmission also plays a major role. This can be done by social distancing, use of personal protective equipment (PPE), face masks/shields, and hand sanitizers.[19] One of the study by Stasi C et al[20] clinical and survival improvement was found in patients treated with plasma and hyperimmune immunoglobulins. Also, Inflammation inhibitors (in particular anti-IL6, anti-IL1, inhibitors of Janus kinases) are of great help for the treatment of COVID-19 in its advanced stages. Certain more studies are needed for better assessment of drugs used in covid 19.

4 VITAMIN D AND HOST IMMUNE RESPONSE

Skin has 7-dehydrocholesterol which when comes in contact with Sunlight (UV radiation), Vitamin D3 is produced. After this effect Vitamin D3 or oral vitamin D is converted into 25(OH)D in the liver and then further to 1,25 (OH)2D (Calcitriol) which is a hormonal metabolite in kidney and other organs[21].

Vitamin D helps in reducing the risk from microbial infection by mainly by 3 ways: physical barriers, cellular natural immunity, and adaptive immunity[22], as shown in figure 1.

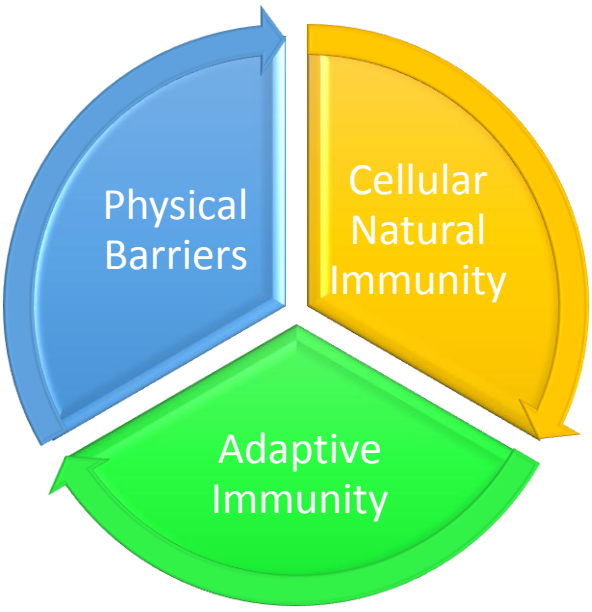

Fig. 1 Ways by which Vitamin D helps in reducing the risk for microbial infections

The physical barriers are maintained by Gap junctions, Tight Junctions and Adherence junctions[23–26]. It is observed that patients with COVID-19 infection show response to viral and bacterial infections by generating both pro-inflammatory and anti-inflammatory cytokines[27]. It is known that Vitamin D may help in reducing the production of pro-inflammatory T helper (T)1 cytokines, (TNF-α and IFN-γ), and increases the expression of anti-inflammatory cytokines by macrophages[28,29]. Serum vitamin D concentrations tend to decrease with age due less time spent in the sun and lower levels of 7-dehydrocholesterol in the skin[30,31]. This becomes a very important factor while treating adult cases with COVID-19. During viral infections vitamin D plays an immune regulatory role by suppression of the adaptive immune responses in respiratory epithelial cells[24,32–36].

Vitamin D reduces the expression of pro-inflammatory cytokines by directly inhibiting the nuclear factor kappa-light-chain-enhancer of activated B cells (NFκB) pathway[37]. Hence, via its opposing actions on cytokine regulation and T cell differentiation, vitamin D plays a complex dual role in immunopathology and hence is assumed to be effective against many Microbial infections[24,32–36].

5 THE CYTOKINE STORM

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infects pulmonary epithelial cells using the angiotensin converting enzyme-2 (ACE-2) receptor[38]. SARS-CoV-2 also infects macrophages and activates them through ACE-2 receptors. Type 2 pneumocyte apoptosis occurs by macrophages, neutrophils, and T cells when they are activated through sustained elevation of cytokines including interleukin (IL)-1, IL-6, and tumor necrosis factor (TNF) alpha, in some patients a path that can eventually lead to acute respiratory distress syndrome (ARDS)[39]. By expression of pro-inflammatory cytokines the host responses are sometimes amplified. This 'cytokine storm' is responsible for some of the serious manifestations of COVID-19 such as ARDS as shown in figure 2[40].

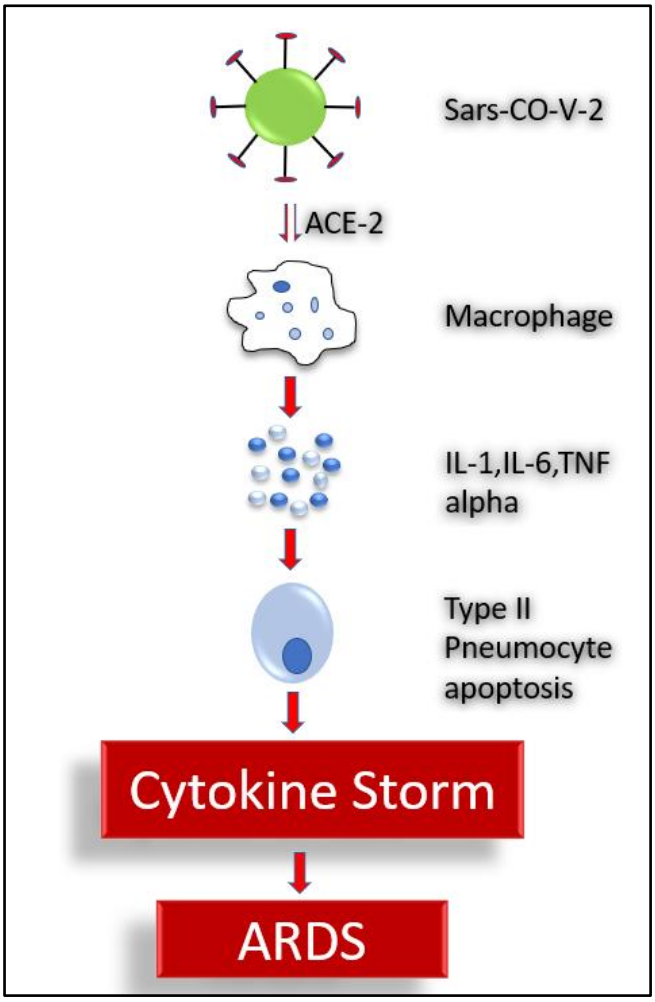

Fig. 2 The cytokine storm and ARDS

6 VITAMIN D AND COVID 19

As the COVID-19 pandemic count continues to rise in many countries including India, it is important to note that in India (approximately >70%) are vitamin D deficient (<20ng/dl)[41]. One of the factors responsible for this deficiency might be improper diet with lack of nutrition. Equally, in Europe, approximately 40% of the population is deficient approximately 24% of U. S. citizens and approximately 37% of Canadians are deficient in vitamin D, but the problem is mostly limited to their non-white communities[42,43].

Meanwhile, a recent systematic review and met analysis has concluded that vitamin D has potential in preventing respiratory infections, especially in those who have high levels of deficiency[44]. On Dec 17, 2020, the National Institute for Health and Care Excellence (NICE), with Public Health England and the Scientific Advisory Committee on Nutrition, published a rapid review of recent studies on vitamin D and COVID-19. They suggested that to maintain the bone and muscle health

vitamin D supplementation is very important[45]. A retrospective, multicentre study has suggested that whilst COVID-19 patients (who were deficient in vitamin D) generally had poor outcomes, those with high levels of vitamin D fared better outcomes[46]. Vitamin D deficiency contributes to acute respiratory distress syndrome and case-fatality rates increasing with age and with chronic disease co morbidity, both of which are associated with a lower 1,25(OH)2D concentration[47]. It is also observed that vitamin D is a negative endocrine renin-angiotensin system (RAS) modulator and inhibits renin expression and generation. Vitamin D can induce ACE2/Ang-(1–7)/MasR axis activity and inhibits renin and the ACE/Ang II/AT1R axis, thereby increasing expression and concentration of ACE2, MasR and Ang-(1–7) and having a potential protective role against acute lung injury/ARDS. Therefore, he suggested that vitamin D may be a potential therapeutic approach to combat COVID-19 and induced ARDS[48,49].

Tregulatory lymphocytes (Tregs) provide a principal defence against uncontrolled inflammation, and against viral infection in general[50]. Treg levels have been reported to be low in group of COVID-19 patients, and 'markedly lower in severe cases' who need more attention[51]. Studies have shown that vitamin D supplementation can increase the Treg levels in the body and can help the patient with the risk of respiratory distress[52,53].

In COVID-19 patients Thrombotic complications are common[54]. In half the patients infected with Covid 19 there is increase in D-dimer levels. Vitamin D has an involvement in thrombotic pathway so reduced level of vitamin D would increase the risk of thrombotic episodes in patient with Covid 19. Patients with obesity and diabetes also carry a higher mortality rate. Also, there is reduction in production of vitamin D in individuals with higher melanin, so it is suggested that there is low level of vitamin D production in black ethnic groups.

In Human immunodeficiency virus infection vitamin D supplementation increases the peripheral CD4+T lymphocyte count[55], and one of the main manifestations of severe COVID-19 infection is lymphopenia hence supplementation of vitamin D could protect the patient against Covid 19 infection.

7 CONCLUSION

In general terms, Vitamin D helps in maturation of macrophages and prevents in secretion of cytokines in large numbers thus, Vitamin D deficiency in patients with COVID 19 could be the factor responsible for cytokine storm and thus may lead to Acute respiratory distress syndrome (ARDS) which may be a main factor for mortality in these patients. Vitamin D supplementation could also increase the Treg levels thus decreasing the risk for Covid 19.

Moreover, Vitamin D supplements are readily available and affordable and can be used as a potential agent to prevent viral infection

and improve the survival outcome. Hence, we hypothesize that proper recommended Vitamin D levels in patients with COVID 19 will provide a better outcome. Moreover, a detailed study is required regarding dosage and severity of the disease for accurate results.

REFERENCES

1. Drosten C, Günther S, Preiser W, van der Werf S, Brodt H-R, Becker S, et al. Identification of a novel coronavirus in patients with severe acute respiratory syndrome. N Engl J Med. 2003 May 15; 348(20):1967–76.
2. Phelan AL, Katz R, Gostin LO. The Novel Coronavirus Originating in Wuhan, China: Challenges for Global Health Governance. JAMA. 2020 Feb 25; 323(8):709–10.
3. Li X, Wang W, Zhao X, Zai J, Zhao Q, Li Y, et al. Transmission dynamics and evolutionary history of 2019-nCoV. J Med Virol. 2020 May; 92(5):501–11.
4. Habas K, Nganwuchu C, Shahzad F, Gopalan R, Haque M, Rahman S, et al. Resolution of coronavirus disease 2019 (COVID-19). Expert Rev Anti Infect Ther. 2020 Dec;18(12):1201–11.
5. Wang W, Tang J, Wei F. Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China. J Med Virol. 2020 Apr; 92(4):441–7.
6. Holick MF. Vitamin D deficiency. N Engl J Med. 2007 Jul 19; 357(3):266–81.
7. Malabanan A, Veronikis IE, Holick MF. Redefining vitamin D insufficiency. Lancet. 1998 Mar 14; 351(9105):805–6.
8. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2011 Jul; 96(7):1911–30.
9. Holick MF. The vitamin D deficiency pandemic: Approaches for diagnosis, treatment and prevention. Rev Endocr Metab Disord. 2017 Jun;18(2):153–65.
10. Daly RM, Gagnon C, Lu ZX, Magliano DJ, Dunstan DW, Sikaris KA, et al. Prevalence of vitamin D deficiency and its determinants in Australian adults aged 25 years and older: a national, population-based study [Internet]. Vol. 77, Clinical Endocrinology. 2012. p. 26–35. Available from: http://dx.doi.org/10.1111/j.1365-2265.2011.04320.x
11. Looker AC, Johnson CL, Lacher DA, Pfeiffer CM, Schleicher RL, Sempos CT. Vitamin D status: United States, 2001-2006. NCHS Data Brief. 2011 Mar; (59):1–8.
12. Wacker M, Holick MF. Sunlight and Vitamin D: A global perspective for health. Dermatoendocrinol. 2013 Jan 1;5(1):51–108.
13. Holick MF. Biological Effects of Sunlight, Ultraviolet Radiation, Visible Light, Infrared Radiation and Vitamin D for Health. Anticancer Res. 2016 Mar;36(3):1345–56.
14. Website [Internet]. [cited 2021 May 9]. Available from: Cytel. Global Coronavirus COVID-19 Clinical Trial Tracker. 2020 https://www.covid19-trials.org/ accessed May 2, 2020.
15. Drug treatments for covid-19: living systematic review and network meta-analysis. BMJ. 2021 Apr 13; 373: n967.
16. Wang M, Cao R, Zhang L, Yang X, Liu J, Xu M, et al. Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro. Cell Res. 2020 Mar; 30(3):269–71.
17. Pereira M, Dantas Damascena A, Galvão Azevedo LM, de Almeida Oliveira T, da Mota Santana J. Vitamin D deficiency aggravates COVID-19: systematic review and meta-analysis. Crit Rev Food Sci Nutr. 2020 Nov 4;1–9.
18. Liu F, Zhu Y, Zhang J, Li Y, Peng Z. Intravenous high-dose vitamin C for the treatment of severe COVID-19: study protocol for a multicentre randomised controlled trial. BMJ Open. 2020 Jul 8;10(7):e039519.
19. Samudrala PK, Kumar P, Choudhary K, Thakur N, Wadekar GS, Dayaramani R, et al. Virology, pathogenesis, diagnosis and in-line treatment of COVID-19. Eur J Pharmacol. 2020 Sep 15; 883: 173375.
20. Stasi C, Fallani S, Voller F, Silvestri C. Treatment for COVID-19: An overview. Eur J Pharmacol. 2020 Dec 15; 889: 173644.

21. Murdaca G, Pioggia G, Negrini S. Vitamin D and Covid-19: an update on evidence and potential therapeutic implications. Clin Mol Allergy. 2020 Nov 19; 18(1):23.
22. Rondanelli M, Miccono A, Lamburghini S, Avanzato I, Riva A, Allegrini P, et al. Self-Care for Common Colds: The Pivotal Role of Vitamin D, Vitamin C, Zinc, and in Three Main Immune Interactive Clusters (Physical Barriers, Innate and Adaptive Immunity) Involved during an Episode of Common Colds-Practical Advice on Dosages and on the Time to Take These Nutrients/Botanicals in order to Prevent or Treat Common Colds. Evid Based Complement Alternat Med. 2018 Apr 29; 2018: 5813095.
23. Schwalfenberg GK. A review of the critical role of vitamin D in the functioning of the immune system and the clinical implications of vitamin D deficiency. Mol Nutr Food Res. 2011 Jan;55(1):96–108.
24. Liu PT, Stenger S, Li H, Wenzel L, Tan BH, Krutzik SR, et al. Toll-like receptor triggering of a vitamin D-mediated human antimicrobial response. Science. 2006 Mar 24; 311(5768):1770–3.
25. Adams JS, Ren S, Liu PT, Chun RF, Lagishetty V, Gombart AF, et al. Vitamin d-directed rheostatic regulation of monocyte antibacterial responses. J Immunol. 2009 Apr 1; 182(7):4289–95.
26. Laaksi I. Vitamin D and respiratory infection in adults. Proc Nutr Soc. 2012 Feb; 71(1):90–7.
27. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020 Feb 15;395(10223):497–506.
28. Sharifi A, Vahedi H, Nedjat S, Rafiei H, Hosseinzadeh-Attar MJ. Effect of single-dose injection of vitamin D on immune cytokines in ulcerative colitis patients: a randomized placebo-controlled trial. APMIS. 2019 Oct; 127(10):681–7.
29. Gombart AF, Pierre A, Maggini S. A Review of Micronutrients and the Immune System-Working in Harmony to Reduce the Risk of Infection. Nutrients [Internet]. 2020 Jan 16;12(1). Available from: http://dx.doi.org/10.3390/nu12010236
30. Vásárhelyi B, Sátori A, Olajos F, Szabó A, Beko G. [Low vitamin D levels among patients at Semmelweis University: retrospective analysis during a one-year period]. Orv Hetil. 2011 Aug 7; 152(32):1272–7.
31. MacLaughlin J, Holick MF. Aging decreases the capacity of human skin to produce vitamin D3. J Clin Invest. 1985 Oct; 76(4):1536–8.
32. Azrielant S, Shoenfeld Y. Vitamin D and the Immune System. Isr Med Assoc J. 2017 Aug; 19(8):510–1.
33. Holick MF. Vitamin D: A millenium perspective. J Cell Biochem. 2003 Feb 1; 88(2): 296–307.
34. Matsuoka LY, Wortsman J, Haddad JG, Kolm P, Hollis BW. Racial pigmentation and the cutaneous synthesis of vitamin D. Arch Dermatol. 1991 Apr; 127(4):536–8.
35. Bikle DD. Vitamin D metabolism, mechanism of action, and clinical applications. Chem Biol. 2014 Mar 20; 21(3):319–29.
36. Greiller CL, Martineau AR. Modulation of the immune response to respiratory viruses by vitamin D. Nutrients. 2015 May 29;7(6):4240–70.
37. Chen Y, Zhang J, Ge X, Du J, Deb DK, Li YC. Vitamin D receptor inhibits nuclear factor κB activation by interacting with IκB kinase β protein. J Biol Chem. 2013 Jul 5;288(27):19450–8.
38. Lu R, Zhao X, Li J, Niu P, Yang B, Wu H, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. Lancet. 2020 Feb 22; 395(10224):565–74.
39. McGonagle D, Sharif K, O'Regan A, Bridgewood C. The Role of Cytokines including Interleukin-6 in COVID-19 induced Pneumonia and Macrophage Activation Syndrome-Like Disease. Autoimmun Rev. 2020 Jun;19(6):102537.
40. Jose RJ, Manuel A. COVID-19 cytokine storm: the interplay between inflammation and coagulation. Lancet Respir Med. 2020 Jun;8(6):e46–7.
41. Aparna P, Muthathal S, Nongkynrih B, Gupta SK. Vitamin D deficiency in India. J Family Med Prim Care. 2018 Mar; 7(2):324–30.

42. Amrein K, Scherkl M, Hoffmann M, Neuwersch-Sommeregger S, Köstenberger M, Tmava Berisha A, et al. Vitamin D deficiency 2.0: an update on the current status worldwide. Eur J Clin Nutr. 2020 Nov; 74(11):1498–513.
43. Mitchell F. Vitamin-D and COVID-19: do deficient risk a poorer outcome? Lancet Diabetes Endocrinol. 2020 Jul;8(7):570.
44. Martineau AR, Jolliffe DA, Hooper RL, Greenberg L, Aloia JF, Bergman P, et al. Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data. BMJ. 2017 Feb 15; 356: i6583.
45. The Lancet Diabetes Endocrinology. Vitamin D and COVID-19: why the controversy? Lancet Diabetes Endocrinol. 2021 Feb; 9(2):53.
46. Alipio M. Vitamin D supplementation could possibly improve clinical outcomes of patients infected with coronavirus-2019 (COVID-19). 2020.
47. Grant WB, Lahore H, McDonnell SL, Baggerly CA, French CB, Aliano JL, et al. Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19 Infections and Deaths. Nutrients [Internet]. 2020 Apr 2;12(4). Available from: http://dx.doi.org/10.3390/nu12040988
48. Malek Mahdavi A. A brief review of interplay between vitamin D and angiotensin-converting enzyme 2: Implications for a potential treatment for COVID-19. Rev Med Virol. 2020 Sep; 30(5):e2119.
49. Iddir M, Brito A, Dingeo G, Fernandez Del Campo SS, Samouda H, La Frano MR, et al. Strengthening the Immune System and Reducing Inflammation and Oxidative Stress through Diet and Nutrition: Considerations during the COVID-19 Crisis. Nutrients [Internet]. 2020 May 27;12(6). Available from: http://dx.doi.org/10.3390/nu12061562
50. Weir EK, Thenappan T, Bhargava M, Chen Y. Does vitamin D deficiency increase the severity of COVID-19? Clin Med. 2020 Jul; 20(4):e107–8.
51. Chen G, Wu D, Guo W, Cao Y, Huang D, Wang H, et al. Clinical and immunological features of severe and moderate coronavirus disease 2019. J Clin Invest. 2020 May 1; 130(5):2620–9.
52. Fisher SA, Rahimzadeh M, Brierley C, Gration B, Doree C, Kimber CE, et al. The role of vitamin D in increasing circulating T regulatory cell numbers and modulating T regulatory cell phenotypes in patients with inflammatory disease or in healthy volunteers: A systematic review [Internet]. Vol. 14, PLOS ONE. 2019. p. e0222313. Available from: http://dx.doi.org/10.1371/journal.pone.0222313
53. Prietl B, Treiber G, Mader JK, Hoeller E, Wolf M, Pilz S, et al. High-dose cholecalciferol supplementation significantly increases peripheral $CD4^+$ Tregs in healthy adults without negatively affecting the frequency of other immune cells. Eur J Nutr. 2014 Apr; 53(3):751–9.
54. Giannis D, Ziogas IA, Gianni P. Coagulation disorders in coronavirus infected patients: COVID-19, SARS-CoV-1, MERS-CoV and lessons from the past. J Clin Virol. 2020 Jun; 127: 104362.
55. Alvarez N, Aguilar-Jimenez W, Rugeles MT. The Potential Protective Role of Vitamin D Supplementation on HIV-1 Infection. Front Immunol. 2019 Sep 25; 10: 2291.

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COMMERCE EDUCATION: ISSUES AND CHALLENGES RELATED TO DIGITIZATION, SOCIAL MEDIA & SKILL BASED LEARNING IN PUNJAB

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Abstract - The rapid trend of Globalization, Liberalization and Privatization has created challenge and threat for organizations to develop in the competitive world. This has forced the development of skilled education with the rapid change in industrialization and development in Information Technology. In every stream of education, the skill development as per the current scenario is the basic necessity. Commerce education is the core of the country's economic system. Despite of this fact, it is facing with high issues and challenges. This research paper is intended to investigate the issues and challenges of commerce education in Punjab with special reference to Punjab. The paper is an attempt to find out the ICT environment in the colleges, types of Computer training delivered to the students, practical skills of commerce students with reference to skill based learning and digitization, types of skills required in commerce students, types of computer training delivered to commerce students at introductory level, skill set required for commerce students in the industry, challenges that commerce academicians are facing with reference to Commerce education. This study is based on the two online questionnaires designed separately for both Commerce Academicians and Senior Level Managers.
Keywords: Commerce Education, Digitization, Social media, Skill based learning.

1 INTRODUCTION

In the era of globalization, as India becomes more developed and the industries require more talent, the knowledge and skills required by the Commerce students to deal with the global scenario also changes. Therefore, Commerce Education must be integrated with the industrial requirements in order to make overall development of the students, organization, society and the economy. Commerce education is visualized as a systematic education to teach the students for enterprising and managing business proficiently and effectively. The main aim of commerce education is to confer with talented human resource mandatory by the business in variety of sectors.

The speedy enlargement of online transaction in business compels an ever-increasing demand for the students to accept the digitization and

be skilful in the electronic market space. Commerce is interlinked with each and every field like economics, accounting, mathematics, management etc and also each and every activity of human being is concurrent with the commerce.

According to Nelson Mandela, "Education is the most powerful weapon which you can use to change the world." Since commerce is the great subject, it has the power to change & develop the whole world. Commerce education not only results in the development of commercial knowledge which is required as per employment perspective but it also upgrade the entrepreneurial skills among the students and establish their own creative and innovate business. It also advances the problem solving techniques, general management skills, aptitude which is required in job as well as in business.

According to Bill Gates," Technology is just a tool. In terms of getting the student working together and motivating them, teacher is the most important. "This quote suggests that the globalization, digitization, e- commerce are just the terms but the highly qualified and dedicated teachers can lend a hand to the students to face with indefinite challenges.

According to Herbert Spencer, "The great aim of education is not knowledge but action." This saying suggests that only the theoretical approach to education is not at all enough in the present scenario, so more and more focus must be given to integrate the course curriculum with some practical industry interface programmes and training.

2 REVIEW OF LITERATURE

Ranjitha (2016)[1], the faculties should be from excellent academic background with an industry exposure. They should be a special breed of people driven by passion rather money. They need to inspire and motivate the students through right communication skills. They should preferably have industry experience in a reputed organization.

According to Dr. Singh (2016)[2] Commerce Education is facing innumerable problems today. These problems have direct bearing on the course objectives, course content and course conduct. These problems need serious attention and close scrutiny.

Borpatragohain (2016)[3] concluded that the most emerging dimension of the business and commerce education in the twenty-first century is the need for business school to use technology and make it integral part of course contents. The quality of commerce education has become a major marketing issue in the changing environment.

Dr. Jadhav (2014)[4] concluded that Economics deals with industries trade, trade and process from production to distribution are studied in commerce. Different economic processes are analysed in commerce. It includes national trade, export import, bank, insurance, advertisement, accountancy etc. commerce education how good are sold

after production so, commerce and economics are closely related with each other.

According to Aziz (2015)[5] Commerce Education becomes the back bone of a country's economic system. Commerce education plays as a machinery for transformation of human beings into human resources according to the need of the world.

Dr. Dwivedi (2012)[6], If the system of higher education in commerce and management undergoes thorough revision, restructuring of policy matters and evaluation, then it can face the consequences of globalization successfully.

Mahajan and Shah (2000)[7] concluded that global competition and proliferation of business educational institutions across the world possess stiff challenges to the business schools in India to produce quality products that could cater to the needs of corporate world and hold out the expectation of different stakeholders of business education.

3 RESEARCH METHODOLOGY

A. Objectives of the study

1. To study the ICT learning environment in the colleges
2. To study the computer knowledge imparted to Commerce students
3. To highlight the practical skills required in commerce education covering value addition programmes
4. To find out the challenges that the academicians are facing with reference to Commerce Education

B. Target Group & Target Area: Commerce Academicians and Senior Level Managers in Odisha.

C. Sample Size:

1. Commerce Academicians of Punjab: 300
2. Senior Level Managers of Corporate Houses of Punjab:100

D. Sampling Method: Convenience Sampling for both groups(Commerce Academicians and Senior Level Managers)

E. Data Collection Method:

- **Primary Data:**

1. Two separate questionnaires are designed for both Commerce Academicians and Senior Level Managers.
2. Online questionnaire as well as Schedules and Printed Questionnaires are used for data collection from Academicians and Senior Level Managers.
3. Online questionnaire links sent to E-mail Ids of the target groups.
4. In this study, LinkedIn is also used to collect the data as links were sent to the target group straightforwardly.
5. Snowball technique is also used to collect the data.
6. Experience and observation of researchers.

- **Secondary data:** (Journals, Magazines & Internet)

F. Limitation of the study

In a stipulated time period, it has not been possible to explore the requirements of specific industrial houses in context of sect oral learning beyond commerce course curriculum as the study is primarily conducted on overall basis.

4. REVITALIZING COMMERCE EDUCATION

Commerce education is the education which fosters required knowledge, skills and attitudes for dealing and flourishing trade, commerce and industry. The growing capability of telecommunication infrastructures and the popularization of IT applications in India have forced the integration of commerce with digitization.

It is really very significant and the need of the hour to redesign the syllabus and the pattern of commerce education because of the following reasons:

A. The course curriculum of commerce education is mostly based on theoretical and outdated knowledge of the books but the syllabus of the commerce must be based on practical approach. This implies that the commerce education must be integrated with the internship, entrepreneurship and industry interface programmes.
B. Some organizations are recruiting the management students, science students and engineering students even for that jobs which are purely commerce based. This has been a challenging factor to the commerce students.
C. New market dynamics i.e. shift of traditional commerce to e-commerce has changed the variety of aspects like global logistics, data analytics, operation management and customer satisfaction etc.
D. Commerce Education involves a variety of disciplines together. It is heterogeneous in nature. Therefore, it demands specialized courses as Jobs demands specialized skills, knowledge and talent irrespective of the degrees.
E. There are various types of Business Applications which requires the Commerce knowledge. So, the candidates who are well acquainted with commerce knowledge and computers will definitely succeed in the competitive environment. ICT has changed the way.
F. Presently pedagogy of commerce Education in India relies more on outdated Teaching methods.
G. Quality of commerce students are less than the quantity of commerce students.
H. The digitization in business is the key solution to solve the environmental and sustainable issues.

I. A commerce student has lots of responsibilities on the shoulder like to control inflation, to upgrade Indian financial position in the international market, manage foreign direct investment etc in addition to normal accounting knowledge. Without integration of digitization and skill based learning with education, the success of commerce students will be far reachable.

J. The top commerce students desire to have professional Courses like CA, CS, ICWA etc. as the degree of Commerce is not very much attractive from employment perspective.

5. DATA ANALYSIS

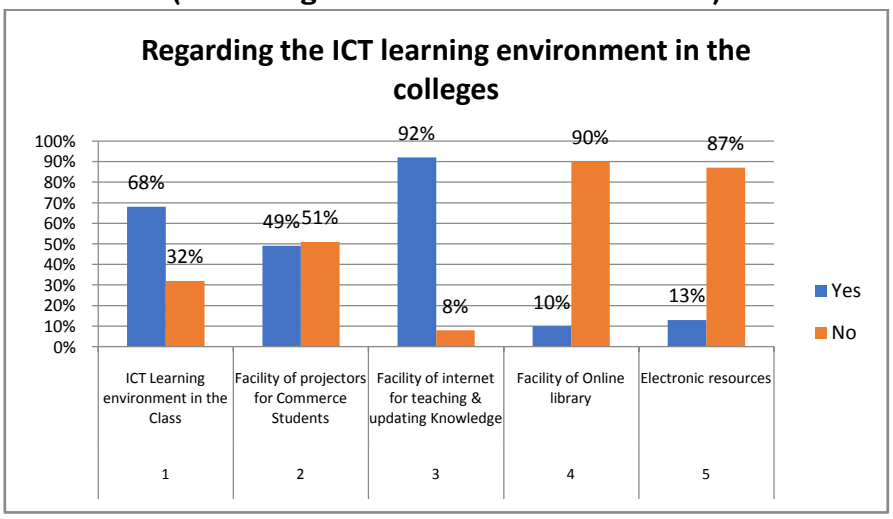
A. Regarding the ICT learning environment in the colleges

Table 5.1 Distribution of ICT learning in the colleges (According to Academicians)

S. No.	Parameters	Yes	No
1	ICT Learning environment in the Class	68%	32%
2	Facility of projectors for Commerce Students	49%	51%
3	Facility of internet for teaching & updating Knowledge	92%	8%
4	Facility of Online library	10%	90%
5	Electronic resources	13%	87%

Table 5.1 represents the distribution of ICT learning in the colleges. It was found that facility of internet in the college is provided to 92% respondents but the online library is provided to only 10% and the electronic resources like EBSCO, Emerald, SPSS, Prowess etc are provided to only 13% respondents.

Figure 5.1 Proportion of ICT learning environment in the Colleges (according to Commerce Academicians)



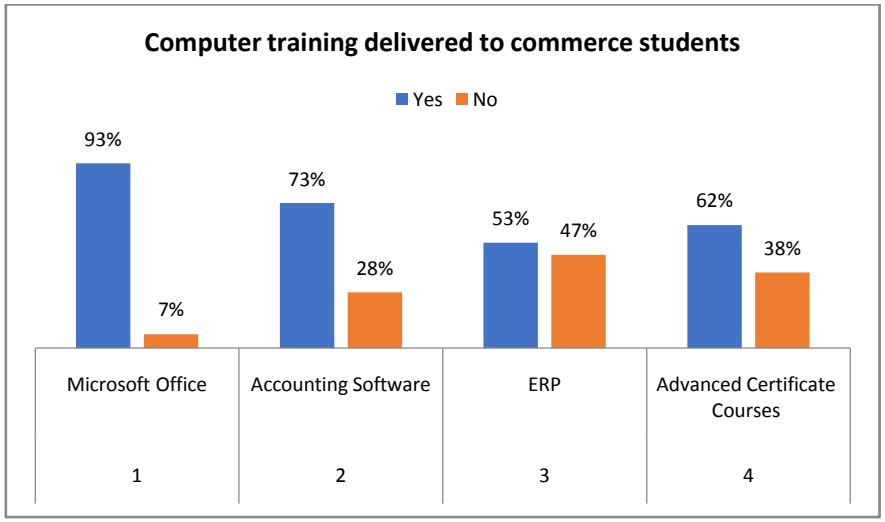
B. Regarding the computer training delivered to Commerce students

Table 5.2 Distribution of Computer training delivered to Commerce Students (According to Commerce Academicians)

S. No.	Computer Training	Yes	No
1	Microsoft Office	93%	7%
2	Accounting Software	73%	28%
3	ERP	53%	47%
4	Advanced Certificate Courses	62%	38%

Table 5.2 shows the kind of Computer training given to the students. 93% respondents agree that the Microsoft Training is delivered to the students in their colleges, 73% respondents agree that the training of accounting software is given to the students, 62% respondents agree that the Advanced Certification Training is delivered to the students and only 53% agree that ERP training is delivered to the students in their colleges.

Figure 5.2 Proportion of Commerce training delivered to the students (According to Academicians)



C. Regarding Skills required in commerce education

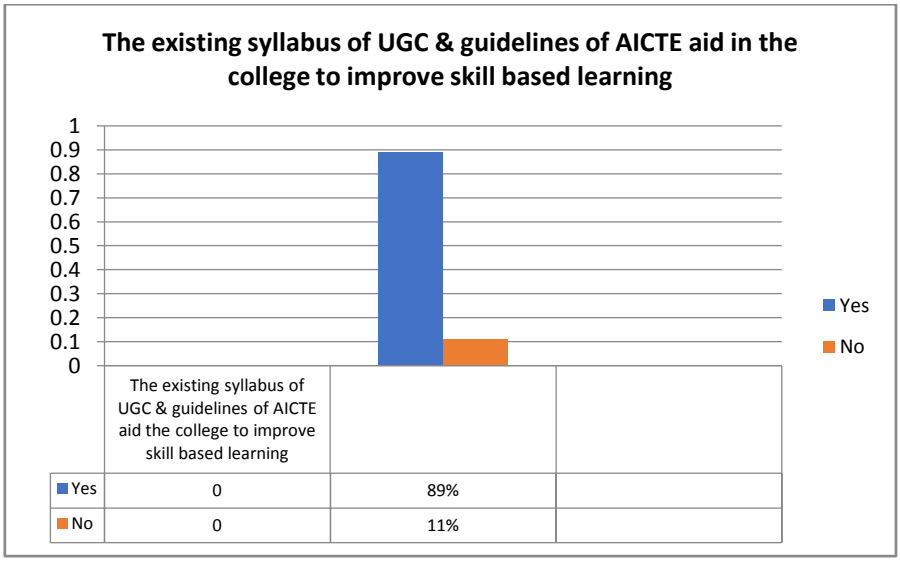
1. **The existing syllabus of UGC & guidelines of AICTE aid the college to improve skill based learning**

Table 5.3 Distribution of respondents regarding the existing syllabus of UGC & guidelines of AICTE aid the college to improve skill based learning (According to Commerce Academicians)

The existing syllabus of UGC & guidelines of AICTE aid the college to improve skill based learning	Yes	No
	89%	11%

Table 5.3 suggests that 89% respondents agree that the existing syllabus of UGC & guidelines of AICTE aid the college to improve skill based learning and the remaining respondents- 11% disagree with this statement.

Figure 5.3 Proportion of respondents regarding the existing syllabus of UGC & guidelines of AICTE aid the college to improve skill based learning (According to Academicians)



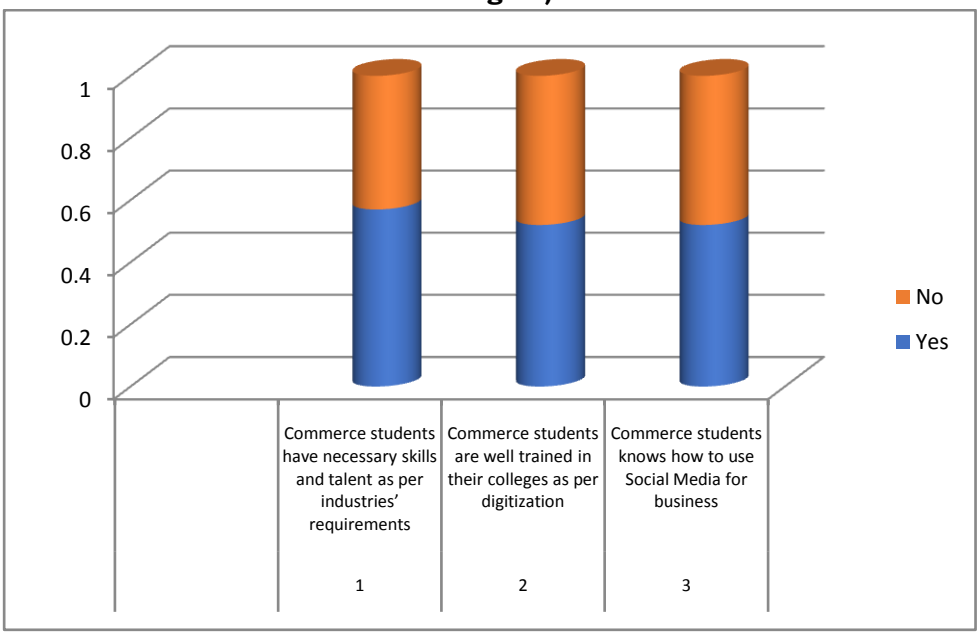
2. Practical skills are according to industrial requirements and digitization.

Table 5.4 Distribution showing practical skills are according to industrial requirements and digitization (According to Senior Level Managers)

S.No.	Perception of Senior Level Managers regarding:	Yes	No
1	Commerce students have necessary skills and talent as per industries' requirements	57%	43%
2	Commerce students are well trained in their colleges as per digitization	52%	48%
3	Commerce students knows how to use Social Media for business	52%	48%

Table 5.4 shows that the 57% Managers agree that theCommerce students have necessary skills and talent as per industries' requirements and others 43% managers disagree to this statement.52% managers agree that the Commerce students are well trained in their colleges as per digitization and 48% disagree to this statement. 52% managers agree that the commerce students know how to use Social media for business and 48% disagree to this statement.

Figure 5.4 Proportion showing practical skills are according to industrial requirements and digitization (According to Senior Level Managers)



3. Practical Skills required in Commerce Students

Table 5.5 Distribution of proportional skills required in Commerce Students (According to Commerce Academicians)

S. No.	Practical Skills required in Commerce Students	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Rank
1	Knowledge of Financial Market	145	50	30	40	35	3.77	4
2	Research & Innovation	80	160	20	20	20	3.87	1
3	Commercial awareness	150	50	30	40	30	3.83	2
4	Entrepreneurial Skills	146	51	29	39	35	3.78	3
5	Office Automation tools & MIS	80	40	120	35	25	3.38	9
6	Internet & E-Commerce Management	55	161	45	15	24	3.69	5
7	Industry internship programmes	80	70	75	50	25	3.43	8
8	Industry interface programmes	95	55	80	45	25	3.50	7
9	Role of social media for business	120	70	30	40	40	3.63	6

Figure 5.6 Practical skills required in Commerce Students (According to Commerce Academicians)

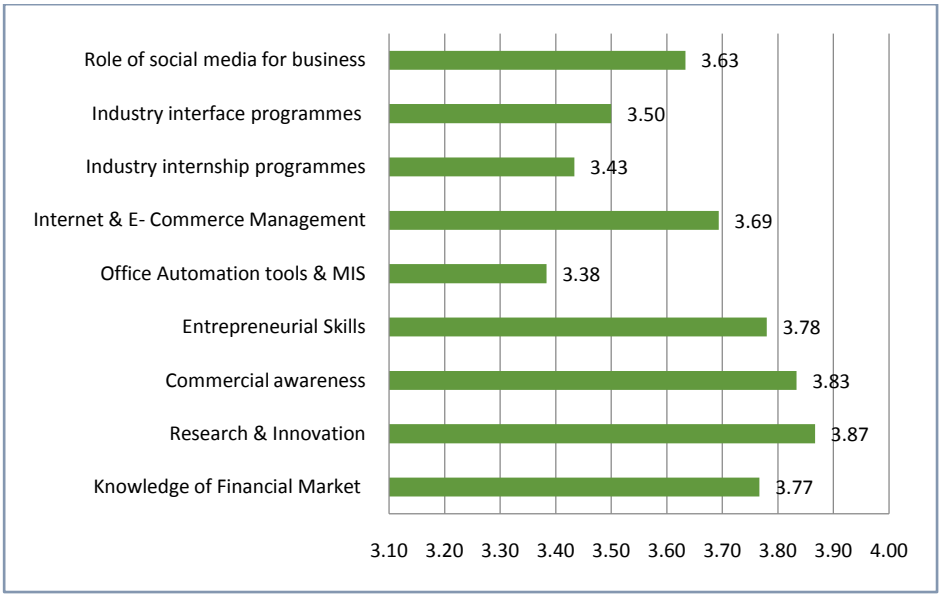


Figure 5.7 Mean Comparison of kinds of practical skills required for Commerce Students

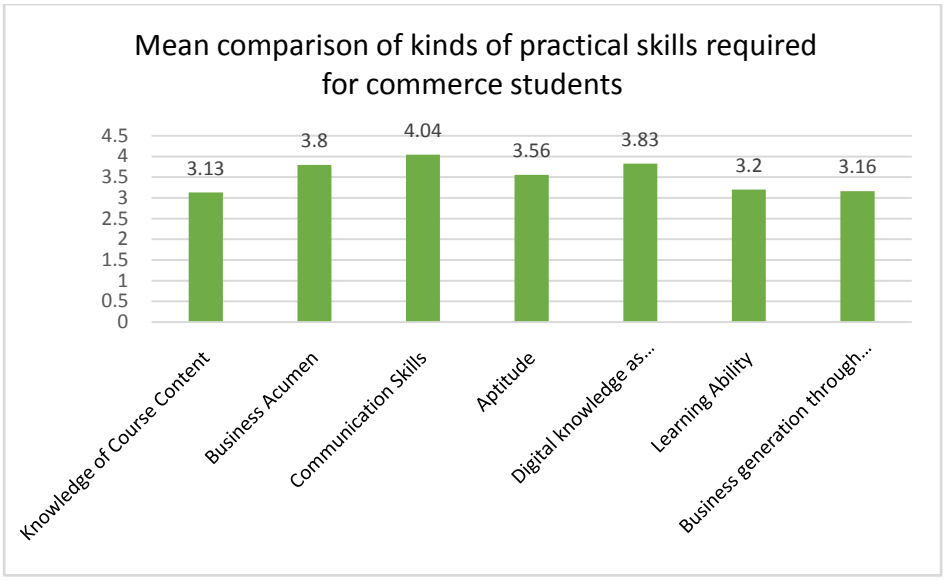


Figure 5.7 describes the mean comparison of various kind of practical skills required in commerce students. The ranks suggested the kinds of training in chronological order:

1. Entrepreneurial Skills
2. Industry Interface programmes
3. Commercial awareness
4. Industry Internship programmes
5. Knowledge of financial market

6. Internet and E-commerce Management
7. Research and Innovation
8. Office Automation Tools & MIS

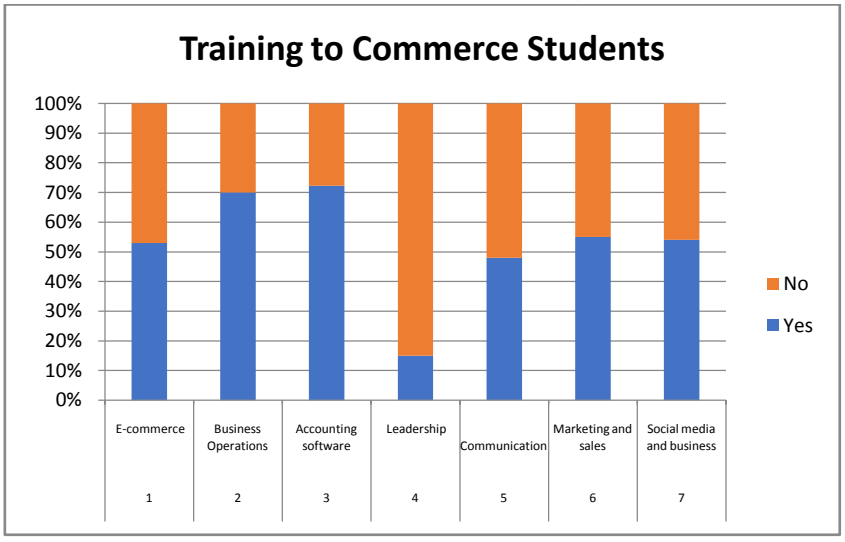
4. Training to Commerce students at introductory level after recruitment in your company are mainly in the following area:

Table 5.6 Distribution of kinds of training at introductory level after recruitment of commerce students in your company (According to Senior level managers)

Sr.No.	Training to Commerce Students	Yes	No
1	E-commerce	53%	47%
2	Business Operations	70%	30%
3	Accounting software	73%	28%
4	Leadership	15%	85%
5	Communication	48%	52%
6	Marketing and sales	55%	45%
7	Social media and business	54%	46%

Table 5.6 represents the type of training delivered to Commerce students. 53% Managers agree that they are delivering E-commerce training,70% agree for Business operations, 73% for Accounting Software, 15% agree for Leadership, 48% agree for Communication skills training, 55% agree for marketing and sales, 54% agree for Social media and business at introductory level after recruitment of commerce students in your company.

Figure 5.7 Proportion of kinds of training at introductory level after recruitment of commerce students in your company (According to Senior Level managers)



5. Skill set as important aspect of recruitment of Commerce Students

Table 5.7 Distribution of skills as an important aspect of recruitment of Commerce Students(According to Senior Level Managers)

S. No.	Skills	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Rank
1	Knowledge of Course Content	21	23	14	32	10	3.13	7
2	Business Acumen	33	30	24	10	3	3.8	3
3	Communication Skills	45	30	12	10	3	4.04	1
4	Aptitude	23	28	35	10	4	3.56	4
5	Digital knowledge as required for your industry	35	34	10	18	6	3.83	2
6	Learning Ability	21	23	22	23	11	3.2	5
7	Business generation through Social media	20	24	18	28	10	3.16	6

Figure 5.8 Mean Comparison of skills as an important aspect of recruitment of Commerce Students (According to Senior Level Managers)

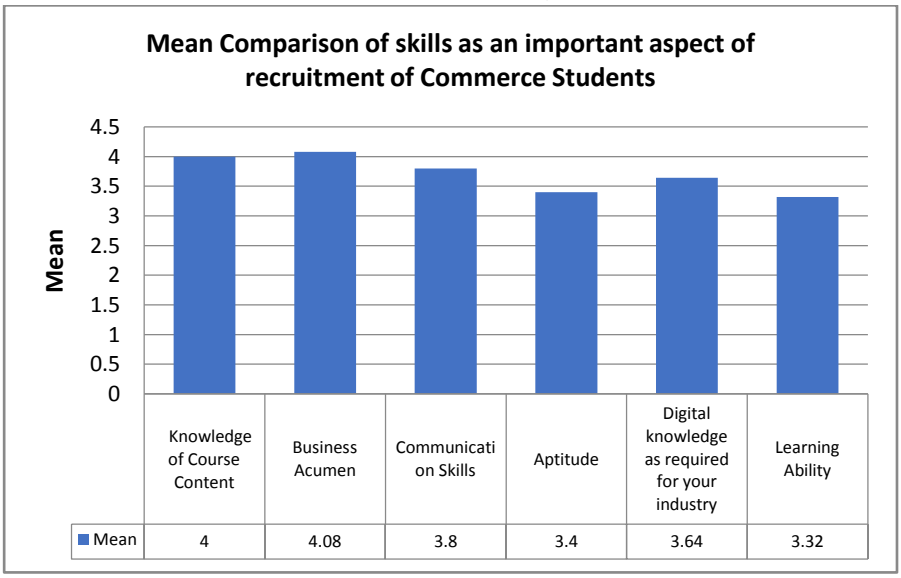


Figure 5.8 represents the mean comparison of skills as an important aspect of recruitment of Commerce Students. The ranks depict the skills of commerce students which are important for recruitment in chronological order:

1. Business Acumen
2. Knowledge of course content
3. Communication skills
4. Digital knowledge as required for the industry
5. Aptitude
6. Learning ability

D. Regarding the challenges that the academicians are facing with reference to Commerce Education

Table 5.8 Distribution of the challenges that the academicians are facing with reference to Commerce Education

S. No.	Challenges	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Rank
1	Lack of infrastructure	122	78	40	35	25	3.79	3
2	Outdated syllabus	40	120	35	45	60	3.12	6
3	Course curriculum is not matching with industries requirements	90	40	110	20	40	3.40	5
4	Lack of seminars, conferences & workshops	160	55	45	25	15	4.07	1
5	Lack of research	95	80	55	45	25	3.58	4
6	Lack of modern tools in teaching	80	140	40	20	20	3.80	2

Figure 5.9 Mean comparisons of the challenges that the academicians are facing with reference to Commerce Education.

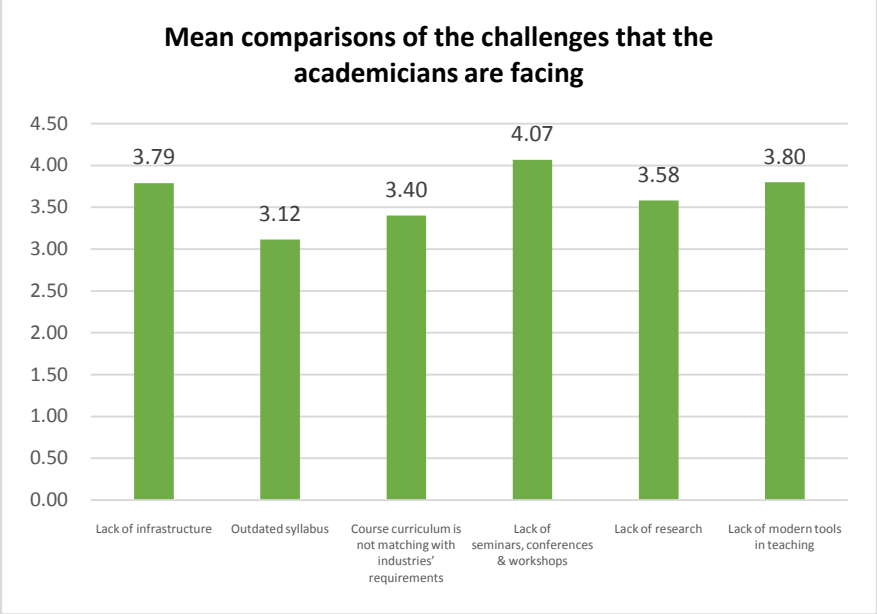


Figure 5.9 shows the challenges that the academicians are facing with reference to Commerce Education. The ranks illustrate the challenges of commerce academicians in chronological order:

1. Course curriculum is not matching with industries' requirements
2. Outdated syllabus
3. Lack of research
4. Lack of seminars, conferences & workshops
5. Lack of modern tools in teaching
6. Lack of infrastructure

6 FINDINGS

The authors' research indicated the following findings:

A. Regarding the ICT learning environment in the colleges

1. Only 10 % Commerce Academicians agree that the online library is provided in their colleges.
2. Only 13 % Commerce Academicians agree that the electronic resources are provided in their colleges.
3. Facility of internet for teaching and learning is provided to 92% Academicians, facility of projectors for Commerce students are provided to 49% Academicians, ICT learning environment is provided to 68% Academicians.

B. Regarding the computer training delivered to Commerce students

Training related to computers are Microsoft training, Accounting software, Advanced Certification like Entrepreneurship Development, Tally, Financial Market, E-commerce, Accounts, Income Tax, Insurance, International Finance, Banking, Auditing etc), ERP training are delivered to the students in the colleges which are agreed by 93%, 73%,53%, 62% respondents respectively.

C. Regarding Skills required in commerce education

1. 89% respondents agree that the existing syllabus of UGC & guidelines of AICTE aid the college to improve skill based learning and the remaining respondents.
2. According to 57% Managers, Commerce Students have necessary skills and talent as per industries' requirements.
3. According to 52% Managers, the Commerce Students are well trained in their colleges as per digitization.
4. According to 52% Managers, the Commerce Students know how to use Social Media for business.
5. There are various types of practical skills which are required in the Commerce students. According to Commerce Academicians, the entrepreneurial skills(Mean:3.78) are the best and the most important skills for Commerce students, then Industry Interface programmes(Mean:3.50), Commercial awareness(Mean:3.83), Industry Internship programmes(Mean:3.43),Knowledge of financial market (Mean: 3.77), Internet & E-commerce Management(Mean: 3.69), Research and Innovation(Mean:3.87),Role of social media for business (Mean:3.63), Office Automation Tools & MIS(Mean:3.38).
6. Table 5.6 represents the type of training delivered to Commerce students. 53% Managers agree that they are delivering E-commerce training, 70% agree for Business operations, 73% for Accounting Software, 15% for Leadership, 48% agree for Communication skills training at introductory level after recruitment of commerce students in your company.

7. Computer training at introductory level after recruitment of commerce students in the company is deliveredin the
    A. Accounting Software by 73% Companies, 28% are not delivering this training at introductory level.
    B. Business operations by 70% Companies, 30% are not delivering this training at introductory level.
    C. E-commerce by 53% Companies, 47% are not delivering this training at introductory level.
    D. Marketing and sales by 55% Companies, 45% are not delivering this training at introductory level.
    E. Communication skills by 48% companies, 52% are not delivering this training at introductory level.
    F. Leadership training by15% Managers, 85% are not delivering this training at introductory level.
    G. Social media and business by 54% Managers, 46% are not delivering this training at introductory level.
8. Certain skills play a great role in the recruitment of commerce students like Business Acumen(Mean: 3.8), Knowledge of course content(Mean: 3.13), Communication skills(Mean: 4.04), Digital knowledge as required for the industry(Mean: 3.83), Aptitude(Mean: 3.56), Business generation through Social Media(Mean:3.16) Learning ability(Mean: 3.2).

D. Regarding the challenges that the academicians are facing with reference to Commerce Education

There are so many challenges that the academicians are facing in commerce education. Like Course curriculum is not matching with industries' requirements(Mean:3.40), Outdated syllabus(Mean:3.12), Lack of research(Mean:3.58), Lack of seminars, conferences & workshops(Mean: 4.97), Lack of modern tools in teaching(Mean:3.80), and Lack of infrastructure(Mean:3.79).

7 RECOMMENDATIONS

1. Commerce education should be a harmonious blend of theoretical knowledge as well as practical understanding of the concepts. This can be ensured by integrating the course curriculum with industry-academic interface programmes and specialized teaching and training pedagogies.
2. Industry experts and corporate practitioners must be actively involved while designing the structure of commerce course curriculum (Course inputs should be relevant as per the industry requirements).
3. E-based learning and application-oriented study should be given first order priority. Emphasis should be given on virtual teams, video conferencing and the like.

4. Commerce students must be imparted Computer mediated training with special focus on ERP, SAP and sister modules, advanced certification software etc.
5. Standardised technological infrastructure and adherence to the state-of-the-art technology can add greater impetus to the learning process.
6. For better delivery of teaching in Commerce, academicians ought to seek Computer assisted Instructions.
7. Specializations like E-commerce, M-commerce etc can facilitate the professionalization of Commerce.
8. Facility of online library must be provided to upgrade the knowledge of the Commerce Academicians.
9. Digitization and technological application should be collaborated with Commerce education massively and prudently as well to boost up the entrepreneurial temper of the younger masses.
10. A ready-to-use access to research-based resources like EBSCO, Emerald, SPSS and Prowess should be provided to students and faculty members.
11. All academic institutions imparting Commerce education should provide ERP/SAP and other practically relevant training programmes for enriching the domain knowledge.
12. Commerce students should be infused with greater zeal and awareness for acquiring diversified technical knowledge through user-friendly technological platforms. This can help them better groomed into promising corporate professionals, Managers and Businessmen. Here, the faculties, facilities and institutional support play a pivotal role.
13. Developing entrepreneurial skills will facilitate our country's economic development as well as formation of new employment opportunities. Commerce Education is really a great platform to develop entrepreneurship traits and necessities like thinking in a creative way, how to start a new business, how to convert idea into an innovative product. Commerce Education is entrepreneurship education. The main objective of commerce and management education must be development of Entrepreneurial characteristics.
14. The focus of Commerce Education must be on vertical sub business like E-accounting, finance, e-commerce, banking, insurance, supply chain management, business integration and diversification, international trade, commerce and business research, trend analysis, statistics, business economics, commercial geography, business application, office management, green management, start up and vertical capital, entrepreneurship, commercial data analysis, macro and micro study, agricultural economy, natural resources economy,

integration of renewable energy with commerce, futuristic/predictive analysis etc.

15. Commerce students have to refer updated print Medias like The Economic Times, Business Standard etc having pink paper base. Special sessions on E-media like BBC News, NDTV Profit, Zee business etc. need to be included in the curriculum.

8 CONCLUSION

The rapid growth of industrialization being witnessed worldwide, it can be inferred that commerce is no longer an infant. The prosperity in Commerceis visualised well. It implies that commerce education must be integrated with skill based learning and digitization in order to make the students competent, skilful and talented. India's education system has to deal with increasing pressures from the internationalized businesses and it can be only possible by revitalizing commerce education and upgrading the knowledge, skills and abilities of the students. In spite of so many challenges that the commerce education is facing, still it has enormous power to transform the society and the economy. Collective endeavours, ideas and initiatives from Academic communities, Resource groups and Industry people can effectively contribute towards the development of the individuals at the micro level and nation at the macro level.

REFERENCES

1. Ranjitha D. S. (2016). Trends, issues and challenges in management education in India. International Journal of Current Research and Modern Education. 1(1).269-272.
2. Dr. Singh P. (2016). Study of industry's perception towards Commerce Education in India. International Journal of Innovations in Engineering & Technology. 6(3).467-475.
3. Borpatragohain A. (2016). Recent Trends in Commerce Education. Journal of Arts and Social Science. 1(1).17-19.
4. Aziz A. (2015). Problems and Challenges of Commerce Education in Darrang District, Assam. IOSR Journal Of Humanities And Social Science. 20(7).14-21.
5. Dr. Jadhav U. D. (2014). Commerce education and its impact on interdisciplinary sectors. Asian Journal of Management Sciences. 2(3).53-55.
6. Diwedi V. (2012). Globalization – Education in India and methodology of teaching commerce & management. International Journal of Commerce, Business and Management (IJCBM). 1(3).109-112.
7. Mahajan K. A. and Shah M. (2000).Service Quality in Business Education. India Journal of Commerce. 59(3).246-256.

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NEUROMARKETING: CHALLENGES AND OPPORTUNITIES IN THE FIELD OF MARKETING

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Abstract - Marketing has been evolving in all its forms. In its present scope, it has metamorphosed from barter system, to production concept, to product concept & so on. Neuromarketing can be considered as another milestone, which is still an evolving process. It can be a powerful tool in market research; where advertising is becoming more scientifically advanced. Todays consumers don't see your advertisement, they FEEL your advertisement.

Neuromarketing applications can throw light on some of the limitations of traditional methods of market research. The paper attempts to understand how even the highest priced or lowest quality products sometimes outsell their competitors, it will look at how some brands that have a devoted cult-like following while others have a zero loyalty, the paper will consider why & how prospects buy products or services even if their choices seem irrational or impractical.

Neuromarketing is a dynamic package of medical knowledge, technology & marketing. It is an emerging branch of neuroscience in which researchers use medical technology to determine consumer reactions to particular brands, slogans & advertisements. Researchers can now predict whether you prefer Surf or Rin; Coke or Pepsi etc. The results will also enable advertisers to be more specific in providing products that consumers want. This has further paved our way towards the term Buyology; which is based on subconscious thoughts, feelings & desires that derive purchasing decisions we make.

The paper attempts to throw light on growing perspective of Neuromarketing in & around. It will involve study of various applications of the concept of Neuromarketing through live case studies of the organizations. It will also analyze the limitations of the concept whether advertisers should probe human minds as means of boosting product sales? In this paper attempt will be made to study whether Neuromarketing will ever be used as a mainstream research method.

1 INTRODUCTION

Did we ever wonder why some brands have a devoted cult-like following while others have a zero loyalty. Why even the highest priced or lowest quality products sometimes outsell their competitors. Why & how prospects buy the products or services they do even if their choices seem irrational or impractical.

Objective of all marketing communication is to induce or enhance purchase. Advertising is one of the major components of promotional mix and that of marketing communications. Every year more than 400 billion dollars are invested in advertising campaigns worldwide. The same dollars bombard consumer's minds with sometimes effective and sometimes otherwise messages.

"Marketers are not concerned with how the consumers process the information and how they perceive the same. The marketers and advertisers communicate what they think is right. They are not concerned about communicating right things in the right manner."

William M. Weilbacher (2003)

Charles Young in his book titled:"The Advertising Research Handbook "says:"This is perhaps the prime reason why the researchers the world over have started questioning the very premises on which 'responsible-for-marketing' communications-people 'base their assumptions, judgments and research."

Marketing researchers have started questioning the premise that a target consumer would reflect 'what he/she really thinks' in response to a question in a questionnaire. If the consumer does not reflect his/her actual feelings to a marketing researcher, how can we assume that the results arrived at after such a research would be reliable.

Remember the pre-poll survey where the results declared that some political party would come to power at centre and actually the opposite happened. The survey was conducted by one of the best research organizations. Sometimes the consumers themselves do not know their real feelings about a given situation. They would act in a particular manner at the spur of the moment. It may also happen that, they know their actual feelings but do not intend the marketing researcher to know the same.

We depend on the principle of marketing research to find out consumer preferences, attitudes, likes and dislikes. We analyze consumer responses and reach certain conclusions. On this basis, marketing and promotional mix is decided. However research has revealed that consumers do not necessarily provide the real answer to researcher. At times they do not even know as to what is that they really think about a given question.

Hence there is some thing over and above all the principles of marketing and advertising which underlie consumer behavior. Gerald Zaltman, the learned Professor at Harvard University has also shown keen interest in the similar area and has authored a book titled: "How customers think: Essential insights in to the mind of the market."Researchers all over the world are trying to find answers to questions on the unfathomable behavior of the target consumers in the fields other than those of consumer behavior, marketing and advertising.

This brings us to neuro-marketing. The field has unprecedented potential of showing the path to those managing brands, marketing communication. Imagine that in a rural fair there are some stalls where the stall owner has three-four guns to shoot small iron balls on a board that contains hundreds of small balloons. If interested, we pay a paltry sum and in turn get few shots. We shoot these shots on the balloons pasted at a distance of about five-six feet. We get satiated only when we burst the balloons with every shot that we fire. There are two ways of firing the shots. Either we fire after taking the exact aim or we fire otherwise. We would definitely burst more balloons if we are aiming for it. Consequently, we would be getting more satiated. Not even the best marksman would be able to hit the shots without first exactly aiming at them. Conversely, even an average one would be able to hit more shots by just exactly aiming at the same. Neuromarketing would definitely enable us to hit more balloons and therefore would make us definitely more satiated. We know that we are not the best. Even if we are average Neuromarketing has all the potential to satiate us. It implies that if we knew as to how advertising stimuli are received and stored by brain and how they influence the choice of brands in future; we would improve the advertising policy.

2 WHAT IS NEUROMARKETING-WHERE BRAIN SCIENCE AND MARKETING MEET

In very simple terms, Neuromarketing is medical knowledge, technology and marketing. Neuromarketing is a new field of marketing that studies the consumer's response to marketing stimuli. Neuromarketing is the application of neuroscience to marketing. Neuromarketing includes the direct use of brain imaging, scanning, or other brain activity measurement technology to measure a subject's response to specific products, packaging, advertising, or other marketing elements. In some cases, the brain responses measured by these techniques may not be consciously perceived by the subject; hence, this data may be more revealing than self-reporting on surveys, in focus groups, etc.

This concept was developed by psychologists at Harvard University in 1990.The word Neuromarketing was coined by Ale Smidts in 2002.It is an emerging branch of neuro science in which researchers use medical technology to determine consumer reactions to particular brands, slogans and advertisements. The first ever Neuromarketing conference was held in 2004 at Baylor College of Medicine in Houston. The base of Neuromarketing is "meme". Meme is a unit of information stored in the brain. These units are effective influencing human who is making choices and decisions within 2.6 seconds. If mem is chosen properly we remember the good, joke or song and would share it. Memes stay in our memory and are affected by marketers. Examples of memes-aroma of fresh bread, biscuits, sweets, characters in fairy tales, stories of grandmother.

This, Neuromarketing is a promising and emerging field with tremendous potential for application in the functional areas of marketing, brand management and advertising. It has emerged after bringing together applicable concepts from the field of neural-science, psychology, human neuro-physiology and even neuro-chemistry.

2.1 Following are certain quotes by research scholars in the context of Neuromarketing:

"The task of the neural science is to explain behavior in terms of the activities of the brain. How does the brain marshall its millions of individual nerve cells to produce behavior and how are these cells influenced by the environment which includes the actions of the other people."

-By Dr. Eric R. Kandel, James H. Schwartz and Thomas M. Jassell (2000)

"We believe that the brain-based approach is revolutionary rather than brand equity methodologies are premised on what we call the standard model of choice and brain scientists have recently shown this model to be deeply flawed."

-Steven Quartz and Annette ASP (2005)

"The task of neural science is to understand the mental processes by which we perceive, act, learn and remember."

- By Dr. Eric R. Kandel, James H. Schwartz and Thomas M. Jassell (2000)

2.2 Introduction of the Buying Brain:

"*Understanding the human mind in biological terms has emerged as the central challenge of science in the twenty-first century."*

-By Dr. Eric Kandel, Neuroscientist and winner of the Nobel Prize for Physiology or Medicine

Millions of people in our global economy have jobs that depend on communicating with and persuading the human brain. So it is vital for us to understand how the human brain really works, what is attractive to it, how it decides what it likes or dislikes or how they decide to buy or not buy the infinite variety of products and services.

"We have learned more about the brain in the last five years than in all human history combined".

-By Charlie Rose

The basic lesson is that human brains process much of their sensory input subconsciously. Most of the works our brains are doing day and night are below our personal consciousness. Our senses are taking in about 11 million bits of information every second. Most of that comes through our eyes but all other senses are contributing-hearing,

touch, smell, taste. Research has shown that our conscious brain can process at best 40 bits of information per second. All the other is processed subconsciously. That is why our brain appears to be a mystery.

This has really widened the scope of Neuromarketing. The concepts of Neuromarketing provide a real competitive advantage in a crowded and cluttered market. The languages of consumers change from country to country and culture to culture, however the language of human brain is the same i.e. universal. Thus, Neuromarketing has greatly affected products, brands, packaging, and advertising as well.

2.3 Importance of Brain to Marketing:

To polish the concepts of Neuromarketing, it is vital for us to know anatomical structure-function relationship of human brain. It is very interesting to understand, how the human brain actually works while performing certain functions or carrying out our daily routine activities. In medical science, this area of information is termed as neurophysiology. This understanding the structure and function of human brain is not only interesting but fascinating as well. It is interesting to know that not a single area in our brain facilitates our speech. It is supposed to be a combination of different areas where each part performs its own little role ultimately enabling us to communicate. The extraordinary prowess of human brain has a lot to offer to brand, marketing and advertising professionals. The information on human brain would go a long way in providing us with a solution to create better brands. We as marketing professionals should clearly understand that our objective is not to impress only the sense organs of our target consumers but much more. Our aim is to ensure that our target consumers actually know our brands. It is only when our customers know our brand well they would remember thus leading to increase in sales, market share of the organization and profit. This would only happen when we know what happens in the brains of our target consumers.

2.4 Structure of Human Brain:

Human brain is made up of billions of cells. These cells are called neurons. The neurons can communicate with one another through small junctions. These junctions are called synapses. When a neuron is active, it sends an electrical impulse to its own terminal or end. The impulse generates a sequence of physic-chemical events leading to the release of a chemical molecule. This chemical molecule is called a neurotransmitter and serves as a messenger. This neurotransmitter forms a bridge between the two neurons and the impulse gets transferred. Once a neuron is activated it is described as ‘a neuron has fired’. A single neuron connects with 600 to 1500 other neurons. Neurons form circuits, circuits form networks, networks form systems, systems form super systems and the super systems are equivalent to galaxies.

"Neurons are the basic working units of the brain and the central nervous system, designed to transmit information to other nerve, muscle or gland cells."

By Dr. A.K. Pradeep Founder and CEO, Neurofocus Inc.

Neurons consist of a cell body, dendrites and an axon. The cell body contains the nucleus and cytoplasm of the cell. The electrically charged axon extends from the cell body to the target and often gives rise to many smaller branches called dendrites. These dendrites extend from the neuron cell body and receive messages from other neurons. Synapses are the contact points where one neuron communicates with one another. Neurons connect with each other and with muscles and gland cells. These connections form specific patterns that grow and migrate over the course of our lives. This neuron specification as well as migration begins in the human embryo where the right types of neurons must form in significant numbers to complete their tasks and then must migrate to the appropriate places to functional units that make up the brain. Once they have reached their destination the neurons extend axons and dendrites to connect to each other.

It is really very interesting to know how a neuron is born. Four weeks after conception, the ridges on the flat plane of the embryo fold and fuse to form the hollow neural tube. This structure grows and further evolves with the fetal brain producing millions of new neurons every day. Neurons collect together to from each of the brain structures. After its spectacular period of growth in the fetus, the neural network is pared back to create a more efficient system. Every neuron has a specific target as they start migrating throughout the body.

2.5 Our brain is a part of central nervous system which has following parts:

- **Spinal cord:** it is the lower part of the central nervous system.
- Brain stem consists of medulla, pons and midbrain. It conveys information from spinal cord to brain and vice-versa
- **Medulla oblongata:** It is above the spinal cord and controls functions like digestion, breathing, senses of taste and control of heart rate.
- **Pons:** It is situated above the medulla oblongata and controls respiration and sleep
- **Cerebellum:** This lies behind the pons. It is a vital area for marketing and advertising professionals as this area of brain is into language as well as thinking functions.
- **Midbrain:** It lies above the pons and the smallest part of brain stem. This area is responsible for eye movements as well as co-ordination of visual and auditory reflexes.
- **Diencephalon:** It lies above the mid brain and consists of thalamus and hypothalamus. Thalamus transfers information that comes

from our sense organs to the main parts of the brain. Hypothalamus controls vital functions like eating, drinking, and growth.

- **Cerebral hemispheres:** These form the largest region of human brain. They perform vital functions of controlling the movement of human body and cognitive functions which include memory and emotions.
- **VMFL (Ventro-medial Frontal Lobe):** This is the most advanced part of the brain responsible for decision making.

Area of Brain	Function	Importance
Spinal cord	Sending message from nerves to different parts of the body	0
Medulla oblongata	Respiration, controls blood pressure, senses of taste and hearing	1
Pons	Controls movement, respiration and sleep	0.5
Cerebellum	Maintains postures, controls head and eye movements, muscle movements, language as well as cognitive functions	1.5
Midbrain	Co-ordination of visual and auditory reflexes	0.5
Thalamus	Taste,smell,touch	2
Hypothalamus	Eating, drinking, growth, motivation	3
VMFL	Decision-making	4

Value range 0 to 5

(Source: Neuromarketing a Peep into Customer`s minds by J.K. Sharma, Deepali Singh, K. K. Deepak, D. P. Agarwal)

3 BRAIN LATERALITY

Human brain can be divided into two hemispheres: Right and left. The left one is supposed to be logical while the right one is creative. It is very interesting to note that the left hemisphere receives inputs better from the right side and vice-versa. This can be a very vital input to print advertisers, OOH (out of home) media and banners on the internet. The visual matter should be placed towards the left while the text on the right. Similar application to packaging which acts like a silent salesman for the product which is on the shelf.

Modern techniques for examining the effect of communication on human brain:

- EEG
- fMRI
- GSR

3.1 EEG:

EEG stands for electroencephalography in which activity in the brain tissue is recorded. This is a passive technology in which sensors are used to capture minute electrical signals that brainwave activity produces. The output is generated in the form of waves which are of four types:

- Beta waves-these are the fastest of all with low amplitude. Beta waves are generated when brain is actively engaged in some mental process. Example: delivering a lecture, in meeting
- Alpha waves-these are generated when our brain is at rest. Their frequency is lower than that of beta waves. Example: person taking rest after completion of any job
- Theta waves-The amplitude of these waves is greater while their frequency is lesser. Theta waves represent a person who is performing some leisure activity.
- Delta waves- They have the highest amplitude with lowest frequency. Example: a person in deep sleep

  Dr. Hans Berger was the pioneer in application of EEG in 1920`s.This is the only method that measures the electrical activity of the brain. On March 21, 2011 Neuro Focus the Neuromarketing arm of Neilson announced Mynd™ world`s first dry, wireless Full-brain EEG measurement headset.

3.2 fMRI:

fMRI is functional magnetic resonance imaging wherein the person is scanned by making him/her lie down in a long, narrow tube made up of very powerful magnets. When these magnets become active electrical fields are produced. fMRI depends upon the blood flow to brain. More the flow of blood more is the neural activity.

3.3 GSR:

GSR stands for Galvanic Skin Reaction which provides us with information to determine the extent of subject's involvement in an external stimulus. Human skin is a good conductor of electricity. Example of External stimulus: audio, visual.

3.4 Success stories of the applications of Neuromarketing:

Campbell`s Soup: The emotional quotient of soup shopping

After decades of producing America's favorite soup, Campbell's Soup Co. thought of a makeover. Although the condensed soups generate more than $1 billion in sales, Campbell wanted to generate a 2% increase in sales without raising the prices. The company decided to employ Neuromarketing in combination with a deeper interviewing process in order to receive conscious and unconscious feedback on consumer preferences, decision making, and emotional responses to soup can labels and in-store aisle displays. In nerscope Research Inc., a Boston, MA, based company with a biometric monitoring and reporting system was hired to help conduct research. It is not easy to know what prompts people to buy soup except to have something warm on a frosty day. For two years researchers studied changes in heart rate, skin moisture and other biometrics to find out how consumers react to the packing design, logo, creative used and many other aspects.

3.5 Following are the changes in the labeling based on Neuromarketing experiments:

- The studies showed that when logo was placed at the top with red background it drew too much attention so the new label suggested had logo at the bottom of the can so that all labels look similar.
- The bowl was updated while the spoon in earlier packing design showed very less emotional connects to the consumers. As a result the new creative was without the spoon.
- The steam was added in the creative of the soup to give a feeling of warmth as well as to increase the consumers emotional connect.
- The different varieties of soup were colour coded for easy identification to the consumers

4 FUTURE OF NEUROMARKETING

There is no element of doubt that Neuromarketing will enable advertisers to be very specific in providing products that the consumers really want. The more senses you trigger about your products and service you can influence the buying behavior. Still Neuromarketing is in ones infancy and not free from critics as well as issues.

The basic aspect of Neuromarketing is that it is an artificial method of research which it has to overcome. Brain activity in a lab may not equate to brain behavior in the mall. The application of Neuromarketing studies cannot be extended to B2B area where the buying process is lengthy and involves too many people. The cost factor also should be taken into consideration as it requires very large investment which may prohibit many companies. There should be proper legislation in case of any dispute for safe application.

In spite of all these issues Neuromarketing is here to stay .All advertising campaigns are not commercial as many focus on changing the behavior of the people. For example to convince people not to smoke, don't drink and drive or talk on a cell phone while driving.

REFERENCES

1. Neuromarketing A peep in to Customer`s Minds by J.K. Sharma, Deepali Singh, K. K. Deepak and D. P. Agarwal.
2. The Buying Brain- Secrets of Selling to the Subconscious Mind by Dr. A.K. Pradeep Founder & CEO, Neuro Focus, Inc.
3. Neuromarketing Hope and Hype: 5 Brands conducting Brain research by Kevin Randal September 15th, 2009.
4. Neuromarketing: The New science of Consumer Behavior by Christophe Morin January 14th, 2011.
5. Science Sells Soup by Nelson, Jacqueline 2010 Canadian Business Volume 83,Issue 7 Page 22.
6. Ad Experts not so quick to buy into 'Buy logy' by Miley, Marissa Advertising Age 2008, Volume 79,Issue 40,Page 4 to 30.
7. Automakers Tap Consumer Brains by Britt, Bill Automotive News Europe, 2004, Volume 9, Issue 1,Page 1 to 22.
8. Market Researchers make increasing use of brain imaging by David Lewis and Darren Bridger Nature Neuroscience Volume 17,July 2004.

9. Neuromarketing: Who decides what you buy? By Vicky Phan The Triple Helix 2010.
10. The Emotional Quotient of Soup Shopping by Ilan Brat Media and Marketing February 2010.
11. Neuromarketing Eye tracking helps Campbell March 9, 2010.

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EDUCATIONAL SCENARIO IN INDIA DURING PANDEMIC: CHALLENGES AND OPPORTUNITIES

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Abstract - Education as a holistic approach addresses students' learning, social and emotional needs- is fundamental, more than anything in current pandemic situation. The current (COVID-19) pandemic is affecting people not only clinically, but also how one learns, works and lives. Many challenges are created by this pandemic, the most important one is how to change already build educational system around physical schools. This pandemic has hard-pressed the world to radically look for the ways of coping with the 'new normal'. The most effective response to the crisis that could be there was to go digital. Continuity in learning is offered by developing robust online platforms. In a developing country like India with vast diversity in socio-economic backgrounds of students and the quality of educational institutions, the shift from offline to online platforms has not been easy. The digital divide has been further increasing the gap, and needs urgent attention from stakeholders of both public and private sector. Competent teachers, improved curricula and effective tools will ensure students stay involved and active in the learning process. Post-covid times could see a blend of e-learning and mainstream face-to-face teaching. However, while online pedagogy when combined with offline education does a great job, it can never serve as the later's replacement. In a developing economy such as India, it holds true. More ever, such expectations could take time to come into effect. This article highlights some of the challenges faced by educational sector and potential opportunities for improvement in the areas of curricula, students, teachers and educational environments. It also discusses about some digital platforms that witnessed a boom in their usage.

1 INTRODUCTION

As per UNESCO most governments around the world have temporarily closed educational institutions to contain the spread of the COVID-19 pandemic. These nationwide lockdowns are impacting over 60% of the world's student population. With the ongoing pandemic led lockdown, there are multiple challenges in education, for students, teachers and parents as well. As the educational institutions are closed during the lockdown, approximately 1.72 billion learners have been affected worldwide, and around 32 crores in India alone, this has resulted into high socio-economic costs for education stakeholders. Therefore a deep reflection on our education system is needed in light of this unprecedented crisis. COVID 19 has changed substantially, the way of learning. In "live with COVID" era, many alternatives are forced to develop to substitute the old style of knowledge delivery.

The pandemic has severely highlighted the fragility of our education systems, even those which were considered relatively stable. It is therefore fundamental that the innovation and creativity enthused by this crisis be leveraged to make education systems more just, inclusive and flexible. Challenges that need to be addressed:

The new crisis that the mankind is facing today has taken us to the big question. What will be the response of complex Indian education system to the emerging situation? Avoiding the question is of no option.

- **Learning for all**

In this situation, the role of a teacher is challenging. While teaching online, they also have to support students to complete the assessments and tests. They need to stay in constant touch with parents about the progress of their ward's through WhatsApp groups, and other virtual parent-teacher meetings. This mixing of professional and personal boundaries is complex but they have also got the opportunity to gain more knowledge and skills. Parents also invest in seamless Wi-Fi connectivity and ensure that their children pay attention to classes. In some cases, they had to buy new gadgets as well. However, students are quick to adapt to online classes and, even if they miss a session, teachers share recorded sessions. Thus, it has become possible to navigate independently through the world of online learning.

- **Curriculum Limitations**

Although some students continued their education, many of them were deprived of adequate opportunities to do so and often lack essential services and tools such as technological equipment or learning support services. It therefore becomes necessary to establish specific priorities and emphasize some subjects more than others in school curricula.

- **The great digital divide**

There exists a huge digital divide in urban and rural schools. In a recent survey, over 75 % of students are impacted due to the lockdown as they found hard to study online, over 80 % students said they need support to shift from offline to online and over 25 % said they need proper training to pursue education through online. Most of the parents in India cannot afford OTT platforms for their children to study. These are still a dream for them. Till now, most ed-tech products catered to tier 1 cities and children from the high-income segment, ignoring the majority of students who come from tier 2, 3 cities and rural areas. With more students from tier 2 and 3 cities, the crisis presents a perfect playground for various companies to modify products, adapt and contextualize them as per the needs of different customers. Digital platforms should therefore utilise this crisis to build the best possible learning outcomes.

- **Quality of content**

The quality of content is a bigger issue. The quality of content provided by the platforms to students is not checked by any means. This might be a major take for ed-tech firms.

- **Vernacular content**

There are bigger problems to solve. Online education is easily adapted by English medium students and teachers due to the readily available content or tools. The situation is opposite in scenario of Indian schools where vernacular languages dominate. Only a few ed-tech firms provide vernacular content.

- **Inequitable Access**

India is infamous for its wealth gap; a 2020 Oxfam report highlighted how the country's richest 10% own almost three-fourths (74%) of its wealth. This means that, of the 320 million learners c do not have the same access to digital facilities as their more privileged peers do.

2 OPPORTUNITIES

Every challenge opens up a new opportunity!

The Covid-19 pandemic situation created a lot of challenges for every aspect of life, especially for Indian education system. At such tough times, understanding these challenges is only key to solve them for better crisis management in field of education. The post-covid implementation plan should be focused on quality, flexible and sustainable learning options and include the following characteristics:

- Readiness for e-learning
- Professional development of teachers (Digital literacy)
- Designing 21st-century technologies that are based upon synchronous and asynchronous instruction.
- Conducting creative online assessments.
- Well being of students, teachers and parents emotionally

The present pandemic has lead to innovations in the education sector. Most of these innovations involve digitization. Educational institutions have moved from physical classes to online classes. In many subjects, these classes have been fruitful also.

- **Flexibility in Indian education system**

This pandemic has some positive effect too for educational sector. Flexibility of the curriculum that needed to cater the dynamic needs of the learner, was missing from our system, has gained momentum. Pandemic told us about uncertainty in life. This is a very good opportunity for the Indian education sector to fulfill this objective and become a global education centre. Indian institutions were late in adopting technology. Pandemic has given a pace to Indian education stakeholders to adopt technology in all possible manners. India is focusing highly on "Atma Nirbhar Bharat". Developing the much needed skills in mankind will help India to achieve this objective.

- **Improving curricula**

There is always a need for improvement in curriculum. But, these tough times have made it mandate to update our recent curriculum according

to the current scenario. The updates curriculum should not only include the ongoing components but also the ways require dealing with pandemic situation by all stakeholders.

- **Learning outside the classroom**

While the extended school closures in schools since 2020 has definitely been a huge disruption in the school year, it has also shown that learning can continue even without students' physical presence in schools through distance education, especially by digital means. These challenges can affect various aspects of education, including the student-teacher relationship that is so crucial for students' success. Even the best technologies cannot completely eliminate this distance between teacher and student. In-class education is no doubt necessary, but this must be adapted to the current ongoing situation. Indoor classes can never be completely replaced by their outdoor counterparts but the pandemic has opened up an opportunity for exploration.

- **Enhancing digital skills of teachers**

It is evident that distance education is primarily based on the use of digital technologies such as email, online courses and document-sharing platforms; the crisis has significantly highlighted the need to develop teachers' digital literacy. While the use of digital tools is an integral part of the teacher training curriculum, many teachers still lack the required knowledge, skills and tools to design learning material. Similarly, many students cannot independently use technologies. As a result, teachers during the crisis have had to play the dual role of training students *about* technologies *with* technologies. In order to address short-term needs during the school closures while awaiting the eventual development of this type of training, they also need to be trained on how to effectively use these tools for student engagement and learning.

- **Blended learning**

Various educational institutions and educational technology companies are enhancing the use of online classes, live classes, recorded lectures which later on published on you tube channels. All these increases the interest of students with more concept clarity due to interactive study material consist of different videos, graphs and animation. As per the current situation significant planning will be required after the lockdown. It is necessary to re-evaluate all the school activities and come forward with new system as a new normal situation. It is imperative to re-evaluate every school activity and emerge with new systems, which will become the 'new normal'. Parents may choose home schooling, if things worsen. While this strategy might not end in finishing the quarterly curriculum, it'll a minimum of reduce the training gap that students are likely to experience if schools still remain shut.

Blended learning may even be ulterior traditional. Faculties will explore tutoring platforms with video conference facilities, bespoken modules, and assessments exploitation technology and information which can facilitate to analyse what students like, their learning patterns, and their understanding of the ideas. TPACK is one amongst the instance.

TPACK stands for Technological Pedagogical Content Knowledge. It makes an attempt to identify the character of information needed by academics for technology integration in their teaching, whereas addressing the advanced, many-sided and located nature of teacher information. At the center of the TPACK framework, is that the advanced interaction of 3 primary styles of knowledge: Content (CK), Pedagogy (PK), and Technology (TK).

With the challenges and gaps associated with digital learning, the launch of a replacement education policy (NEP 2020) may operate the first step for Indian education to transition into the digital sphere.

The ed-tech corporations have witnessed 10-fold rise in registration for trial or free work, inside the last 2 months.

In India, state governments are the foremost necessary suppliers of education. However, they are affected by many challenges together with massive college student ratios, infrastructure and lack of quality coaching amongst academics. Personal faculties too face a tangle with teacher coaching.

- **Use of technology which is able to bring modification**

The Ed-tech companies can modify the method by which lecturers teach and students learn. In place of the conventional chalk and speak schoolroom, schools can witness the rise of 'flipped classrooms', wherever students watch video lectures and do their 'homework' in class. It offers a chance to urge out of boring categories and offers real-life learning opportunities and diminish the gap between what is being educated among the lecture rooms and thus the real-life workplace needs.

Bharat web is connecting all the villages with high-speed broadband network. An area of the project connecting remote areas in North-East Republic of India is already complete and ensuring connectivity among different users easily.

Some digital platforms that witnessed a rise in the usage:

- **Conferencing Apps**

Conferencing apps like Google Meet, Google room, Zoom and Webex area unit are most favored apps used for conducting interactive sessions. Although these are very popular, these systems have to be compelled to handle video content as they need high information measure for uninterrupted flow.

- **On-line RADIO**

Online radio is one novel manner of unidirectional communication. Several channels already webcasting well-liked categories on varied

subjects. This is often one among the most cost effective ways that of on-line categories. The downside is that this medium doesn't have video contents.

- **Terrestrial Radio Channels**

All Asian nation Radio is broadcasting course of study primarily based academic contents daily in its VIDHYABHYASA RANGAM program. Governments and universities will utilize this terribly effectively. Most state governments and also the central government area units are already utilizing these.

- **TV Channels**

Television channels will reach resolute students in an exceedingly higher manner since they will telecast video, transmission contents and audio at the same time. for instance, PADASHAALA, associate test primarily based program recently telecast in Doordarshan. DD contains a footprint over eighty five geographic region of India and might be viewed with no additional price. TV channels particularly Doordarshan play a significant role in spreading distance education. Doordarshan together with government of Bihar started a program named 'MERA DOORDARSHAN MERA VIDHYALAY'. This program could be a massive hit in a state wherever education facilities within the rural areas are very less.

- **Diksha**

This is a project by the Ministry of human resources development (MHRD), Government of India to empower lecturers within the digital surroundings. This is often a digital infrastructure for data sharing. It conducts numerous courses for lecturers for his or her systematic progression in their noble profession. Teaching aids viz. idea videos, lessons, plans etc. is accessed from DIKSHA and lecturers will simply transfer academic resources created by them, for the utilization ofothers.

- **National Repository of Open Academic Resources (NROER) Advancement (NESTA)**

This is an efficient program to coach the Heads of the faculties, resource persons and lecturers at the primary school level. This is often a capacity-building program.

- **SWAYAM**

SWAYAM, a program initiated by the govt. of India aimed toward providing everybody, quick access to high-quality digital aides and resources. Premier government organizations host this program. It offers free of cost subject-specific courses to the learners. It also manages primary and secondary education through NIOS and NCERT.

- **SWAYAM Prabha**

This is a bunch of satellite channels in DTH that uses GSAT15 satellite. At present, there are unit thirty two channels geared toward secondary, senior secondary, graduate and postgraduate education. Recently government of India beneath declared COVID 19 package that twelve SWAYAM PRABHA channels to market digital learning for classes one to twelve. i.e., one channel dedicated to at least one class.

- **Youtube**

One can access an outsized volume of digital resources from YouTube and alternative social media platforms. YouTube is that the largest supply of digital learning materials. Several institutes are conducting classes and even a person, be it a teacher or anyone can teach content online to a vast size of population.

3 CONCLUSION

The COVID-19 pandemic has highlighted lots of challenges and opportunities in education. Prioritizing opportunities for providing authentic education through the program, learning priorities and therefore the learning environments projected by education specialists exposed a future direction for education which will be more explored once learners come back to high school. Whereas students currently ought to find out how to figure things independently, academics ought to acquire skills for effective use of technological tools needed for quality teaching. The absence of students and teachers from classrooms inspired ed-tech platforms to be utilized by institutions and in response, academicians and students also, are fast to adapt and implement new instructional pedagogy — learning through digital infrastructure. Government is additionally improvising its policy through NEP2020 to deal with this pandemic and leaving no stone unturned. Several initiatives by Indian government are still in progress. To form digital education effective, the academics should be equipped with sensible delivery models. The issues arises here is that students are more tech-savvy than their teachers. Teacher community needs to keep pace with their Inter-Net generation students, however there's a minority who still hesitates to venture into the digital platforms. The promptness of the teaching community in acquiring digital skills would establish the positive results about when they would be able to cater the needs of the learners. When schools re-open, they need to control with reduced schoolroom strength, to check social distancing. It means that the scope for schoolroom education can stay curtailed and e-learning should fill the gap within the education sector. With integrated learning as potential solutions for schools, e-learning can still dominate the arena for an extended amount.

REFERENCES

1. Jena, Pravat. (2020). Impact of Pandemic COVID-19 on Education in India. International Journal of Current Research. 12. 12582-12586. 10.24941/ijcr.39209.07.2020. retrieved at: http://matt-koehler.com/tpack2/wp-content/uploads/2013/08/TPACK-new.png
2. Konikkal (4 jul 2020).Education in Covid 19 scenario - Challenges and opportunities. *Mathrubhumi.* Retrived at: https://english.mathrubhumi.com/education/articles/education-in-covid-19-scenario-challenges-and-opportunities-1.4880403
3. Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A new framework for teacher knowledge. *Teachers College Record,* 108(6), 1017-1054.retrived at: http://jgu.edu.in/blog/2020/06/29/impact-of-covid-19-on-higher-education-challenges-opportunities.

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A COMPARATIVE STUDY OF EFFECTIVENESS OF C.A.I. PROGRAMME AND CONVENTIONAL CLASSROOM TEACHING IN MATHEMATICS AT D.T.Ed. LEVEL

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Abstract - This paper analyzes the comparative effectiveness of using Computer-Assisted Instruction (CAI) method and traditional teaching method in mathematics on DTEd. students. DTEd stands for Diploma in teacher education. These students are would be primary teachers and they have a subject as "Teaching methods of Mathematics" in first year of course. A purposive random sample consists of 60 students from 1st year of DTEd course were chosen for this study in Pune, Maharashtra. The students were divided into two groups consist 30 students in each. The students of the experimental group learnt the topic "Volume of Cube and Cuboid" using CAI, which included graphics with 2D animation and a song whereas the students in the control group learnt the same topic through the traditional method of teaching. The research design chosen has been the pretest-post test equivalent groups design. All instruments (the pre-test, the post test) contained the questions belonging to four different cognitive domains: knowledge, understanding, application and skills. The data has been analyzed using **mean, S.D and Test of significance 't' and analysis of variance for testing significance of difference between statistics especially between means.** Findings of the study clearly point out that significant increase in the mean gain scores has been found in the post test scores of the experimental group. Significant differences have been found between the control group and experimental group on post test gain scores. The experimental group, which has been taught using the CAI showed better performance in learning and also the CAI is an effective medium of instruction for teaching mathematics at DTEd. level.

Keywords: DTEd., Computer Assisted instructions ,Traditional Teaching. Teaching Methods, Mathematics Instruction, Primary school teachers, Comparative Analysis, Graphics, 2 D Animation, instructional Effectiveness, Pre tests, Post tests, Scores.

1 INTRODUCTION

In India now, there is a revolutionary concern for improving the educational system and making it realistic and relevant to the life of learners. Industrial revolution has brought out tremendous progress in the field of science land technology. Technological changes and curricular development are constantly bringing forth new problems and opportunities for research. Perhaps more than ever before educational innovation are being advocated in the classroom organization, in teaching

materials and procedures and in the use of technical devices and equipment.

Such innovations as a Computer Assisted Instruction. Programmed Instruction, team teaching need now days to be evaluated through research process. This is an age of computers. In the field of Education, computers can find tremendous use as tool, tutor and tutee. Computer technology has advanced to an extent where teachers can easily use computers for classroom teaching. An attempt has been made in the present research to explore where the computer Assisted instruction can be more effective as compared to traditional classroom teaching.

The researcher has been prepared a Computer Assisted Instructional (CAI) program on unit in Mathematics for DTEd. Students and a comparative study has been conducted.

1.1 Computer Technology and Education:

Though most of us may not realize it, Computers have become an integral part of life today. It is difficult to find a single aspect of life, which is not touched by this technology.

We Indians have proved ourselves for our excellence in software Industry. Yet, the teacher who shape the young minds have shield away from computer technology. There are various reasons some of these are as follows.

- Lack of Easy access to computers.
- Lack of adequate training.
- Cyber phobia in same.
- Unavailability of adequate number of Computers for teaching.
- Lack of software, carefully tailored to the teachers need.

So, “Only when teachers become comfortable with the technology will students reap the benefits.” (Armstrong et.al. 1996, p.81).

Computer technology can be a powerful tool in the teaching learning process.

It can act as a powerful teaching tool due to the following capabilities.

1. It helps as a motivation factor for student.
2. The content can be presented in suitable steps and proper sequence.
3. Lessons presented on computers can be planned in conjunction with the use of positive aspects of various methods like discussions, Lectures, Project etc.
4. Education can be more students centred. Every student can be provided material to suit his level of understanding. Thus extra and enriched information can be provided to gifted Children While those who are lagging behind can be provided the lacking pre-

requisite information, Which can lead to better understanding of the new material.

5. Students can use computers to develop portfolios. On various units or to complete various assignments.
6. CAI can make use of multimedia i.e. Play voice integrate graphics. Use Corel – Draw, Photoshop for making diagram which can completely change the mood of the classroom.
7. The lessons that normally seems boring to the students can be presented in lively and interesting manner.

Taking into Consideration the various, strengths of CAI in the teaching learning process, Educators have begun to look at Computer Assisted Instruction as an alternative or support to traditional classroom teaching.

2 NATURE OF MATHEMATICS

Many questions have been raised by the teachers and researchers about the nature of mathematical knowledge, but no simple answer is available. Many mathematics educators think mathematics activity as a timely discovering of the truth and totally independent of the culture and disciplines. They are pointing towards the numeration or learning of the basic arithmetic skills (+, -, ×, ÷). Ernest (1994) has also reported the same fact about discovery learning saying that discovery learning assumes that mathematical knowledge is pre-existing. Researchers of the present era are more focused towards the use of constructivism, especially in teaching of science and Mathematics. The mathematics learner should be allowed to construct knowledge in their own cultural and social context. Many studies have highlighted that in India the teachers are following traditional teaching method that is Chalk and Board method. This method is appropriate while teaching the basic operations and facts. The frequent use of computers for teaching of mathematics demands development of new software that may be embedded in the local context. Therefore there is a need to provide enough knowledge and skills to the teachers that consequently help to develop a more positive attitude towards the use of technology for teaching.

2.1 Importance of Mathematics Teaching

Mathematics is an important subject in school curriculum. It is more closely related to our daily life as compared to other subjects. Except our mother tongue there is no other subject which is more closely related to our daily life as Mathematics. Mathematics is considered as father of science in present days mathematics has been given an important place in school curriculum. In order to give an important place in curriculum a particular subject must possess the following views.

1) Utility of particular subject in daily life.
2) Whether the subject is helpful in the development of mental discipline or not.
3) The social and cultural importance of particular subject.

2.2 Statements of the Research Problem:

To study the effectiveness of computer assisted instruction program and traditional class room teaching.

2.3 Operational Definition:

Computer Assisted Instruction: (CAI)

When Computer is used as a sophisticated instructional device which presents the subject matter to the learner and provides meanings to his responses. This we call as computer assisted instruction.

2.4 Mathematics:

A compulsory subject from – primary level to Secondary level.

2.5 DTEd. (Diploma in Teacher Education)

Two years professional course designed to credit professionally trained primary teachers.

2.6 Assumption:

1) Computers provide meaningful experience to students to achieve aims.
2) Computers assist in the formation of realistic goals.
3) Students learn easily with CAI.
4) Mathematical concepts are better understand by CAI to students.
5) CAI is an effective method of teaching as students like it.

2.7 Objectives of the Study

1) To test the previous knowledge of student teachers.
2) To prepare the program by traditional method.
3) To prepare computer assisted program.
4) To execute the program by traditional method.
5) To execute the program by computer assisted instruction.
6) To compare the effeteness of CAI program and traditional classroom teaching in terms of achievements.

3 HYPOTHESIS:

The researcher has been taken efforts and used several principles of learning to prepare the CAI presentation. So, it was expected to be better than traditional classroom teaching and lead to higher achievements than traditional classroom teaching. Moreover, review of related researches shows that CAI proves to be more effective than traditional classroom teaching, In such cases a directional hypothesis would been

most appropriate, However researcher selected put forth null hypothesis for following 3 resources.

a) The researcher has prepared CAI presentation for first time. Its effectiveness has to be tested.
b) Traditional classroom teaching was done by a very experienced teacher, which could also effect the results.
c) The researcher wanted to avoid any kind of bias.

3.1 Variables of Research Study

Independent Variables

In present research, research methodology (traditional method and CAI) are independent variables.

3.2 Dependent Variables

Students achievement is the dependent variable in present research.

3.3 Confounding Variables:

Power point presentation, Use of Internet, Video Clips may be confounding variables in the present research.

3.4 Null Hypothesis:

There will be no significant difference at 0.05 level of significance in the achievement in the unit taught through computer assisted instructional program and through traditional classroom teaching.

3.5 Population and Sample:

The sample is incidental cum purposive consisting of DTEd. First year students from "Meenatai Thakare D.Ed. College, Pune".

Sample Size: 30 students in Experimental group and 30 students in control group.

3.6 Tools of Data Collection:

Achievements test on the selected unit in Mathematics both as pre-test and post test.

3.7 Treatment of Data:

To test the significance of difference between means "t" test was used.

3.8 Scope and Limitations:

1) The study is restricted to student teachers of only one DTED College from Pune City.
2) The CAI program has been prepared only one unit of Mathematics of Std. VII text book.
3) The study is restricted to English medium students, only, as the program has been prepared in English.

4 RESEARCH METHODOLOGY:

To check and compare the effectiveness of the presentation program, the research has been selected experimental method for research study.

4.1 Analysis of Data:

Quantitative analysis had been carried out using "t" test.

4.2 Statistical Methods of Analysis:

1) Test of significance „t" and analysis of variance for testing significance of difference between statistics especially between means.
2) Factorial analysis for the purpose of analyzing the composition of certain complex phenomena.

M1=Mean of control group M2=Mean of experimental group

M1= 12.83 M2 = 17.93

4.3 Analysis:

1) Mean of post test in control group was 12.83 and Mean of post test in Experimental Group was 17.93
2) Mean in post test has increased from 12.83 to 17.93, in Experimental group there is gain of 5.1 score points.

From Above three we can conclude that there is significant improvement in students achievement in experimental group.

1) Mean of Scores (Experimental & Control):

$$\text{Group I} = \frac{\Sigma X}{N} = \frac{385}{30} = M_1 = 12.83$$

3) $$\text{Group II} = \frac{\Sigma Y}{N} = \frac{538}{30} = M_2 = 17.93$$

2) Standard Deviation of Difference

$$\delta_1 = \sqrt{2.313}$$

S.D. or δ_2 $\quad \delta_2 = 2.048$

1) S.D. in control group is 2.313.
2) S.D. in Experimental group is 2.048
3) S.D. in Experimental group has come down from 2.313 to 2.048. There is reduction of 0.265 points.
4) So from above references researcher has been concluded that, experimental group is more homogeneous as compared to control group.

3) Standard Error in the Difference of Mean:
δM1 = 0.422 δM2 = 0.374

4) Correlation Coefficient (Product Moment Method):

$$r = \sqrt{\quad} - 0.354$$

5) Standard Error of Difference Mean
δD = 0.654

6) Difference of Means Between Two Group:
D = M2 - M1
D = 17.93 – 12.83
D = 5.1

7) 't' Value

$$t = \frac{D}{\delta D}$$

$$t = \frac{5.1}{0.654}$$

$$\mathbf{t = 7.80}$$

8) Degree of Freedom:

$$df = N - 1$$

$$= 30 - 1$$

$$\mathbf{df = 29}$$

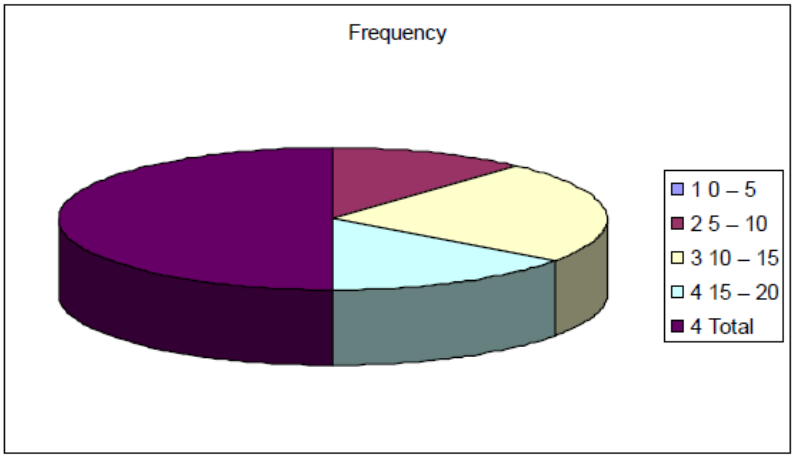
0.05 level = 2.04 (Sample t value)
(Actual t value) = 7.80

5 CONCLUSION:

1) Researcher has been selected 0.05 level of significance to text the validity of hypothesis.
2) Value of df is 29 on 0.05 level of significance is (t = 2.04).
3) Actual t value t = 7.80 is greater than sample (2.04) and as this mean difference is significance at 0.05 level, it can be said that the difference is not due to differentiation between sample, and significance is real.
4) From above references, researcher has been concluded that there is a significant difference between D.T.Ed. student Teachers in control

and experimental group post test scores, and Null hypothesis is rejected at 0.05 level.

5.1 Marks Distribution of Control Group



5.2 Importance of Present Research

1) Researcher has used educational technology to compare the effectiveness, which encourages students and teachers to adopt. New technologies in daily teaching – learning process.
2) Though Mathematics is a subject, which is felt difficult by students, present research will definitely help to create interest about Mathematics among students and teachers.
3) Present researcher is useful to the teaches to know the technique of CAI in effective manner.
4) Researcher has given an effective treatment to the students to reduce their problem regarding mathematics subject.
5) Researcher has been examined that when we use scientific technology in our day to day teaching students take active participation in teaching learning process.

Present research will benefit following people.

1) **Principal:** Present research will help the principals of School and colleges to create awareness the use of computers in education. Principals can arrange orientation programme and workshops for their teachers.
2) **Teachers:** Present research will help to expand widen the scope of knowledge of teachers, New methods and techniques of teaching can be used instead of only lecture method. Teacher can make this subject interesting and favourite subject of the students.
3) **Students:** Present research will help the students to make their concepts clear and will make their learning interesting. It will help in fixation of the concepts in the minds of the students.

4) **Society:** The study of mathematics help in creating the mathematical outlook in the students and concern people. This research will help to develop good citizens having scientific and mathematical outlook.
5) **In Syllabus and Curriculum Formation:** Present research will help to add such topics in the curriculum which can be taught effectively by CAI.

6 SUGGESTIONS

Though teaching is an art and there are very few born teachers a majority of teacher, who have no inherent flair for teaching and are unable to arouse that much interest in the students to learn, can improve upon by practice so it is essential that.

1. Every teacher should be acquired with different methods of teaching.
2. The teacher should use variety of methods according to the demands of the content.
3. The method should be made flexible to suit variety of circumstances.
4. The teaching should be pupil centered rather than teacher centered
5. Teaching – learning process should be co-operative endeavor of teacher and students.
6. Teaching should be included rapid feedback to the students for their response.
7. Teaching should be taken into consideration the interest of students and try to motivate them to learn.
8. CAI can be used by teacher to covert the lecture to more of a demonstration.
9. The use of CAI can be made to show diagrams, charts, graphs, several categories of learning in Mathematics.
10. Verbal information, concept formation, problem solving and attitude formation which are an essential part in Mathematics and can be fulfilled by CAI.
11. Last but not the least, Computers can be used for revision of difficult topics, remedial teaching, for slow learners and finally to bridge the gap between slow learners and bright learners.

6.1 Recommendation for Further Study:

1) A comparative study can be done for effective use of program learning.
2) The investigation of different methods adopted for teaching Mathematics in Marathi Medium D.Ed. Colleges can be done.
3) A comparative study can be done for effective use of multimedia projector.

REFERENCES

Books:

1. Best W. J. & Kohn J.V., “Research in Education” prentice hall of India Pvt. Ltd. New Delhi, 2003.
2. Kaul L, “Methodology of research in Education, M. B. Buch, “Vol. – 4 & Vol. - 5” Sterling Publisher Pvt. Ltd. New Delhi, 1979.”
3. Alba, A. (September 1997). Fundamentally MATH, The Mathematics Teacher, Volume 90, Number 6. P. 495.
4. Bailey, R. 0. (May 1995). Fundamentally MATH, Teaching Children Mathematics , Volume 1, Number 9, p. 586.
5. Baker, E. L. (1999). Technology: How Do We Know It Works? The Secretary's Conference on Educational Technology-1999, U.S. Department of Education, www.ed.gov/Technology/TechConf/1999/whitepapers/paper5.
6. Birman, B. F. (January 1997), The Effectiveness of Using technology in K-Education: A Preliminary Framework and Review, Washington, DC: American Institutes for Research.
7. Coley, R. J., Cradler, J. and Engel, P. K. (1997). Computers and Classrooms: The Status of Technology in U.S. Schools, Policy Information Center, Educational Testing Service, Princeton, NJ. Davis, S. J. H. (November 1997), How Mastering Technology Can Transform Math Class, Educational Leadership, Volume 55, Number 3, pp. 49-51.
8. Evans, J. (1965). Programming in Mathematics and Logic, in Robert Glaser.

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