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Restructuring Curriculum: A Response To Digital Disruptions For Tackling Employment Challenges

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Abstract: The apparel industry has been significantly influenced by digital disruptions encompassing e-commerce, smart manufacturing, data analytics, and supply chain optimization. The Indian Apparel Industry (IAI) has also been experiencing disruptions due to COVID-19, global recession, digital transformation, and technological innovations. The role of a fashion designer has also undergone several changes due to 'cyber-physical system of Fashion 4.0'. A fashion designer's role is emerging as a "Social scientist" (Faerm, 2021), "entrepreneurial fashion designers with both creativity and business acumen" (Min and Wilson, 2019), "a ringleader" communicating with entire network (Sun and Zhao, 2018), "algorithmic fashion designer" (Gross et al, 2018), "cyborg designer 4.0" (Särmäkari and Vänskä, 2022). Looking at the extent of change being witnessed by IAI, it is important to enhance existing capabilities, develop new capabilities to manage, survive and grow in the rapidly developing digital and innovative technical environment. However, there is a growing concern about the widening gap between the digital skills required by the industry and the skills possessed by the existing workforce as per the emerging role of a fashion designer. The present curriculum offered by institutes and universities need to address this widening gap. This research problem aims to investigate the multifaceted relationship among digital disruptions, skill gaps, and curriculum to tackle the grave situation. The present research study is based on the research questions:

- What are the key digital disruptions that have impacted the apparel industry, and how have they reshaped its operational landscape?
- What are the current digital skill gaps within the apparel industry's workforce, specially fashion designer, and how have these gaps evolved in response to digital disruptions?
- Can a curricular framework model address the issue and provide industry with innovative, digitally, and technically savvy fashion designers?

The research paper uses the "backward design" approach that focuses on 'intended learning outcomes' for creating a curriculum (Wiggins and McTighe, 2006) that can meet the industry requirements and enhance talent. To address the above research questions, the study employs a mixed-methods research approach that includes qualitative and quantitative methods. The results reveal that there are digital disruptions that have impacted the apparel industry. The study recommends revising the existing training curricula comprising the latest technology innovation i.e., AI and Machine Learning etc.

I. INTRODUCTION

Digital technologies are reshaping the business scenario to provide best customer experience. Valuable insights from customers are gathered using various digital technologies to reframe business strategies based on decision making process. Similarly, digital technologies are impacting customer behaviour which is visible through their changed preferences, awareness levels, expectations, experiences. Adopting technological advancements, hiring digitally competent workforce, reskilling and upskilling existing workforce has become the need of the day. Indian Apparel Industry (IAI), second biggest employment generator, has witnessed issues like unfriendly policies, lack of talent, recession and pandemic after effects. Thus, the aggrieved industry is further grappling and trying to cope up with the current phase of technological innovations and transformations due to digital and non-digital disruptions. To overcome digital disruptions, an organization has two ways: (i) invest in technological and digital developments, and (ii) hire technically and digitally sound workforce. Investing in technological transformation and upskilling existing workforce is totally dependent upon the company's vision. But when it comes to hiring talent, role of educational institutes becomes vital. The programmes offered should be in line with the changes happening in the business world to produce professionally ready graduates. IAI is highly sensitive due to global transformation and macro trends. To overcome skills gap in IAI, educational framework is required to produce "professionally ready graduates". McKinsey & Company report entitled "The State of Fashion 2024: Riding Out the Storm" stated that automation powered with AI is highly significant. 73% fashion executives consider that 'generative AI has become a priority but industry faces dearth of talent Storm' (Business of Fashion, 2023). NEP 2020 also emphasizes on imparting digital education to empower students (GOI, 2020).

II. REVIEW OF LITERATURE:

The digital disruptions that comprise of smart manufacturing, e-commerce, RFID technologies, blockchain technology, virtual reality (VR), NFTs, data analytics, augmented reality (AR), IoT, Cloud Computing and other emerging ones have impacted the way manufacturing and retailing is performed. Literature review, divided into 3 sub-heads, is based on published research journal studies, market analysis reports, books, fashion magazine and YouTube interviews of global creative directors in fashion industry.

Digital Disruptions: According to Kuhn, an influential philosopher of science and author of The Structure of Scientific Revolutions, science follows two types of phases: normal phase and revolutionary phase. This revolutionary phase is the disruptive period which is followed by normal phase, thus, displaying a period of continuity and cyclical pattern (Bird, n.d.).

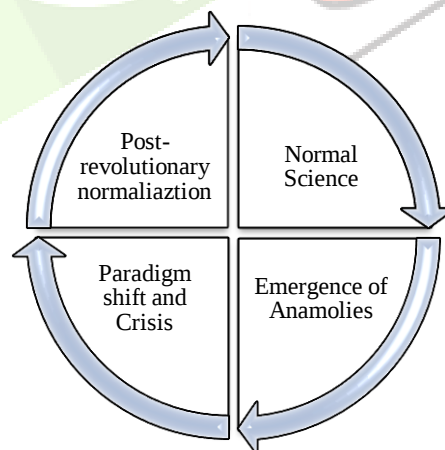


Fig.1: Kuhnian Scientific Revolution (1962)

Digital disruption occurs due to technology led digital innovation and transformation compelling businesses struggle to re-strategizing the entire business by investing in technological upgradation, hiring best suited talent as per the change, adding newer roles like Chief Digital Officer at strategic levels. Grossman (2016) found that highest disruption is faced by B2C segment with media industry. To reduce and overcome the impact of disruptive forces, the report suggested that companies should create "catalytic roles" such as Chief Digital Officer or Chief Analytics Officer or a Digital Director; a culture of data- driven decision-making process should be adopted by the organizations; and, companies should commit to become digital companies in all ways- process, people, systems and strategies.

Riemer and Johnston (2016) investigated the disruptions faced by music industry due to origin of mp3 as companies failed to understand the benefits of the revolutionary proposition. Kuhnian philosophy highlighted the new business paradigm that explored and provided digital possibilities of sharing and storing music at global level. leading to new business models like ipods, itunes etc and soon it became a popular culture among youth and adults. Live streaming and downloading of music became a common practice. This was a revolutionary period that was possible only due to scientific innovation coupled with technological intervention. Slowly, it became a post-revolutionary normalcy.

There are three categories of Disruptive technologies (i) enhance existing skills while creating new ones; (ii) those that replace skills; (iii) those that fall somewhere in between (BOF,2023). Digital disruptions are rapidly transforming the modern workplaces. Keeping abreast with emerging technologies and acquiring necessary technical skills has become critical for a job seeker or to retain a job. It is apparent that many job roles will become obsolete in near future, Chinoracký and Čorejová (2019).

According to Behr (2018), fashion industry has been witnessing an amalgamation of digital innovation with fashion concepts to produce smart clothing, wearable technology, biometric body analysis, new materials, use of sensor technology and this requires companies to develop new business models to meet challenges and benefit from the opportunities. These business models may include use of innovative materials, new product development approaches, collaborations, bespoke products, prompt delivery systems, pre and post purchase services and reconsidering revenue models. Langley and Rieple (2021) identified the following disruptive changes as a result of digital revolution- AR/VR, Cloud based apps, AI and Machine Learning, blockchain, robotics and automation, custom manufacturing, 3-D printing, and big data analytics. Researcher further stated that repositioning in digital world can create a competitive edge as several companies are facing threats and survival issues due to big companies who have adopted digital strategies. Reconfiguring business systems, collaborations and partnerships besides improvising operational capabilities, investing in technology and customer centric approaches can help companies that face constant threat. Equally important is to hire and retain digital talent with enhanced dynamic capabilities.

Impact of disruptions on Fashion Industry: Kumar (2020) identified Artificial Intelligence; on demand customization of products; Fast Fashion; digital channels like e-commerce, online shopping; smart fashion; use of AR and VR technologies; and, virtual models, 3-D technologies, wearable technologies as major disruptors in fashion industry. Incorporation of digital technologies has created challenges for design development, sourcing, production, supply chain mechanisms and retail. To survive, it has become necessary for traditional fashion companies to integrate technology, devise and implement new business models, adapt to digital communication channels for customer reach and feedback, and provide exceptionally unique online shopping experience.

Kim (2017) mentioned that rise of social media influencers, fashion bloggers, fashion show reels distributed through Instagram, Facebook, Snapchat have changed the way customers react and make choices. Customers want the seen product immediately instead of waiting for months to see the products in retail stores. It has led to the disruption of once famous Fashion Weeks that were considered to be exclusive and prestigious. The trend of Social Media Fashion Shows has gained momentum where anyone can create a show and publish a short video of a capsule collection or a coordinated look. Similarly, major disruption is evident in print media. It has become difficult for Fashion magazines to survive due to digital era which requires web content creation, hosting blogs, managing websites. The power that was once enjoyed by Fashion Editors has now shifted to Fashion Bloggers as they interact directly through digital modes with the readers about lifestyle, trends, personal styles, opinions powered with images and videos to create a personal and emotional connect. This has influenced the customer buying behaviour patterns. Effects of disruption are also visible on retail sector where customers are no more interested in traditional retail formats. Their choices are highly influenced by blogs, social media, and other online channels. YOOX Net-a-porter is world's leading online store for fashion and lifestyle products. The impact of disruptive technologies is not limited to manufacturing but also visible on fashion industry allied fields. Aiolfi and Sabbadin (2019) studied the innovative business models in fashion industry while investigating the threat experienced by traditional physical retail stores in times of digital transformation. Integrating digital technologies has become the need of the day and the disruptions are forcing brands to redesign strategies to include virtual channels. The growth of internet, smartphones, awareness levels, global connectivity is forcing brands to invest in digital and technological upgradation. Digital storytelling concepts, publishing images and videos of latest collections on Instagram, Pinterest, Snapchat, other apps; engaging customer through digital presence, improved websites, virtual mannequins, click and collect approach, Interactive kiosks and touchscreen displays in physical stores, use of QR Codes, Augmented Reality (AR), chatbots are some of the ways digital

disruption is transforming the fashion sector. Dennis (2020) argues that fashion designers work on creating designs for clothing or accessories and some use AI tools and devices to create them. The bigger question is about the ownership of designs- fashion designer, programmer or AI- device. The research done by designer can be easily converted into '*algorithms that are programmed in a machine*'. Since it becomes AI assisted and AI generated design, therefore, the output becomes copyrightable.

Digital skills gap: Skills gap is not a new problem for industrial sector. In layman language, skills gap can be termed as a gap between required skills and acquired skills. When this gap occurs due to revolutionary technological innovations and digital transformations, it is considered as digital skills gap. It also means that the existing workforce and new entrants to industry are not equipped with appropriate digital skills and competencies, hence making them incompetent for emerging job roles. According to Dawson et al (2022), AI, Cloud Computing, Product Management and social media are highest in-demand fastest growing emerging skills in the disruptive era. Reshaping course structures, offering bundle coursework, multiple entry and exit pathways for upskilling can help overcome the digital skills gap through educational institutions. Bongomin et al (2020) used survey method and identified 35 disruptive technologies and 13 key technologies for equipping workforce with technical and personal skills aiming to integrate industry 4.0 concepts into education system. According to researcher industry 4.0 is a period of disruptive technologies with the potential to bring about huge change in work patterns, production, and consumption, thus, creating a demand for revised curriculum, skills and competencies, employment opportunities, emerging job roles and digital adaptation. In order to implement industry 4.0 and adapt to these technologies, newer and appropriate digital skill sets will be required. Besides general and vocational skills, the skill requirement will include documentation and reading, data and information processing, data interpretation and analytics, machine-human interaction, logical reasoning, virtual modelling, emotional intelligence, process simulation. Imparting these skills can be achieved by developing new curriculum, offering focused online programmes in diverse areas, revamping university programmes that teach life skills to adapt to ever changing labour landscape, adapting learning factory concept that offers realistic learning experiences. Kalbaska and Cantoni (2019) analyzed digital fashion related jobs through LinkedIn portal and found that digital marketing, social media, digital designer, graphic designer, e-commerce manager, media manager, project manager, fashion brand manager, customer care, PR manager, luxury fashion, digital analyst, brand marketing, email and online marketing, sales manager and product manager as job titles mentioned in advertisement. Knowledge of digital marketing, e-commerce projects, communication skills, resolving customer problems, project management, teamwork, designing and managing email/ social media marketing campaigns, sensitivity and general operational skills were identified as important skills. Researcher further stated that in fashion and luxury domain, besides vocational skills, analyzing and interpreting big data using web analytical tools, trend predication and forecasting play a significant role. Findings also revealed that there lies high probability for job roles that are still not requested by the fashion industry. These include: 3D printing, AR, safe payment systems and logistics for e-commerce. According to the researcher a successful candidate should be talented couples with necessary skills, knowledge to work in fashion industry along with attitude and passion for digital world.

Thus, from the literature, it is evident that the digital disruptions have shaken the fashion industry. Studies also highlight that the skills gap has further widened due to these disruptions which can only be overcome by technically and digitally sound industry ready professionals. Some of the existing job roles have become obsolete and are being replaced by either change in job specifications or due to emerging job roles. This change has compelled IAI to rework on talent hunting and enhancement strategies. Looking at the magnitude of digital disruptions, the role of educational institutions becomes extremely important. Identifying the reasons for skills gap and then restructuring existing programs or developing new programs with industry required skills, competencies and knowledge to deal with digital disruptions is necessary. Upgradation of existing skills and knowledge should be focused. Literature also highlights the role of fashion education institutes as one of the ways to overcome the problem caused due to these digital disruptions. According to Mashelkar (2018), "*disruptive technologies have led to the demand for revised curriculum comprising of new content focused on employment and strengthened with much needed knowledge and skills*".

III. METHODOLOGY: The study follows a mixed method approach to collect quantitative and qualitative data from fashion design industry ready graduates and industry-academia professionals. Since the research is preliminary, the sample size is small. The graduate students (n=46) belong to a 4-year degree programme in Fashion Design Program taught at a prestigious design institute located in Gandhinagar. A questionnaire was prepared in Google forms and emailed to professionals with industry exposure ranging from 2 months to 3 years. The questions included Likert scale, semantic differential scale and multiple choice.

Industry-academia professionals ($n=16$) primarily comprised of visiting faculty who also run their business and are well aware of academic requirements, syllabus being taught, impact of changing business environment, and hire design graduates. An interview schedule comprising of 6 questions was developed to collect data telephonically/ face-to-face mode.

The questions were analysed using statistical tools for summarizing data and drawing conclusions respectively.

ANALYSIS AND INTERPRETATION: Post digital revolution, as AI is conquering every dimension of manufacturing and services sector leading to digital disruption, the study has been conducted to study the impact of disruptions on the skill requirements, digital skill gaps, evolving role of a fashion designer, transition towards use of AI tools and the need for curriculum revision to produce tech-savvy designers.

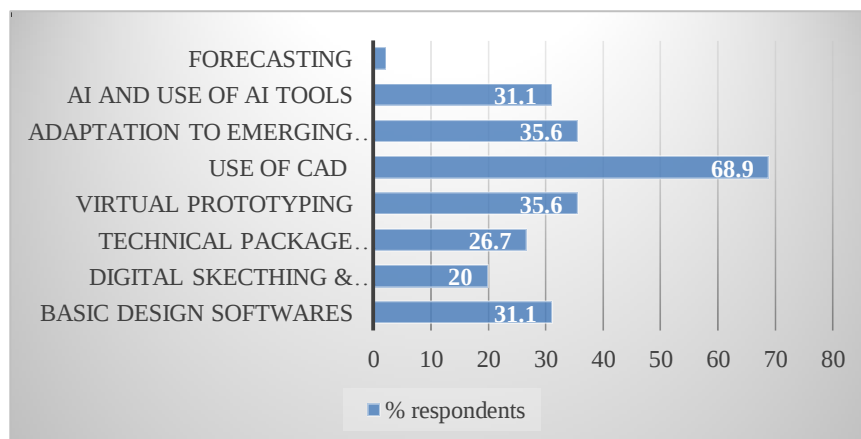
Industry ready professionals- respondents: The data revealed that 100% respondents were working in design department of the manufacturing setup. 45.7% worked in design house, 21.7% in export house, 19.6% with a domestic brand manufacturer and remaining 13% in a start-up unit. As a designer, one is expected to perform various tasks. Table 1 displays a list of 12 tasks that are performed in a design department and students were asked to select whether a particular task required manual skill, digital skill or a combination of both.

Table 1: task- skill requirement in design department

Manual skill	Digital skill	Both manual & digital
Material/ fabric board (39.1)	Trend study, interpretation (56.5)	Ideation & mind mapping
Material sourcing (52.1)	Technical drawing with rendering (47.8)	Design development (45.6)
Swatch/ sample development (60.8)	CAD-CAM (34.7)	Initial sketching (36.9)
Product development (52.1)	Virtual prototyping (36.9)	
Sampling (63.0)		

From Table 1, it is evident that *swatch development, product development and sampling* require manual skills- involving cutting, stitching, finishing, ornamentation. 56.5% mentioned that *Trend study and interpretation* required digital skills as most companies use digital formats of trend and forecasting agencies like WGSN, Promostyl, Peclars Paris, Pantone etc. CAD-CAM (45.6%), virtual prototyping and technical drawing required digital skills and knowledge. 54.3% respondents stated that ideation and mapping required use of manual and digital skills as it involves digital research and analysis to define a concept for designing. It was followed by design development process (45.6%) which requires a designer to create inspiration and theme boards, research on look/ silhouette boards, research on latest value addition techniques and prepare surface ornamentation looks. Creating a colour board that matches pantone shade is also a digital process to be followed.

Graph 1: % respondents experiencing digital skill gaps



The data further reflects that 73.9% respondents faced digital skills gap. Graph 1 reflects that 68.9% faced maximum digital skill gap in ‘*use of CAD*’ followed by ‘*virtual prototyping* (35.6%)’, ‘*adaptation to emerging technologies*’ (35.6%) and finally ‘*application of basic design software*’ along with *AI and use of AI tools*.

A close look into the curriculum indicated that CAD, virtual prototyping, AI and use of AI was missing in the Fashion Design curriculum. CLO 3-D had been introduced in the curriculum in third year of study but a one-day online workshop was conducted to give an overview about CLO 3-D. None of the subjects’ content or expert inputs were suggested to provide knowledge about AI and other emerging technologies. Thus, students faced major digital technological gap upon joining the industry and perform their assigned functions.

The data further revealed students understanding of digital disruptions and three themes emerged from the viewpoints:

Table 2: Opinion on what digital disruption implies

EMERGED THEMES		
TRANSFORMATION	DIGITAL CAPABILITIES	Post COVID-19 SURVIVAL
• Advancement/change of technology • Emerging technologies • Technological innovation • Digital fashion, metaverse, social media • Sizeable change in operations • Gen AI takeover	• Use of AI • Changing skill expectations • Digital design development • Social media marketing • Experimentation • Creating art vision into exact reality • Enhancing digital skills as per industry requirement	• Challenging established business models • Increased online presence • Value network • Elevating user experience • Old methods becoming irrelevant

Transformation is indicative of the changes happening in the business environment due to technological advancements and emerging technologies. Since 73.9% respondents faced digital skill gaps, it is evident that the curriculum is lacking in the delivery of necessary digital skills. Use of terms like digital fashion, metaverse, Gen AI, emerging technologies shows respondents’ awareness of changes.

Digital Capabilities is based on students’ experience of not being able to fulfil tasks due to lack of digital skills and knowledge. The theme emerged as students felt the need for building newer skills, industry expectations due to adoption of technological developments, power of AI, massive use of digital interaction to create innovative and indulging user experience. In other words, students felt that the skills and knowledge gained through the curriculum was insufficient and could not harness their skills as per industry expectations.

Post COVID-19 survival brought companies and customers close due to digital modes of buying, research, interaction, feedback besides financial transactions. Companies focused on lay-offs and only people with best skills who added value to the organization survived. Lesser business and transformation to the digital world brought disruption in the existing traditional business model. The analysis further revealed that 75.6% respondents considered digital disruptions as the major cause of digital skill gaps experienced by them. Evolving landscape of AI and other digital-technological innovations in response to beat the disturbances caused by digital disruptions have laid emphasis on the evolving skill requirement among the graduating students. 91.1% agreed that digital disruptions are reshaping the operational landscape for the fashion designers.

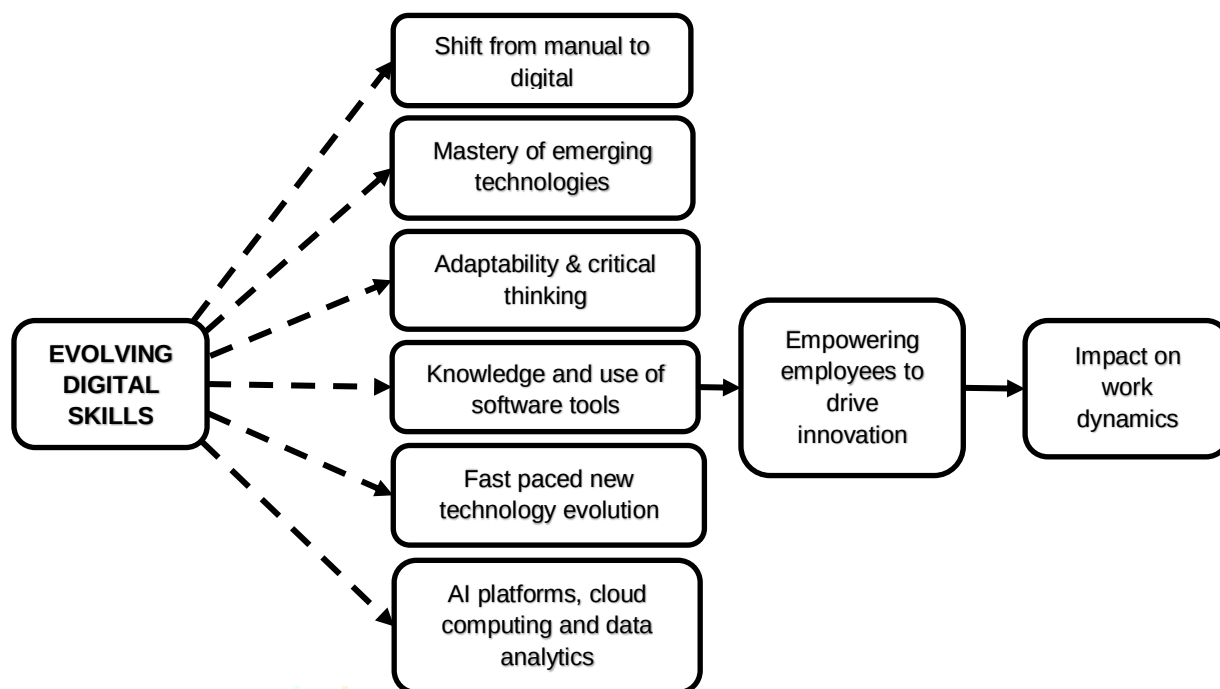


Fig.2: Evolving digital skill sets

Digital skills are pivotal and the fashion industry has preferred it along with the traditional skills. Only 31.1% respondents were satisfied with the curriculum taught and considered that they learnt necessary skills to work in the industry. These were small scale manufacturing companies employing traditional methods and depended upon traditional skill. In contrast, 68.9% were dissatisfied with the curriculum. These respondents had the opportunity to work in export houses, domestic brands with large scale production. 60% respondents conveyed that industry exposure in the curriculum was highly limited. Expert sessions and industry visit was conducted only for topics where it was defined in curriculum. 8 weeks internship period at the end of third year was moderately fruitful. Also, students lack skills and knowledge to perform in the industry, therefore, it takes time for them to unlearn and relearn as per industry requirements. 55.6% respondents found major subjects lacking in digital inputs. These included draping, pattern making, garment construction, fabric knowledge, surface ornamentation and history of fashion. Although most courses required learning manual skills but digital skills could be enhanced by incorporation of CAD software like tukaCAD, Lectra, CLO 3-D etc. Learning to use such software will enhance digital skills along with the manual skills. Several global enterprises and academic institutions are using CLO 3-D. Similarly, Tuka software, used widely in 42 countries, has replaced more than 20,000 competitive systems in apparel industry (TUKATECH INC.,2020). Students need to be taught what is relevant and adopted by industry. 84.4% of the respondents opined that coding and algorithm design inputs, ML, Cloud computing, specific to a fashion designers' role, should also be introduced at a basic level in modular format in the degree course. Although a designer may not be fully involved in coding and algorithm design but basic understanding is a must.

Table 3 enlists the various AI tools used by respondents as industry expected them to know the use and purpose of these tools. 84.4% respondents highlighted that they learnt the use of Gen AI tools by self-practice.

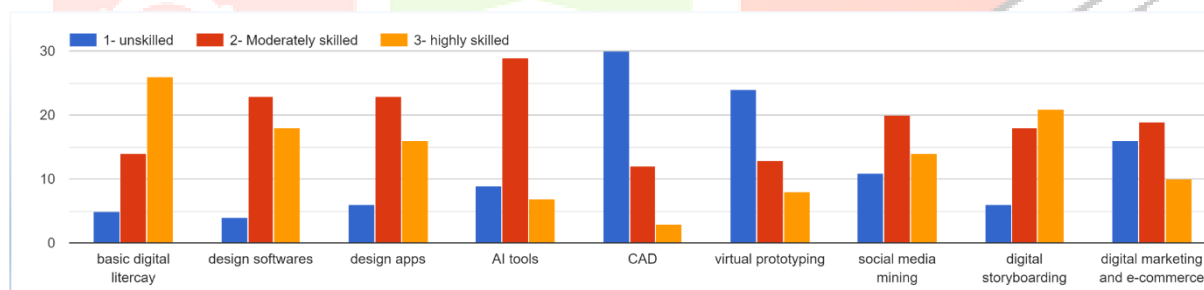
Table 3: AI tools/ apps used by respondents

AI tool used by student respondents		
Bard AI	Magic studio	Mockplus
colors.com	Runway ML	Chat GPT
Uizard	IBM Watson Studio	Stylumia
Midjourney/DALL-E 2	Adobe Sensei	Notion AI

Global brands/ companies such as Zara, H&M, MemoMi, Burberry, LVMH, Adidas, Nike, Farfetch, Carlings and several others have embraced the latest technology and digital platforms for greater reach, personalized user experience, smart production, transparency and traceability. Globally acclaimed fashion designers like Iris Van Harpen, Incorporation of Smart Mirrors, social haring, virtual try-ons, maintaining 3-D digital assets for every garment, image search, tagging, image processing and transformation, trend prediction, adversarial additions and overlays, virtual style assistants, Gen AI, artificial creativity, sewing robots, size and fit recommendations, demand forecasting, inventory management, analyzing customer preferences, browsing history to suggest relevant products, to name a few are being used by fashion manufacturers and retailers globally. Business of Fashion (Bain, 2024) highlighted the role of AI as an element of succession planning where Norma Kamali, 78, is closely working with AI focused agency Maison Meta to create prompts based on her creative DNA to generate new designs. This way her legacy will continue as hired designers will be able to continue working on her design aesthetics when she is no more. Using AI to understand past collections is being explored by designers Hillary Taymour and Julius Juul to generate new collections. Case Study entitled '*The Complete Playbook for Generative AI in Fashion*' by Bain in 2023 highlights on different approaches for the designers while developing ideas for clothing line using tools like DALLE-E API, Runway, Midjourney, Stable Diffusion etc. using prompts such as 'edgy' or 'minimalist' or detailed description of the garment look required. Creating visual content (Midjourney), writing content (jasper and Copy.ai, hypotenuse), shopping and customer service (ShopWithAI, KNXT, chatbots) are well embedded in fashion. It is expected that by 2026, the application of AI will grow to \$ 98.5 billion, hence new skill sets will be needed.

. Although 46.7% respondents felt that digital disruptions have redesigned the job role of a fashion designer, thus, impacting on the employability status. It was surprising to note that 48.9% were not sure whether there was any impact on the employability status. It is quite possible that these 48.9% respondents had work exposure in a company that was functioning on a small scale, focused on traditional skills, did not invest in technological upgradation, catered a specific market, produced and marketed staple products to reduce business risk, and employed small team. 88.9% respondents believed that AI can partially replace the role of a fashion designer but reduce manual tasks (BOF,2023).

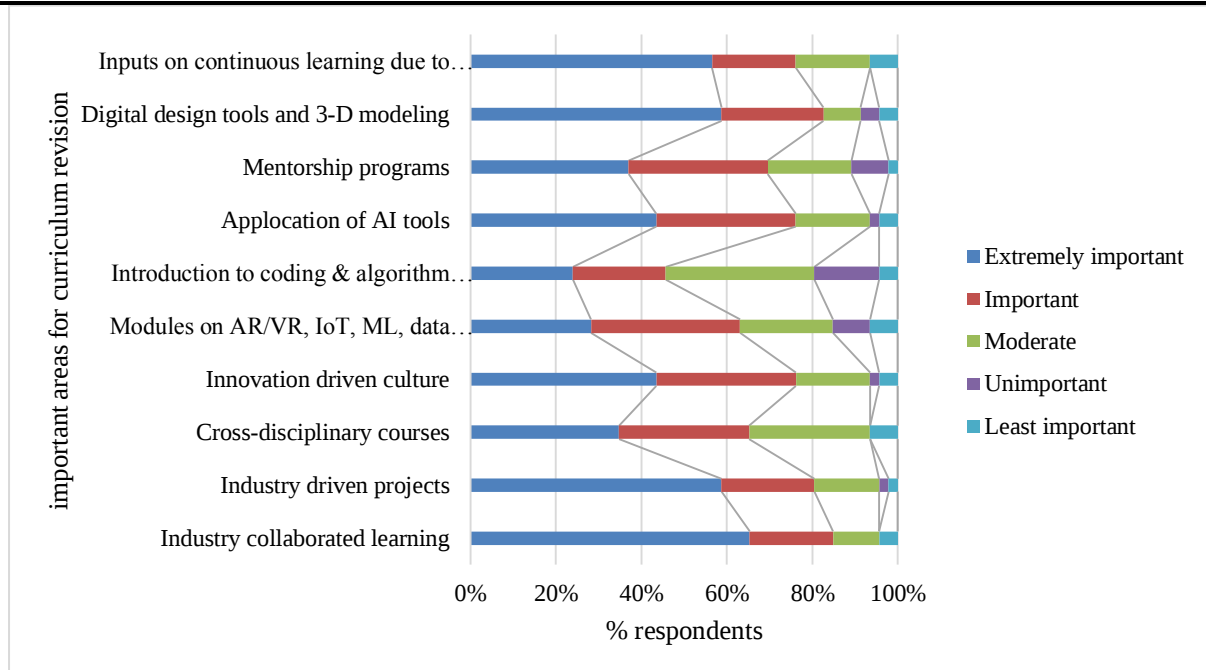
From Graph 2, reflects that respondent considered themselves as 'unskilled' in use of CAD, virtual prototyping and digital marketing & e-commerce. Many respondents were handling social media communication and content creation for company's website.



Graph 2: Level of proficiency in digital skills

Since respondents had worked using AI tools through self-practice, they were quite confident about the use of AI tools and considered themselves as 'moderately skilled'. Similarly, application of various design apps and software was also labelled as moderately skilled. Respondents considered themselves as highly skilled in basic digital literacy and digital storyboarding. Findings reflect that the existing curriculum was inadequate in empowering with digital skill sets. The need for revision in the existing curriculum as per industry needs was emphasized.

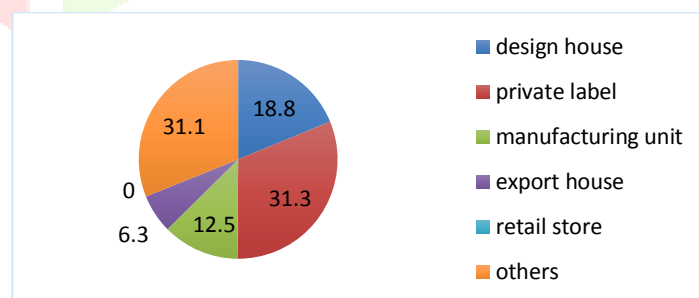
Industry collaborated learning, industry driven projects, inputs on virtual prototyping and 3-d modeling followed by continuous learning due to emerging technologies and innovation driven culture were considered as '*extremely important*' areas to be either introduced or strongly implemented during teaching. Modules on AR/VR, IoT, ML, data mining and analytics followed by application of AI tools and mentorship programs was rated as '*important*' for strengthening the curriculum.



Graph 3: Importance of factors for strengthening of curriculum

From the analysis, it is apparent that the respondents experienced digital skill gap while performing the role of an assistant fashion designer or a fashion designer in their daily chores in the industry. The current operational scenario in a fashion manufacturing setup requires digital skills along with technological know-how. Digital disruptions in past few years have further worsened the employability status as the curriculum has not kept pace with the skill requirements of the industry. Use of Gen AI tools, ML, AR/VR, IoT, cloud computing, data mining, big data have further worsened the scenario as institutions have not responded fairly to the changing skill requirement and work dynamics.

Industry-academia respondents: This set of respondents comprises of visiting faculty members in the institute who are otherwise working in industry or have their own studios or manufacturing setup. Graph 4 represents that 31.3% respondents work in a private label or own the label. 18.8% respondents work in a design studio either as designer or own the design studio followed by 12.5% respondents working in a manufacturing unit (large scale company). While 6.3% work in an export house remaining 31.3% respondents had a varied professional background such as being only a visiting faculty, small business, R&D for handloom weavers and academicians. Among these profiles, 43.8% were owners of the business organization. Since the respondents possessed both industry and academia exposure, their industry experience ranged between 10- 39 years and academic experience between 5-15 years.



Graph 4: Professional background of respondent

The bipolar adjectives in semantic differential scale (SD) allowed the researcher to study the perceptions of the industry-academia respondents on digital skills, digital skills gap in curriculum and relevance of curriculum in digital disruption era. It allows for greater autonomy in expressing opinion about a question or statement and provides more accurate data of respondent's attitude.

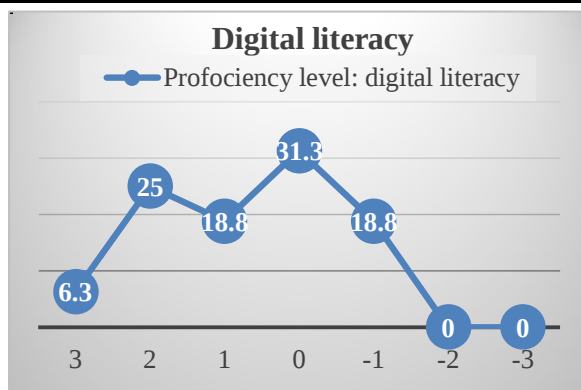


Fig.: 5.1

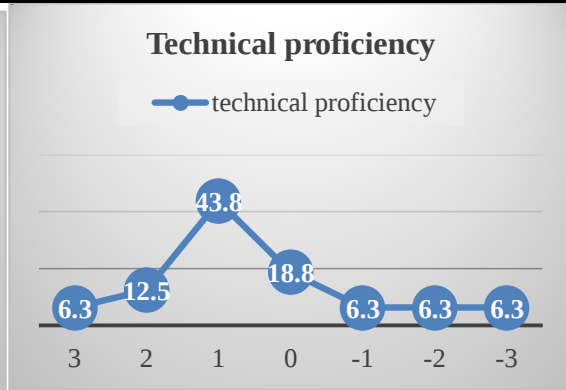
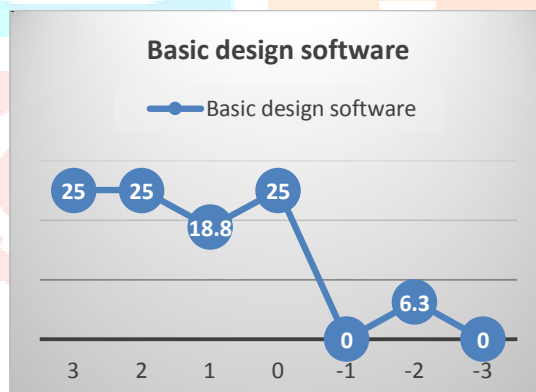


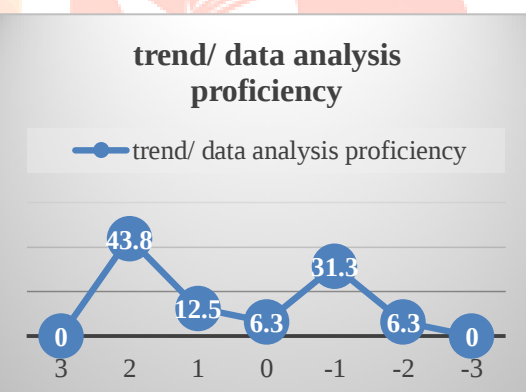
Fig.: 5.2

Figures 5.1 to 5.12 illustrates the average scores across 16 questions for each construct across the seven-point SD scale. The scores revealed that the constructs more strongly associated with digital literacy, technical proficiency, basic design software, trend/data analysis, innovative thinking skills, and digital communication proficiency. It explains that students possessed these skills and were able to utilize these skills to work on various tasks as assigned by the company in day to day working.

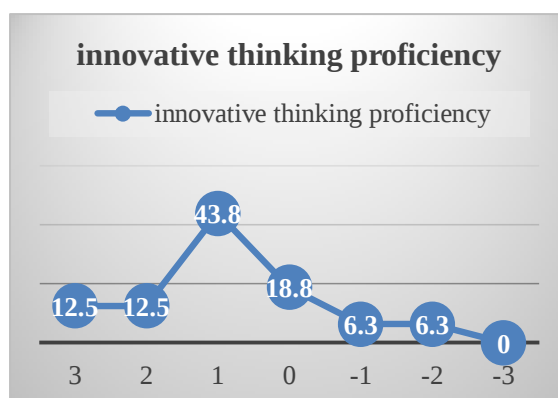
On the contrary, the data was negatively skewed and showed lack of skills in the areas such as awareness and use of AI in fashion industry, inclination to learn the application of AI tools and the ability to handle company's social media handles. All these areas required good grasp and understanding of tools and their application. Balanced data also revealed that academia-industry respondents considered that students with exposure in industry working have awareness of latest technological developments like blockchain technology, CLO-3D, digital printing etc as they have heard such terms during classroom discussion, practiced trial versions of CAD software, watched YouTube videos and blogs on emerging technological developments.



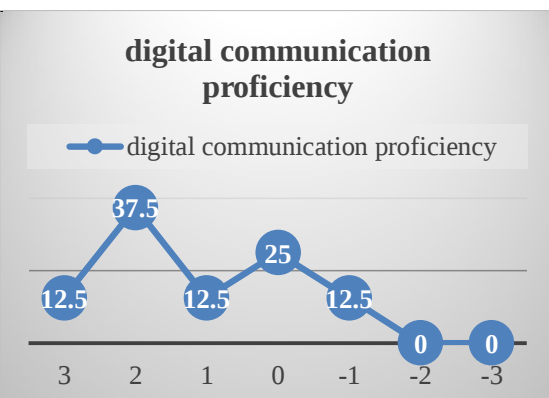
Graph: 5.3



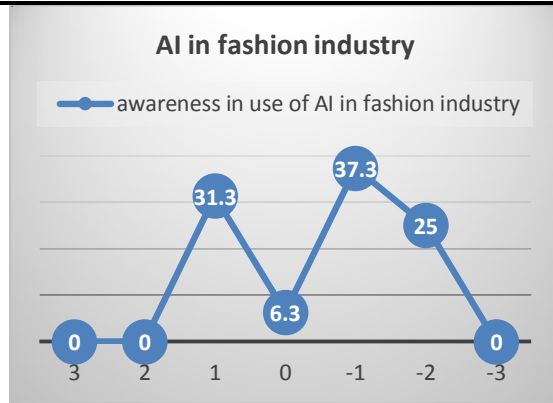
Graph: 5.4



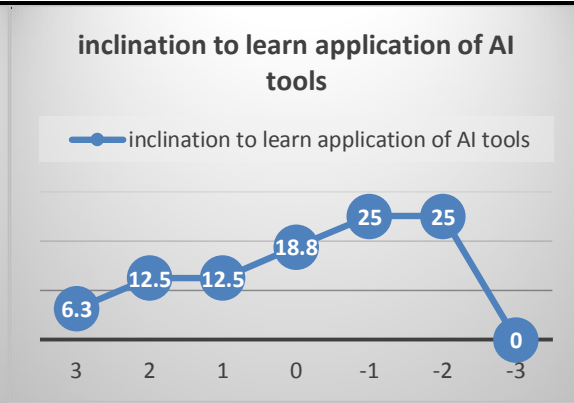
Graph: 5.5



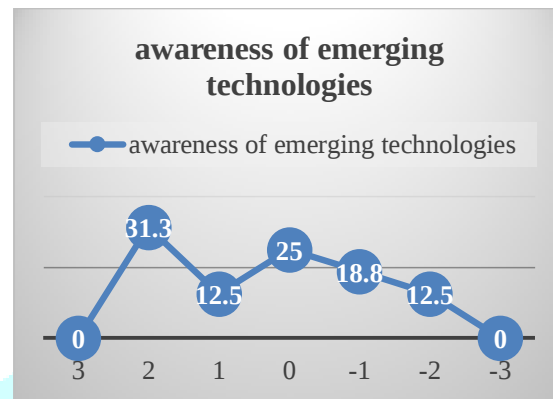
Graph: 5.6



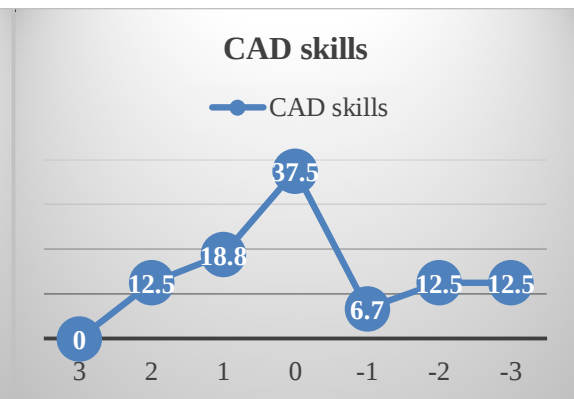
Graph: 5.7



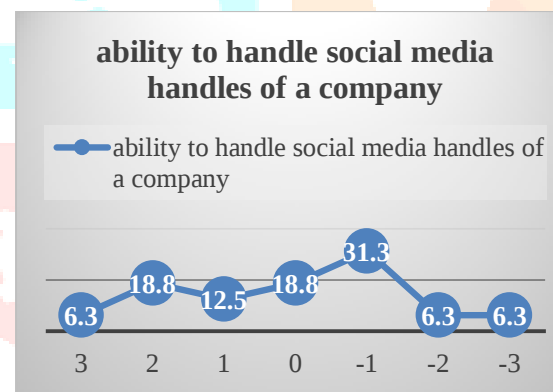
Graph: 5.8



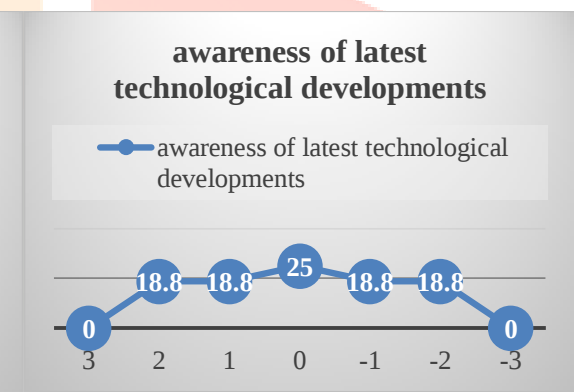
Graph: 5.9



Graph: 5.10



Graph: 5.11



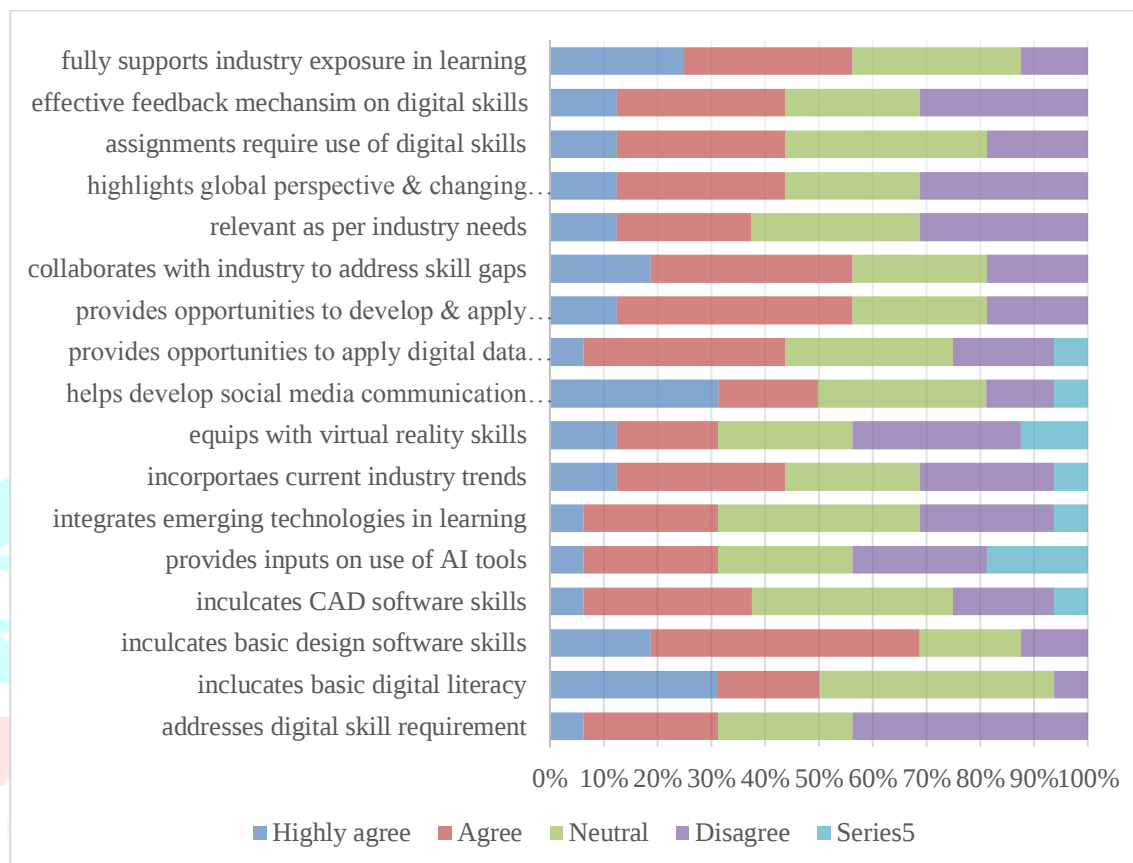
Graph: 5.12

According to 93.3% respondents, digital disruptions are reshaping the operational landscape for designers and therefore, ignorance, poor skillsets, resistance to learn, low interest, as evident from above graphs, makes them unsuitable to work in the transforming fashion industry.

The opinions of respondents were sought using a 5-point Likert scale on the existing curriculum to identify the areas of shortfalls that require revision. 50% respondents opined that coding and algorithm design should be part of the curriculum. The respondents stated that although students are not from technical background still, they need to have knowledge about coding and algorithms to understand and apply the digital skills that are related to AI, ML, IoT, big data and analysis, AR/ VR and other emerging digital and technical developments. 75% respondents agreed that the digital disruptions have reshaped the job role of a fashion designer and today's designer must have proven digital skills and competencies to survive and grow. 81.3% mentioned that these digital disruptions have made an impact on the employability of a candidate and it becomes essential to understand the necessity of upskilling themselves with right set of digital skills. Although, 12.5% respondents opined that AI can replace a fashion designer's role fully, 43.8% do not agree while remaining 43.8% are not sure whether AI can replace a fashion designer in the industry. The areas where AI can replace designers were specified as concept sketching, explorations, analysis, sourcing and presentation, concept writing, data mining, risk management, scenario prediction, design, forecasting and production, styling, documentation, research, and design process.

Graph 6 revealed that respondents highly agree that the curriculum inculcates basic digital literacy (31.3%) and social media communication skills (31.3%). Similarly, 50% respondents agreed that students get trained in basic design software application and possess good skills in CorelDraw, Adobe photoshop, illustrator, InDesign but skills in CAD software use and application lacks. 43.8% respondents disagree that the curriculum addresses digital skill requirements of today's work environment.

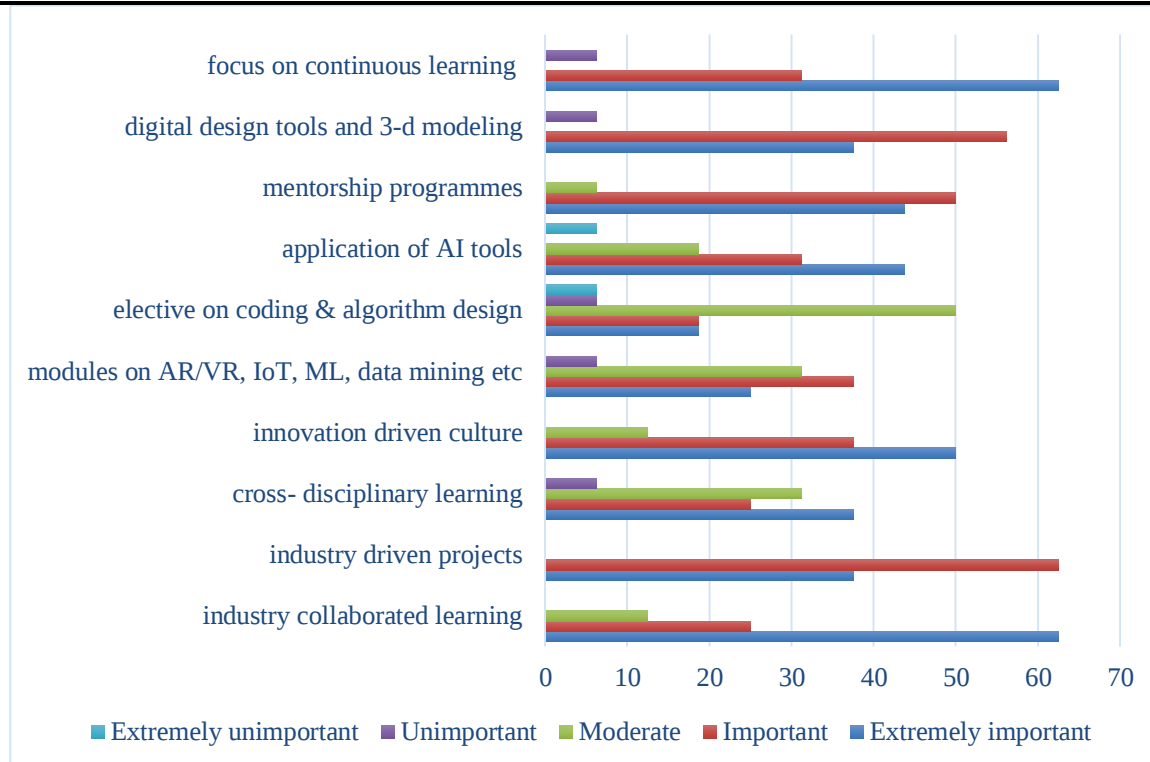
Majority of the respondents disagreed to the fact that curriculum provides sufficient inputs on the use of AI in fashion industry. 43.8% respondents also agreed that the curriculum provides ample opportunities to develop and apply digital skills through classroom exercises and assignments. 37.5% agreed that curriculum has sufficient opportunities to collaborate with industry to address the skill gaps but it is being under-utilized.



Graph 6: Perceptions about the curriculum on digital skills component

Disagreement was also revealed in effective feedback mechanism on digital skills (31.3%), is not relevant as per industry needs (31.3%), equips with virtual reality skills (31.3%) and offering global perspective on digital skills and changing work dynamics (31.3%). Thus, looking at the level of agreement and disagreement, respondents' perceptions were taken on topics that are extremely important to be considered when revising the curriculum. It was found that continuous learning (62.5%), innovation driven culture (50%), inputs on application of AI tools (43.7%) and mentorship programs (43.7%) were considered extremely important. Learning to apply digital design tools and 3-d modeling (56.2%) and mentorship programs (50%), modules on AR/VR, IoT, ML, data mining etc. (37.5%) were considered as "important" areas for consideration.

Industry collaborated learning, focus on continuous learning matches with student respondents' opinion as *extremely important* for curriculum revision. Industry-academia respondents consider innovation driven culture whereas student respondents highlighted industry driven projects and application of digital design tools and 3-d modeling to be added in curriculum.



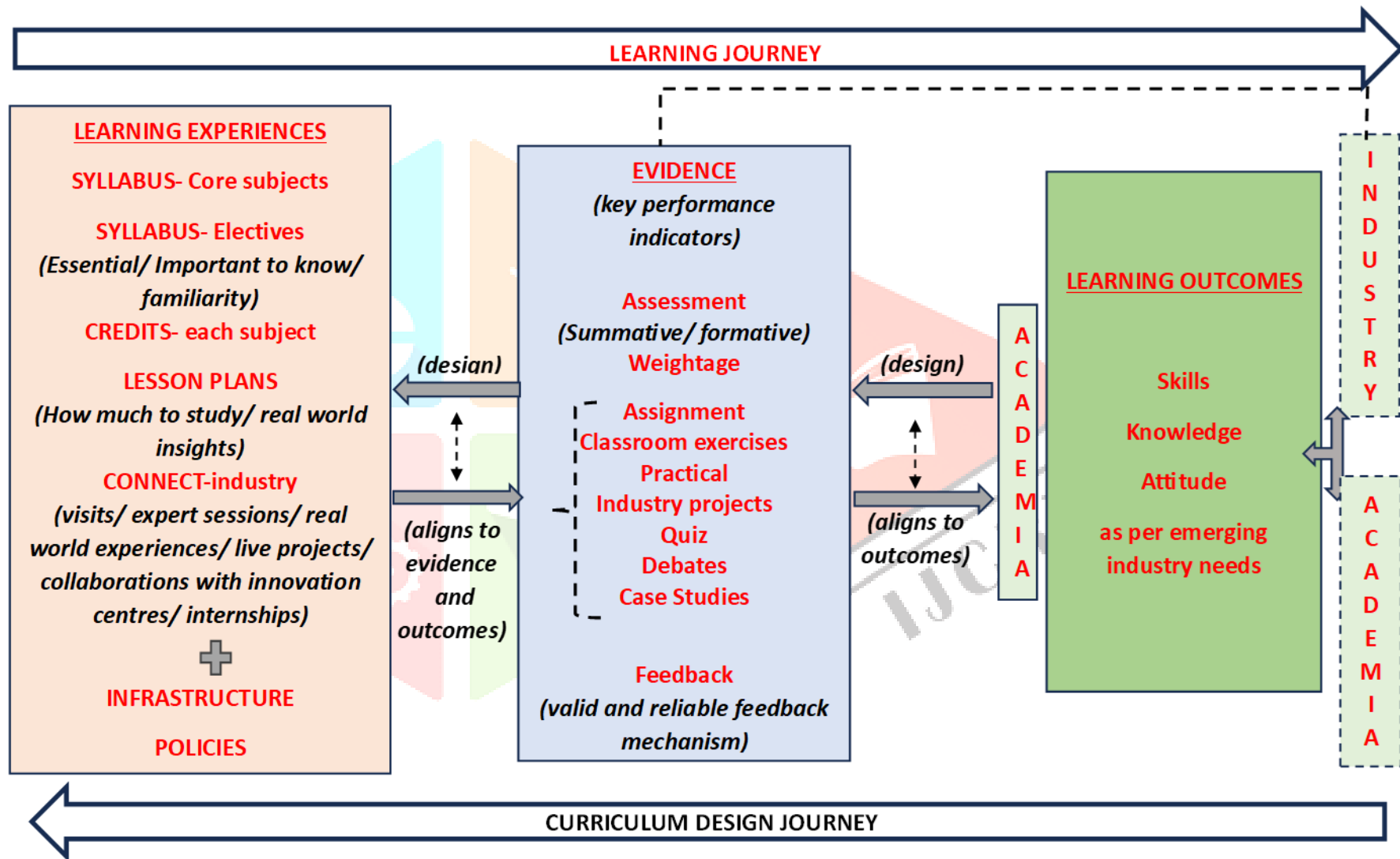
Graph 7: Important areas for curriculum revision

Proposed curriculum framework: Based on the empirical study findings, a curriculum development framework based on ‘Backward approach’ is suggested in Figure 3. The process begins with collaborative thinking by industry and academic to define learning outcomes based on emerging industry needs due to digital and technical innovations. It aims at identifying skills, knowledge and attitude needed from an industry ready professional. New set of skills being introduced need to be based on emerging areas and technological advancements driven by digital culture in the industry. Identifying an appropriate combination of vocational, technical and digital skills has become the need. Industry can guide academia in identifying the required skills sets and knowledge for existing and emerging job roles. Use and application of digital skills in AI, big data, data analysis, AR/VR, IoT, prompt design for best result output, 3-D modeling, AI driven apps and software usage needs to be added in the curriculum. Besides major courses, a list of elective courses should be introduced as per latest technological developments. Institutes like LCF and Parsons School of Design are offering elective courses to students to develop understanding and gain exposure in the use of AI. An undergraduate student, Imogen Hawkes, at NTU has worked on developing knitwear collection using Midjourney.

Academia then starts defining authentic evidence in terms of kinds and number of assessments, weightage for each assessment with evaluation criteria, inquiry-based student-centered learning activities, followed by reliable and valid feedback mechanism. At this stage, feedback on evidence can be taken from academia-industry panel that defined learning outcomes. Once approved, academia begins with detailing the syllabus for each course focusing on essential, important to know and familiarity component of each course. Credits are allotted and lesson plans are detailed with due emphasis on industry connect. Infrastructural requirements are re-looked and policies that support learning are adopted.

Although Industry connect forms an integral part of every institute, but short visits and 2-3 hour expert sessions seem insufficient. Instead, a 1-week module, strongly backed by industry, should be included in third year of study the way industry internships are conducted at the end of third year. This module will enable students to get exposure to the emerging and changing role of designer through the understanding and application of digital skills currently in use in the industry and how to strengthen their knowledge and skills by getting hands-on-experience under industry guidance. In this module, academia can invite industry experts from various fashion allied sectors- export, retail, back-end operations, merchandising, design, social media departments to provide necessary inputs. This way it will not be a burden on industry also as 1 day in a year can be devoted to imparting such knowledge in supporting institutional efforts of graduating well trained manpower. Assessment of same can be conducted as a practical examination along with term end examination and Quiz and classroom exercises while the module is on-going. The result of module will highlight the areas that the student needs to focus upon to be successfully employed in a fashion industry. Thus, in a 4-year fashion design programme that imbibes vocational technical skills and knowledge, addition of digital skills mandatory module can help reduce digital skills and knowledge gap.

Figure 3: Proposed Curriculum framework based on Backward Design approach



CONCLUSION: Research findings convey that digital and technological skill gaps exist in curriculum that impact students' employability and performance. Digital disruptions coupled with growth and adoption of AI in the fashion industry has further widened the skills gap. Study highlights the need to restructure to the curriculum and incorporate the findings as per Graph 7. Spang (2014) also stressed on the need to align curriculum with employers' real-time needs. It is also a fact that restructuring of curriculum is a long process but a provision should be made in the curriculum where short modules can be introduced and taught as per changing industry environment. The proposed model allows to work in backward direction so that learning outcomes defined can be achieved through proper and detailed planning of the curriculum. The study is preliminary and would be conducted with bigger sample size.

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