

An Inquiry into the Teaching of Artificial Intelligence to Undergraduate Management

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ABSTRACT

The Indian Prime Minister Narendra Modi has pushed for the adoption of Artificial Intelligence to steer India out of poverty and into the category of developed nations. This is a paradigm shift in the education system for a developing country in the Global South. The United Nations (UN) charter outlines “Sustainable Development Goal” (SDG) 4 as the right to quality education and “Sustainable Development Goal” (SDG) 8 as the right to decent work and economic growth. In today’s world as Artificial Intelligence (AI) has applications in every field, it should be taught to all students irrespective of geography. This will enable graduating students to get quality education which will lead to decent work. As India gears up to be a strong player in the world, it is fitting that the education system should examine newer ways to deliver and to engage students. It is only when the young are familiar with the latest technology that the country will prosper. While AI has been taught in various engineering courses, there is a strong need to teach it in business schools at the graduate and post graduate levels. Although, AI is useful to all areas it is of immediate relevance to the Business world, and hence to students of Business. Business students typically look at the application part of AI along with the tools needed for the same. Hence, the method of teaching AI to Business management students is different from that of engineering students. Various studies have said that Statistics and AI are strongly connected and that statistics led to the development of AI (Marzban 2009; Säfken and Rügamer 2024). Hence, in order to teach AI, one should know how to teach Statistics. This paper examines articles from various sources through a systematic literature review (SLR). The techniques of Latent Dirichlet allocation (LDA) and Sentiment analysis are used to examine perceptions and trends for the same through topic modelling. The programming software R is used. This paper is important as the methods outlined in the paper can be used to teach AI to Business students and can be extended to students of Social Sciences as well.

Keywords: Artificial Intelligence, Statistics, Teaching, Learning, LDA, Sentiment Analysis, SDG 4, SDG 8

INTRODUCTION

The United Nations in 2019 had defined 17 Sustainable Development Goals (SDG’s) as a blueprint leading to a sustainable future for the earth(UN 2019). SDG 4 is about the “right to quality education” for all of earth’s inhabitants and SDG 8 is “to promote decent work and economic growth for all”. If the two are taken together it translates to Education leading to employability and a good life. In today’s world there is a lot of discussion on AI and there is a growing appreciation of the applications of Artificial Intelligence (AI). But what is AI ? AI is a technology that teaches computers to think like human beings by finding patterns in huge amount of data. The human population uses the internet to socialize, shop, communicate, find solutions, get information, conduct financial transactions, make payments etc., thereby generating vast swathes of data. Information, thus mined, can

be used to predict what a customer will desire and thus can be very useful for businesses. It is useful to users of the Internet as it feeds customized content to each user, based on their interest and search history. AI can have conversations, make videos and images and also generate music. However, the downside is that it is very costly in terms of the electricity consumed and more alarming is the fact that it can use the information gathered for morally repugnant issues – it can lead to fake news, false propaganda, sway elections or reproduce inherent biases like racism or sexism (McCallum et al., 2024).

The emergence of AI has changed the demands on management education (Diamant 2024). A recent report in the Times of India states that the CEO hiring pattern has changed. There is now a demand for candidates with skills in strategy and Artificial Intelligence (Mukherjee 2024). The change has happened due to the technological changes brought about by the applications of AI in business. Another report says that hiring of professionals in AI has increased manifold (TOI Business Desk, 2023). Yet another report says that there is demand for AI across Management functions with 40 % of management students selecting AI as part of their curriculum (Gohain 2024). This brings to the fore that there is a strong need to bring AI in to the business management courses.

Prime Minister Modi of India is a firm believer in the employment of AI, especially to key sectors like healthcare, agriculture, and sustainable cities. He commended the establishment of three AI Centres of Excellence (CoE) in key sectors such as healthcare, agriculture, and sustainable cities in March 2024. These CoEs among other initiatives are set to drive innovation, boost productivity, and enhance quality of life through cutting-edge AI solutions (World News 2024). Adding to this initiative is India's Union Budget for the year 2025 which paves the way to an AI based Future by announcing the establishment of a "Centre of Excellence (CoE)" in AI in the education sector, worth ₹500 crore (Radhakrishnan Vignesh et al. 2025).

India is a developing country that aspires to reach the status of a developed nation. This can only happen through a good education leading to a good job and a good life. For this, the young need to be educated on all facets of AI. While AI has been taught in various engineering courses, there is a strong need to teach it in business schools at the graduate and post graduate levels. Business students typically look at the application part of AI along with the tools needed for the same. Hence, the method of teaching AI to business management students is different from that of engineering students. Various studies have said that Statistics and AI are strongly connected and that statistics led to the development of AI (Marzban 2009; Zakaria 2023; Säfken and Rügamer 2024). Early data scientists used structured data in the form of tables, conducted analysis and then interpreted the results. These datasets were comparatively small and a calculator and subsequently a computer with some amount of power could be used to conduct the analysis. With the advent of the Internet the amount of data generated as structured data, unstructured data, audio and video files, tweets etc. is phenomenal. AI is the simulation of human intelligence in machines that are programmed to reason and behave like humans based on the mined data it has been fed. The goal of AI is to create intelligent machines that can mimic tasks that humans do like recognizing speech, image, and text, understanding natural language, playing games, and also driving. Statistics deals with the collection, analysis, interpretation, presentation, and organization of data and statistical methods are used to analyze, interpret and make inferences about populations with knowledge gleaned from samples (Legacy et al. 2024). The statistical tools majorly used in AI such as Regression, Bayesian inferences, Natural language programming (NLP), machine learning algorithms etc. help AI systems make inferences from data (Martha and Priya 2022). Artificial intelligence as a tool has great potential in data science as AI shortens the gap between production of data and interpretation of data into actionable insights. It has vast applications in computer vision, Natural Language Processing (NLP), machine learning, decision making, etc. Hence, in order to teach AI, one should know how to teach data science or Statistics as the underpinnings of these advancements in AI are deeply rooted in statistical theories and practices (Friedrich et al. 2022). They have provided some of the foundational frameworks upon which many AI algorithms are built (Säfken and Rügamer 2024). In today's time when the production and application of AI tools is present in every field, it is important that the knowledge of it be available to all graduating students. As businesses need these insights fast, AI experts are needed (Kumar, 2020). This paper looks at ways in which AI can be taught to students with non technical backgrounds by conducting a study of previous literature.

Objective

The objective of this research is: To find ways to teach AI to business students.

METHODOLOGY

A Systematic Literature Review (SLR) was conducted using papers from the databases of SCOPUS and Web of Science (WoS). Part of the systematic literature review has been automated by using the programming language R. The first step was to hunt for the search terms using the package Litsearcher. The keywords used were "teaching artificial intelligence to business students". WoS was used to extract 445 useful papers and the main terms identified were as given below:

- Artificial
- Artificial intelligence
- Artificial intelligence AI
- Chatgpt
- Education
- Higher education
- Intelligence

The first three terms are based on artificial intelligence. Hence using the above terms, a further search was conducted on WoS and 500 papers were downloaded. Keeping in mind the learnings from previous readings which said that artificial intelligence is based on the concepts of business analytics and Statistics, the exercise was repeated 2 more times. For the first search the keywords used were “statistics education” and 499 records were extracted. For the second search the keywords used were “teaching business analytics” and 490 records were recovered. For the third search the keywords used were “teaching of artificial intelligence to business students” and 396 records were extracted. The three files were then merged and a dataset of 1363 records was realised. These were saved as a text file i.e. with the extension (.txt). The file was exported from the WoS database using the option “Plain text, Full record & Citation” and then run through the app Biblioshiny. The main information about the 1363 files is displayed in fig 1.

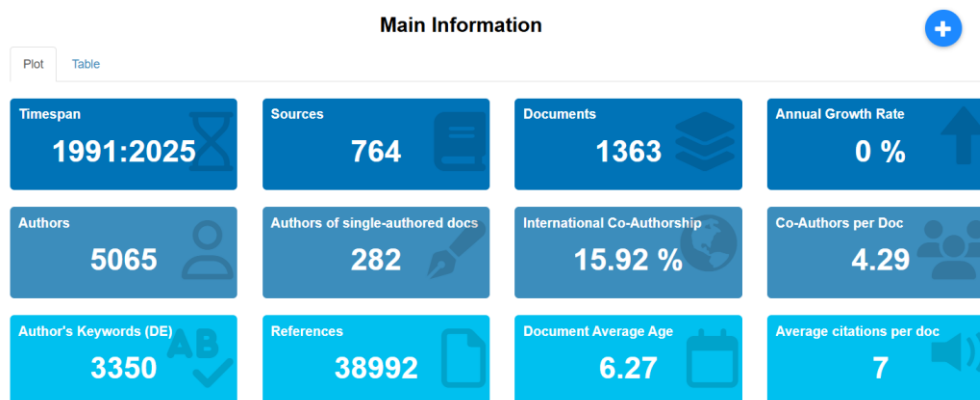


Figure 1: Main Information for the Dataset

The data used had 1363 journal papers from 764 sources through the years 1991 till 2025. The trend for the annual scientific production (Fig 2) is positive which is commensurate with the increasing interest in AI and is peaking for the year 2024. While the maximum number of papers are in 2024 it is expected that this would be overtaken in the year 2025, keeping in line with the trend so far. The most frequent words used in this database are “Artificial Intelligence”, “statistics education”, “learning analytics”, “data analytics” etc. These are shown in Fig 3. It is worthwhile to note that while the term “artificial intelligence” has shown up the maximum number of times, the terms following it are referring to statistics, business analytics, data science etc. leading us to the observation that machine learning, data science, statistics, AI are all in the same broad domain and methods that are used to teach these can be used to teach AI.

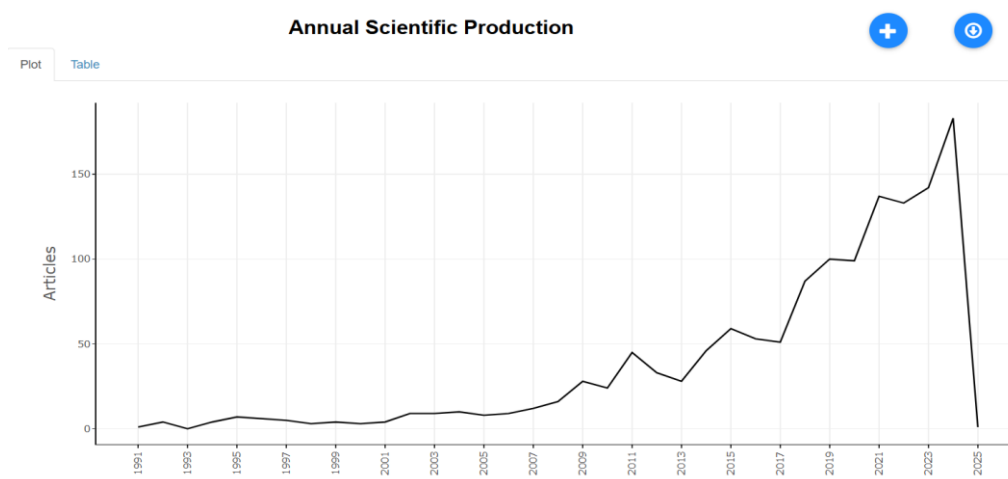


Figure 2: Trend of Annual Scientific Production



1. ldatuning
2. Topicmodels
3. Tidytext
4. Dplyr
5. Magrittr

Figure 7. Output of the LDA Analysis



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Difficulty”. The second column of terms mentions analytics, systems, data, skills, business, management, marketing etc. i.e terms that are connected to the work place, hence the second trend identified is “Application / Value of Studying AI / Industry Expectation”. The third column has terms like case, course, project, code, class, example etc. i.e terms connected to ways of teaching AI. Hence, the third term identified is “Education / Teaching Methodology”.

In order to give a clear understanding of the research process, it is shown as a flow chart. The flow chart of the Analysis is as given in figure 9

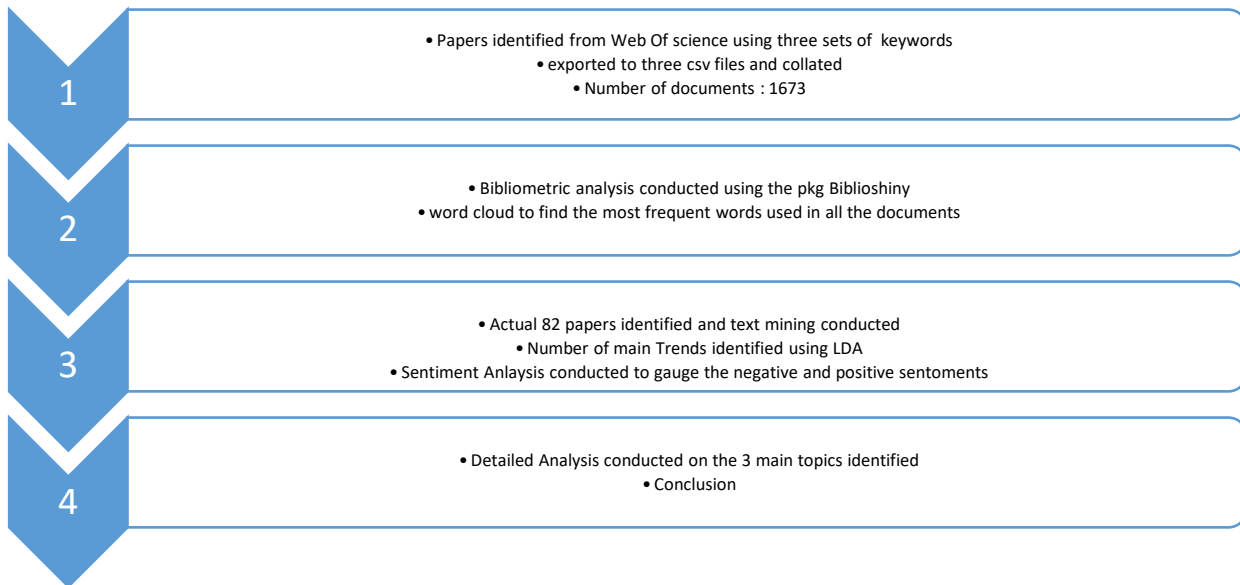


Figure 9. Procedure of the Research Process

Analysis

As the first inflection was at 3 the data can be grouped under 3 categories. Hence the trends identifies were as follows:

Anxiety Surrounding the Subject / Perceived Difficulty: Statistics induces anxiety among students (Perepiczka et al. 2011). There are a lot of negative perceptions about the subject as students feel that there is too much of Math in it (Salim et al. 2017). However, as the field of AI is expected to grow exponentially in the coming years, students will be taking courses that are aligned with Business Analytics and AI as it will lead to brighter career prospects (Dang et al. 2024). As business students realise the importance of getting a job that is related to Statistics such as jobs in AI, their attitude towards Statistics will become less negative (Chu 2025). While most studies say that male students are more positively inclined towards AI based subjects, the anxiety is irrespective of gender (Sophia Rusli & Zamri Khairani, 2022). A negative attitude stemming from previous non exposure to the subject further fuels the anxiety (Perepiczka et al. 2011). For students, where Statistics or Machine Learning or Artificial Intelligence is not their core subject, it is even more anxiety inducing (Rastpour & Amini, 2024). Some students also undergo computer anxiety (Miller and Pyper 2024), which would lead to even more aversion towards AI. A possible solution to remove anxiety could be the use of “no code” software like Power BI (Liu & Downing, 2024). Among business students the domain of Marketing is a popular one. However, most marketing students tend to avoid marketing analytics. On the other hand, business students who major in Finance or Operations are better inclined towards the study of Statistics (Witmer 2024).

Application / Value of Studying AI / Industry Expectation: In a short span of time the business landscape has changed rapidly due to the advent, advance and deployment of artificial intelligence, big computing, big data and correspondingly, robust machine learning techniques. Those businesses which start with using artificial intelligence early enjoy an advantage as they are able to execute their core competencies and strategies better than their competitors (Kumar 2020). As interest in AI grows the traditional analytics process which is discrete and typically relies on dashboards will make way for the more democratic use of data. Nowadays, dashboards are based on business questions which are set and pre-defined. Answering these questions requires accessing data, conducting analysis and getting insights which requires time (days or weeks) and technical skills from data scientists. As data continuously flows into organizations, AI will process these data in near real-time to provide increasingly accurate predictions, insights, and recommendations, thus lessening the dependence on human intervention

(Gramling and Rainer 2023). Data visualisations have helped in understanding data faster and communicating the same in an easy manner. The marriage of AI with data visualization will pave the way for dashboards that are dynamic, living, responsive tools that adapt to changing data landscapes (Hudiburgh and Garbinsky 2020). Bouyed by advances in big data analytics and quantum computing, AI has produced conversational and generative AI (CGAI / GenAI) and human-like chatbots that disrupt conventional operations and methods in different fields. While AI applications have been used in Operations Research and Decision Sciences since long recent advances have changed the name of the game (Akpan et al. 2024). Decision making while using Analytics has become better and faster (Dingus et al., 2024). AI can be used to answer customer queries through chatbots, create images, make music etc. which can reduce the dependence on humans and thus make more profits for businesses (McCallum et al. 2024). It can be of tremendous help in international trade as it can accelerate processes and make them more efficient; thus helping customers (Claudia Salazar-Rodríguez and Antonella 2024). AI will be a gamechanger in healthcare by having the potential to improve quality, access, and reduce cost of health care. The use of apps will greatly democratize the knowledge of healthcare issues and will also help doctors to diagnose illnesses faster (Wagner et al. 2025). The integration of AI-driven predictive analytics in nursing is revolutionizing patient care by anticipating the needs of customers and providing personalized healthcare (Kotp et al. 2025). The analysis of texts, tweets or comments can lead to decoding the users experience with various tourist locations or experiences (Miró and Luis Bustelo García 2024; Mou and Wang 2025). It can be used to pick trash, forecast salaries of students, suggest where to buy a house etc. (Gramling and Rainer 2023). The movement towards marketing mechanization and heavy reliance on artificial intelligence has resulted in a shift for marketing strategies and approaches. Using artificial intelligence has helped marketing managers' narrow their focus to other tasks. They can harness the knowledge gleaned through analysis of data to develop successful marketing campaigns, provide personalized customer experiences, and deploy effective strategies to reach target audiences (Bryant et al. 2024). Another area can be the use of AI in judicial systems wherein the basic work for research can be conducted by AI (Spalević et al. 2024). The use of AI is also focused on large scale implementations wrt water distribution, cyber security and telecommunication networks (Edozie et al. 2025; Taloma et al. 2025; Calzarossa et al. 2025). The use of AI has brought about significant changes in how business is conducted and so Industry expects students to be educated in the use of AI.

There is an emerging job known as AI influencers who talk about the useful AI applications in the market and try to separate the chaff from the wheat (Lochab 2025). These influencers take in all the above points and reinforce the usefulness of the AI products available in the market in bite sized content. This reemphasizes the need for students at the undergraduate and graduate level to be well versed in AI and its applications.

Education / Teaching Methodology: AI will not be easy to teach. The faculty incharge of teaching courses related to AI/BA will have to take the onus on making sure that the students complete the course (Nikiforidou et al. 2010a). Instructors should use the first class to disabuse the students of the notion that studying AI is code based and boring and change their attitudes. The faculty's involvement, style of teaching and a clear course design will lead to an interest in the subject and retention of students (Dang et al. 2024; Tsai 2024). The authors say that learning could be impacted by the style of the teacher or even the personality of the receiver. The authors argue the learning of the subject could be affected by learning styles, age, personality, mood, diverse environments, teaching tools and instruction (Garfield and Ben-Zvi 2014). While there have been many ways to teach a subject, Case studies have been found to have an edge as they deal with messy data, making it look genuine (Wright et al. 2024). In particular, the Open Cases on Github are recommended. Case studies bring the applications of AI in to the grasp of the user (Jacobs et al. 2024).

Another method for teaching could be active learning where students can be asked to talk about simple terms used in AI. For eg. A discussion on the meaning of "an average person" or a normal distribution" might lead to surprising answers from students and lead to discussions and hence higher engagement in class. Wang & Kai promote active learning for teaching data science (Wang and Cai 2024; Tsai 2024). In particular, they outline an activity in which students through group work are more engaged and their understanding of the algorithm via hands-on explorations is stronger.

Students' negative perceptions around statistics can be alleviated by introducing the "fun" element especially through the use of games. This is especially useful in online classes (Rastpour and Amini 2024). Another way to incorporate fun is to introduce "in real life" examples of smart watches, Netflix, photos on personal phones etc and encourage discussions on how Analytics is being used by these brands for marketing and business (Dingus et al. 2024). Another way to bring in the fun element is particularly through the use of games.

The learnings from emergency teaching during Covid 19 should be extended to hybrid and face to face teaching (Flores et al. 2024). Faculty should provide documentation, videos and reading material and constantly take feedback; so that students are engaged. For those who are learning online the content should focus more on exploring real-world applications, communication skills, developing reasoning, working on statistical software and

developing problem-solving skills (Mills 2015; Tsai 2024). Another line of thought is to remove the dependency on the topic of “probability” or just 5% of the course should be based on the same (Mocko et al. 2024). Faculty should use “mnemonics” to help students recall the rules of Statistical tools and then check if what they remember is what they can apply or explain (Witmer 2024).

Undergraduate business students should be introduced slowly to Analytics and thus AI (Carroll 2023). While there is high demand for business students who have technical and soft skills, these opportunities have to be communicated to them. Students need to be offered both ends of the spectrum – wherein, they should be offered suitable modules to develop soft skills and also incremental mathematical modelling educational experiences. As we use more and more of the internet through the mobile, we create more big data. This environment repositions the teaching of Statistics in line with the advances in AI. For that purpose professors and researchers who are conversant with Statistics and machine learning need to do a mental shift and start working with Big Data. (Figuerola and Perez 2017)

Software tools such as Tableau and Power BI allow users to create interactive and dynamic visualizations of data, making it easier to explore and analyse complex datasets (Chanthiran et al. 2024; Friedman and Beasley 2024). The authors describe how visualizing data in Tableau for the housing market in California made students appreciate that data needs to be cleaned and sorted before going in for visualizations and dashboards. Lesser & Santos recommend the method of discussion before introducing new topics in class (Lesser and Santos 2024).

A more holistic view is provided by (Kurtzke and Setkute 2021) who say that there are four nodes that educators need to consider. These are domain knowledge, soft skills, tools and technical skills (Kurtzke and Setkute 2021). While the paper predominantly addresses the need for a holistic education for Marketing Analytics students, the model outlined is of practical use to all Analytics and AI specialists. The authors present a model for students success in Marketing Analytics by adopting a model which incorporates four nodes – namely Technical skills (Data analysis, web analytics etc.), Knowledge (marketing, finance etc.), Tools (python, business intelligence tools) and soft skills (communication).

It is assumed that in today’s information-driven societies its dynamic citizens, are able to evaluate, interpret and communicate data (Nikiforidou et al. 2010b). This will happen only when instructors are flexible in terms of whom they teach and at what level, keeping in mind the different audiences. For educators to train students to make a living in AI the course has to made in a way that it entices the student. The course should move from a mathematical emphasis on computations to an ability to interpret, evaluate, and apply ideas to business or social scenarios.

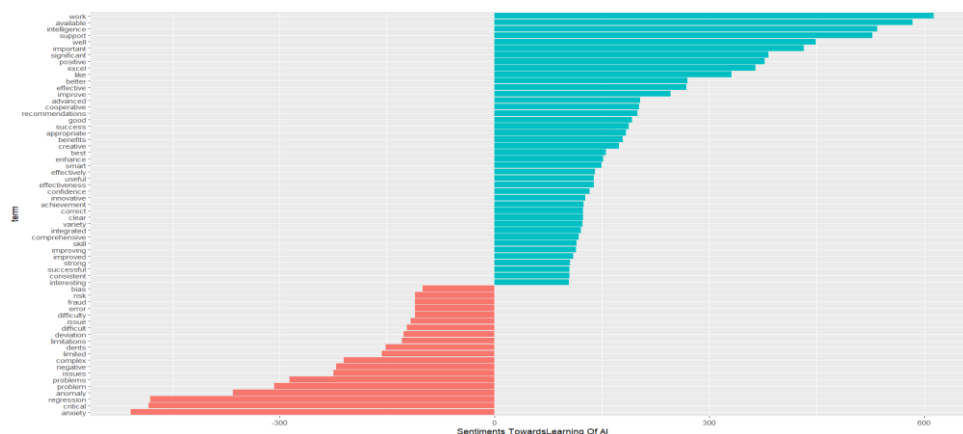


Figure 10: Output of the Sentiment Analysis

Sentiment Analysis: It is worthwhile to study the sentiment surrounding the teaching and learning of AI. Fig 10 gives a list of terms associated with the same. The bars on the right denote a positive sentiment and the bars on the left show a negative sentiment. It is heartening to note that the bars on the right outnumber the ones on the left, denoting that sentiment is more positive towards AI rather than negative. The bars on the right in figure 9 contain terms like “success”, “excel”, “achievement”, “good” etc. The bars on the left contain negative terms like “bias”, “fraud”, “error”, “anxiety” etc. This shows that while there is a lot of positive sentiment associated with AI, there is a need to be careful while deploying it.

CONCLUSION

In order to concretise a bright future for students, it is imperative that they be comfortable with AI and learn how to deploy it. There is anxiety around learning the subject and this can be reduced or removed by the instructor where the attitude of the instructor is of paramount importance. The instructor should be knowledgeable and

should be able to keep the students engaged. Instructors can employ various tools to make the classes engaging and ensure higher learning for students – these can be through the use of stories to explain ideas, case studies to bring in real life examples, long projects to help in removing statistical anxiety and exam anxiety, collaborative projects that will help in peer learning, exposure to working with real world datasets as relevant examples will be rich material for class discussions. They would benefit from learning on specialized software package in solving statistical problems. The education of AI should move from calculations based to inference based. Students should be made to interpret and critically evaluate information and discuss reactions. Students should be able to work on software like SPSS, Tableau, Excel etc.. Later papers prefer R, Python, Mongo DB etc. It is important to note that most papers advocated active learning and moving away from traditional classroom lectures. There have been experiments conducted in class and outside class which have been successful in keeping the student engaged. Retention through activities has been usually high as universities experiment with blended learning and experiential learning. Further, a successful student of AI should be proficient at the following four:

Domain Knowledge: A Marketing student should know the ins and outs of the subject, then at the applications of AI in it. Similarly, students of other business domains like Finance or Operations should know the building blocks and the latest happenings in their domains. Only then should they learn how AI can be integrated in their work and the advantage of using AI.

Technical Skills : Students should be conversant with basic statistical tools like Excel, SPSS, business intelligence tools like Tableau. Power BI or AI tools like Deep Seek, Chat GPT, SQL etc.

Communication Skills : Every worker should be able to explain themselves clearly. If students are good at AI but unable to translate their work to their superiors then there is no value to that work. Hence, communication skills should be taught at the college level itself. It is imperative to be able to share ideas and strategies in a simple way with everyone, especially with the decision makers.

Ethical Compliance: AI will soon be governed and it is important that all work related to it follow the guidelines. Hence, AI specialists should know the boundaries within which they work and obey them. This will save them from heartache later.

Proficiency in all four areas will lead to a demand for the student.

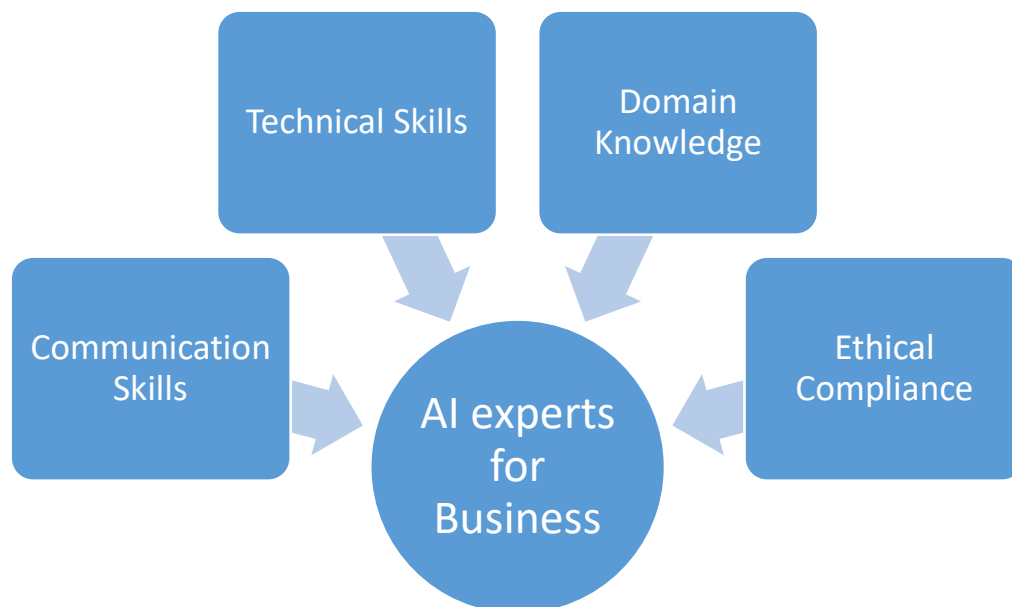


Figure 11. Skills Needed for AI Professionals

RECOMMENDATIONS

India has revamped its education policy to make it more relevant and offer students more flexibility under the National Education Policy (NEP) 2020. As India moves to integrating AI into all activities for the betterment of society this paper can be useful in the teaching and learning of AI, and in this way help in achieving SDG's 4 and 8. As the study points out that it is important to teach both theory and practice it might be a good idea to relook the NEP which guides institutions to offer 20% experiential. As the present study suggests that students learn more through active learning one suggestion is that at least 50% of the teaching should be experiential. This will increase engagement in class leading to higher attendance, better learning, better jobs and a better life.

Abbreviations Used:

AI: Artificial Intelligence
 SDG: Sustainable Development Goals
 UN: United Nations
 SLR: systematic literature review
 LDA: Latent Dirichlet allocation
 CEO: Chief Executive Officer
 COE: Centre of Excellence
 TOI: Times of India
 NLP: Natural language programming
 WoS: Web of Science
 BI: Business Intelligence
 CGAI: Conversational and generative Artificial Intelligence
 BA: Business Analytics
 SPSS: Statistical Package for Social Sciences
 Mongo DB:MongoDatabase
 Chat GPT: Chat Generative Pre-Trained Transformer
 SQL: Structured Query Language
 NEP: National Education policy

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