Research Article

Enumeration of Potential Teaching Methods in Higher Education: A Cross-Disciplinary Study

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In today's multifaceted academic context, selecting, adopting, and adapting appropriate teaching methods (TMs) have been a pivotal concern for teachers. No study, to the researchers' knowledge, has been conducted on compiling the maximum number of TMs in higher education. This study aims to list, describe, and provide a platform of the potential and the most practicing TMs in four major educational disciplines. This article, taking a cross-disciplinary lens, conducts an in-depth review of 90 articles and enumerates 110 TMs of higher education. It also identifies several TMs that are commonly used in each discipline. The article concludes that knowledge generated from this study fills up the existing literature gap. It calls attention to the current TM practices and provides teachers with an outline to employ available TMs in their respective disciplines.

1. Introduction

Higher education institutions exhibit quality education, prepare students for professional attainment and growth, and serve various stakeholders with diverse expectations [1]. Methods and approaches followed by teachers in their respective contexts work as a prominent catalyst. Again, selecting the right method and customizing it according to the need of students partially depend on teachers' knowledge of "definitions" and "types" of methods. Hence, a multifaceted academic context cataloging TMs and approaches suitable for higher education is essential for the academicians who are directly involved in teaching.

It is believed teachers should demonstrate an intention to adapt and customize methods aiming to improve students' learning [2]. Using methods for a positive change prompted by creativity, originality, and professionalism demands a good knowledge of the existing methods being used in teaching phenomenon. With a sound knowledge of

TMs, a teacher can improve and improvise the techniques to make the teaching-learning situation more conducive to students. A teacher can also be eclectic in using techniques if he has a commendable knowledge of the methods at hand. In every educational discipline, methods are, therefore, relatable to observable results for teaching and learning. Here, in this study, a few methods from four major disciplines have been discussed briefly to show how methods can bring substantial developments in the way teachers teach to facilitate students' learning. The grouping of disciplines, in this regard, has been flexible according to the nature of their academic content and knowledge [1].

The present academic milieu is getting more and more multidisciplinary and multicultural. This ever-changing situation poses extra challenges on the teachers and demands from them customization and modification of objectives, context, the contents of the lessons, and teacher-student, student-teacher, and student-student communication patterns. Teachers' unfamiliarity with the TMs

sometimes complicates the teaching-learning affair in the manifold. Henceforth, along with familiar types of TMs [3] used in the academic arena for a long time, some additional names, though not widely practiced by the academicians [4], have been listed in this article. On occasions, these fewer known methods could be useful for innovative teaching techniques.

Each discipline has its own requirements according to the objectives that it has to be achieved [5]. The course curriculum makes it possible to implement those objectives. There are several mechanisms of a curriculum, e.g., the contents, methods, and the process of the teaching. The curriculum or syllabus itself is settled following its educational objectives in respect of the participants, circumstances, and education programs. In teaching, a method is essential to conceptualize the whole teaching and learning binary to facilitate both teachers' teaching and students' learning. TMs are essential aspects of teaching and learning that define the undertakings of teachers and students, the quality of the teaching process [3] that tacitly sends a message about teaching techniques, students' progress in learning, and knowledge acquisition [6]. According to contemporary development in the teaching-learning milieu, the plurality of TMs and the need for more balanced use of them is an integral part of the development for each discipline. Insight into the understanding of TMs substantially impacts the quality of teaching. Understanding and analyzing TMs can lead to a deeper understanding of the quality of students' learning and the work of teachers [7].

When TMs are self-initiated, self-motivated, and self-valued, they become meaningful and sustainable in a learning framework [8]. The application of TMs, techniques, or principles largely depends on multiple variables of the surrounding contexts. Teachers should adopt a method that is relevant, significant, and appropriate for their own classroom setup [9]. However, teachers always attempt to innovate in their teaching in order to improve student learning. Many forms of pedagogical innovation have been made in recent years to meet the challenging contexts of higher education [2, 10]. We could hardly find a list of potential methods in one place. Besides, different educational disciplines use different methods to cater to the need of the students of their respective disciplines. Here, the concern is to present the potential methods through this study and provide a platform where the readers find many methods in one place.

1.1. Aim of the Study. This study aims to facilitate educators with the potential and the most practiced pedagogical methods in four educational disciplines, i.e., *Arts and Humanities* (AH), *Medical Education* (ME), *Science and Engineering* (SE), and *Social Science* (SS). It presents a manually conducted analysis of scientific literature on the available TMs to recognize the major four disciplines in higher education. It determines the TMs that are exclusively practiced in those disciplines and raises the potential research questions around TMs. It also provides educators with the choice of teaching methods for subjects to be taught.

Therefore, the study's approach is intended to examine the following two potential research questions:

RQ1: What are the potential TMs being practiced in higher education?

RQ2: What are the TMs exclusively being practiced in the four major disciplines?

2. Methodology

2.1. Data Acquiring, Retrieval, and Preanalysis. In information retrieval and manual analysis, deciding one procedure to search the keywords was challenging. Initially, the authors discussed several ways and keywords of the searches for information retrieval, e.g., scientific research databases, seminars and webinars, accessing library resources, and discussing with educators. Further, the choice of keywords, such as higher education, teaching methods, pedagogy, e-learning, traditional teaching methods, technology-based teaching methods, major disciplines, and sometimes the combination of such keywords were discussed arbitrarily. Additionally, some of these keywords narrate similar phenomena in the higher education context. The other challenges were how to choose disciplines and investigate the maximum number of TMs and the most practiced TMs in each discipline.

The study was conducted in three distinct phases:

- (1) Phase 1: a systematic literature review for TMs in higher education institutions.

Firstly, the four disciplines—Science (Medical and Engineering), Social Science, and Arts and Humanities—were taken as major disciplines in higher education by considering the knowledge available at the platform of Web of Science (WoS) core collection. Besides, these disciplines are popular and widely taught in higher education institutions across the regions. Secondly, the literature was searched in a manner that would identify the maximum number of TMs across the disciplines. The presented study used the keywords robustly in the searches to maximize the review scope. Most importantly, the search results of hundreds of articles included at least one of these keywords, in either titles or abstracts. Besides, the articles were selected manually, screening the description of teaching methods and the disciplines where they were applied practically. In the end, the authors took opinions from several educators about the study's idea and intended to provide readers with the maximum number of potential TMs in a single article.

This review process was conducted for almost seven weeks accessing the different online scientific databases and other resources. During the search process, the keywords listed in the review design in Figure 1 were searched from the published articles. All the keywords were searched in different combinations to obtain the most similar and relevant articles from the databases. The databases were selected considering (i) education research journals, (ii) published quality articles, i.e., ISI indexed journals, (iii) other databases relevant to the study's aim. The criteria were the same for all the disciplines, i.e., teaching methods in

FIGURE 1: Review design.

higher education. Moreover, we considered some other research databases based on the content relevant to the study's idea.

For the selection of articles, *screening*, *eligibility*, and *final inclusion* have been considered. Articles have been screened considering the titles and abstracts that included the keywords listed in Figure 1. For eligibility, the articles were included considering their accessibility to the authors and their suitability in the four disciplines of higher education. The articles were also carefully weighed for method, discussion, and result in line with the study's aim. Finally, these articles have been selected based on their complete content and cited in the body text and included in the reference section.

- (2) Phase 2: an analysis of the literature review to find out the TMs in four educational disciplines.

Under phase 2, the selected articles were analyzed to find the TMs in four educational disciplines. Figure 2 describes the total number of articles that have been differentiated according to four disciplines. Analysis of these articles enumerated different TMs and led the study to phase 3.

- (3) Phase 3: identifying the exclusive TMs in four disciplines.

This phase analyzed the corpus of articles to determine the most practicing methods in each discipline exclusively. A thorough reading of the corpus of included articles led to consensus meetings which resulted in critical evaluation. Subsequently, different TMs which were found exclusively used in each discipline have been enlisted.

2.2. Referencing Timeline. This study mostly considers articles with TMs published in the last three decades. A few of the articles were dated very old and presented some of the TMs that had been significantly practiced for years. With the advent of modern methods, they might look obsolete, but those methods ushered the path to the latest. Authors found these references, though old, very relevant for discussion purposes. Besides, some methods discussed in those references are still useful in the teaching-learning context. In combination with the latest methods, old methods can be used partially to facilitate the learners. Subject and discipline-wise, some old methods occasionally prove useful, such as the grammar-translation method in Humanities and lecture method in all disciplines. Our referencing aims at showing the gradual progression in the teaching methods happening for decades in academia.

FIGURE 2: Number of articles studied for each discipline.

2.3. Methodology Selection. Howe and Abedin [11] searched 21 terms to carry out the review on a single TM, “classroom-dialogue.” Song et al. [12] used the same terms for their research. Further, they employed the Delphi method, consulted four experts to give their opinions about the terms used in the study, and employed bibliometric analysis to evaluate academic outputs of a specific research field and publication source for a period of time. The bibliometric analysis shows a research trend and its importance for a specific research field, e.g., education. It utilizes the impact factor of journals, citation count, and the h-index of authors to measure the influence of the research [12–14]. Similarly, topic modeling is a natural language processing method that mines research texts to discover semantic structures among them, which is used in social sciences [13]. On the contrary, this study used online and manual search using predefined keywords for article mining. Several potential research databases were needed to search rather than a single source because of its focus on multiple disciplines and an open range of time. The search was distributed among the authors according to their specialty. Factually, the bibliometric analysis was found difficult to be employed and inappropriate under such a case.

3. Findings

3.1. Teaching Methods in Higher Education. This article provides an in-depth search for the available TMs being practiced in the aforementioned disciplines in higher education. Additionally, it identifies that there is no such study that fully acknowledges similar kinds of work in listing TMs that teachers should adopt. It organizes the potential TMs in higher education, found in the literature review, and includes them in Table 1 to illustrate the study’s findings. Remarkably, we found 110 TMs after careful review of 90 articles from the different publishers’ databases.

3.2. TMs Exclusively Being Practiced in Each Discipline. One hundred and ten TMs share a lot of commonalities. However, Table 2 enlists 14 TMs in AH, 21 in ME, 22 in SE, and 25 in SS that are exclusively practiced in higher education. Exclusive TMs are the methods used for a particular discipline. Figure 3 illustrates 110 TMs of higher

education that accommodates the number of exclusive TMs in each discipline and 28 TMs that are used across the disciplines.

3.2.1. Arts and Humanities. We found 14 exclusive TMs from 26 research materials that are generally being practiced in Arts and Humanities. According to our study, most of the methods found are active and student-centric, while a few are passive and teacher-centric. One study [9] found that in Asian context, CLT was unsuccessful at the classroom setup. The researchers suggested the teachers to consider educational, cultural, economic, and social factors in accepting any particular TM. Likewise, the grammar-translation method is limited to literature and fine arts [42]. Besides, students engage themselves in student-to-student mentoring and in real-world situations in different ways through artists’ talks, consultancy, event-based learning, live projects, and simulating conditions of industry [5]. An analysis of the data-driven learning method shows that most of the students found the method interesting, productive, and motivating [40].

Similarly, under desuggestopedia, the classroom was found bright, cheerful, and positive, whereas, on the other hand, the discovery method intensifies students’ knowledge, but no classroom was observed under this method [24]. As student diversity is increasing, methods based on multiple intelligence play a vital role in the pedagogy of higher education. The researcher suggested enhanced students’ learning using this method [80]. Two student-centric methods task-teach-task and total physical response are used for learning foreign languages, and still, there are scopes to improve [91, 95].

3.2.2. Medical Education. We reviewed 17 articles with utmost care to find out the potential methods. In this case, we found 21 TMs which are exclusively being practiced over the years. As ME has been advanced in recent years, tape-slide program [72], CAL and tape/slide, didactic teaching, and models poorly fit the learning objectives. In contrast, three other practical methods: dissection, living and radiological, and prosection, have higher “fitness for purpose” and widely preferred by the anatomy students [31]. A recent

TABLE 1: TMs in higher education.

Sl. no.	Teaching methods	Description	Reference
1	Action learning	It is a problem-based learning, and the problem must be real. While working on the problems, no one is supposed to know the answer.	[15]
2	Activity	It is a learning method by doing something and a student-centered approach. Students participate in rigorously for quality learning.	[16]
3	Applied project	This is a teacher-facilitated approach in which students with coordinated efforts acquire knowledge and skills. It helps in solving the real problems by following certain standards.	[17]
4	Artists' talks	This is based on practitioner talks and provides insights into the broader view of the practices. Here students engage based on these talks.	[5]
5	Behavioral simulations	This method primarily focuses on experiential entrepreneurship activities where students learn business behaviors and skills to develop certain entrepreneurial aptitudes.	[4]
6	Blog	Here the instructor writes a summary after the lecture and posts online on the course link. This summary includes supplementary material and required action items to do the homework or assignment.	[18]
7	Both activity and lecture	It combines two methods—activity and lecture.	[16]
8	Brainstorming	It is a group activity where attempts are made to determine a specific problem solution. It is defined as “an organized way to allow the mind to produce ideas without getting bogged down in trying to judge the value of those ideas at the same time.”	[19–22]
9	Business plan creation	It is an entrepreneurship teaching instrument for teachers and entrepreneurial teacher for students. It consists of several complex items that contribute to business development.	[23]
10	Business/computer/game simulations	In the simulation method, learners experience artificial representation based on real-life situations. Learners asked to go through various situation-based instructions. Learners generate a large number of results quickly in ease of use environment.	[4, 5, 24–30]
11	CAL and tape/slide	Computer-assisted learning and tape/slide includes computer-based instructional resources in teaching. With the use of audiovisual aids, it focuses on interactive instruction.	[31]
12	Case-based teaching method	Case-based teaching is an instructional technique and tool, widely used in nursing, business, law, etc. Students work on case studies and apply their knowledge to solve real-world problems. The other teaching methods that consist of the word “case” are almost the same.	[15, 19, 30, 32–37]
13	Clinical case	This is an instruction-based method where cases are selected carefully based on a teacher's guidance. This enables students to apply their knowledge in clinical medicine.	[27]
14	Communicative language teaching	This is a language teaching approach which involves mostly speaking. It aims to make students communicative competent, and teachers develop language skills learning procedures.	[9]
15	Consultancy	In this method, students act as consultants to business organizations. Here they engage in solving business issues with the stakeholders.	[5]

TABLE 1: Continued.

Sl. no.	Teaching methods	Description	Reference
16	Cooperative learning group	This method is a learners' group of three or four students, cooperating to learn the learning outcomes. They work on some projects or assignments and submit the report to the instructor.	[24, 38, 39]
17	Data-driven learning	This is learners-oriented data-driven method using corpus data. The idea here is to make learners autonomous researchers and discover facts about the target language by using the language corpora.	[40]
18	Demonstration	It is described as a method of instruction, involves tutor, learner, or both. Here a particular technique or skill applies to a particular activity, and the learner mimics that activity correctly.	[24, 41]
19	Desuggestopedia	This method applies mostly to language teaching and suggestions to pedagogy. It helps to eliminate students' negative feelings and overcome the learning barriers.	[42]
20	Development of new venture creation project	This is an entrepreneurship teaching method that generally applies to university entrepreneurship programs. It helps professionals and students that are committed to their venture creation projects.	[26, 32]
21	Dialogic	Dialogic teaching engages students in dialogue. Instructor explains the lesson to the students involving ongoing talk between him and students.	[43, 44]
22	Didactic teaching	This method helps students to learn theoretical knowledge specifically those who depend on teachers' guidance for reading and writing.	[31]
23	Discovery method	This method is usually based on content, and learners ask to discover certain principles based on specific situations. Here teacher organizes prior knowledge that helps in discovering new information.	[24]
24	Discussion sessions	This method involves students and instructors in the target topic. Students prepare some material on the topic and discuss it in the session.	[24, 45, 46]
25	Discussion and debates	It is based on the distributed material earlier to the debate. Students in small groups discuss the target material and then openly debate.	[30]
26	Dissection by students	This is generally professional anatomists' method to achieve course objectives. Students prefer this practical method for their learning.	[31]
27	E-learning/web-based learning	This is an electronic network-based teaching method, and students learn using ICT. Most of the institutions have their virtual learning environment setup or learning management systems, e.g., blackboard.	[5, 15, 47, 48]
28	Event-based learning	This is an off-site learning mode where students engage in real-time projects. These projects usually come from industries, schools, and galleries.	[5]
29	Experiments	It is basically learning and teaching in experimental sciences which include biological sciences.	[27]
30	Expert script	It is a tool for enhancing entrepreneurial skills and an instructional pedagogy that helps students in improving entrepreneurial expertise by following information theorists' recommendations regarding script acquisition.	[4]
31	Extended analogy	This can be an alternative method to lecture method. It is a combination of analogy and exaggeration. Instructors develop an extended analogy that helps students to understand a difficult topic.	[49]
32	Face-to-face	In this method, a teacher defines learning content and applies it to learning complex theoretical topics. The teacher provides the learning contents in short presentations.	[50]

TABLE 1: Continued.

Sl. no.	Teaching methods	Description	Reference
33	Flipped classroom	It is the reverse of the traditional classroom where students prepare their lessons at home. Students go through lecture videos, text, online materials, and PowerPoint presentations prepared by the instructor before their class and practice them in the classroom.	[51–61]
34	Game-based learning	In this pedagogical approach, students get engaged and involved in the use of the educational games. Game-based activities improve students' learning and attitudes.	[30, 62, 63]
35	Grammar-translation method	Using this method, students learn grammar-translation rules of a target/foreign language and apply them by translating passages from their native language into the target language and vice versa.	[42]
36	Group discussion	It is a modified form of classroom lecture method. Here a teacher presents information and involves the students in answering questions, opinions, and examples.	[5, 15, 19]
37	Group oral presentation	This method involves groups of three or four students. Each group prepares a presentation on a given topic. The student' group mutually decides the topic's segment and presents it in the class.	[17, 30]
38	Group work	It is a group-based method usually practiced in SE. This helps in enhancing students' personal and learning skills. Here activities involve such as sharing ideas, concerns, mutual interest, and issues.	[5]
39	Guest lecturer/speaker	This is quite a motivating method for students. Here a guest speaker delivers lectures, and students have the opportunity to raise their doubts, issues, and share their learning experience.	[15, 17, 64]
40	Handout	Here the instructor provides printed materials for several things: problem-solving case studies, outlining a course of action, placing a point of view, laboratory guidelines for an experiment, and more.	[30, 65]
41	Homework	This is the most popular method that applies to almost every academic course. It includes a set of problems, a few questions, and many other types based on the course and the teacher's approach.	[18]
42	Hybrid group	This method is a blend of online education module that delivers circular content and materials online, such as videos. This method usually applies to ME.	[29]
43	Hybrid tutorial	The centerpiece of this method is a problem-based learning tutorial system. Here students in small groups learn the fundamentals of medicine through clinical cases.	[66]
44	In-class discussion	It is primarily a class-based discussion method where students in small groups discuss simulated scenes or real-time scenarios.	[35]
45	In-class exercises	It involves active teacher-learner interaction. Here students exercise lesson materials to gain proper understanding with the help of the teacher.	[17]
46	Individual presentation	This is a learner-centric method where learners present the target topic considering presentation dynamics. This helps students improve their communication skills.	[15]
47	Individual project	It is a students' skills development method. Here an individual student works on a project that helps the student's learning strategies and dealing with complicated situations.	[32]
48	Individual written report	The instructor assigns students to write an individual report on class or review paper as homework.	[15, 54]

TABLE 1: Continued.

Sl. no.	Teaching methods	Description	Reference
49	Industrial training	This method emphasizes entrepreneurial skills and equips students with this skill. Students directly involve entrepreneurial processes, such as industrial training.	[5, 32]
50	Inquiry-based learning	IBL involves active inquiry where students make questions and solve problems rather than processing teacher-provided knowledge.	[5, 67–69]
51	Interview	Students interview the boss or manager of a company about the soft skills that are required to get a job. This method gives the students a better understanding of real-world business operations.	[64]
52	Invited expert lecture	An expert professor on a specific subject is invited to conduct a lecture.	[54]
53	Jigsaw	It groups the students into teams. The overall task is cut into pieces and distributed among the students of the team. Each student is responsible for completing his task outside of the class. The team then assembles the pieces to complete the task.	[33, 70]
54	Journal article	Students are instructed to read academic journal articles on specific topics and later they discuss it in class.	[64]
55	Keller method	This method was developed by Fred S. Keller and his colleagues in the mid-1960s to help students to be self-learners. It is a personalized learning method where individual students independently move through their course contents at their own pace. When a student passes an individual unit of study, he can move onto the next unit.	[71, 72]
56	Lab work	Lab work helps students' learning by doing. What the students learn in the classroom, they put it into practice.	[17, 72]
57	Lecture	The lecture is the most widely used but criticized method of instruction. This is a traditional passive method which is useful for managing large classes. It instructs ideas, facts, principles, and terminologies through verbal presentation.	[5, 15, 18, 19, 24, 30, 33, 35, 41, 45, 71–77]
58	Lecture-discussion combination	Instructors use visual aids to deliver their materials. Students make questions and discuss the topics presented. This method forces students to contribute and ask questions.	[17, 33, 39, 45]
59	Lecture handouts	The instructor prepares and distributes hard copy of the lecture notes before each lecture. The notes contain exercises for the students.	[18]
60	Lecture with collaborative exercises	Traditional lectures are conducted, followed by collaborative exercises. Topics are introduced in the lectures and the exercises as well.	[78]
61	Lecture with PowerPoint	PowerPoint presentation with multimedia contents is used during lecturing.	[16]
62	Library exercise	Library exercise expands students' knowledge. Students are assigned tasks that have to be prepared from the library materials.	[30]
63	Life stories	Students learn from real-life stories and write their own biographies and plan the learning they needed for future careers.	[4]
64	Live projects	Students experience projects in collaboration with industry practitioners.	[5]
65	Living and radiological	Medical students learn from examining living subjects and radiological images.	[31]
66	Low-tech hands-on	Instructors use limited technology in the classroom and students pursue learning by doing.	[79]

TABLE 1: Continued.

Sl. no.	Teaching methods	Description	Reference
67	Making/reading peer reviews	The instructor gives projects to the students. Each report of the projects is peer-reviewed by students in a double-blind fashion following a rubric provided by the instructor.	[18]
68	Management simulation	Under management simulation, students deal with the real-world business organizations. They make a series of decisions in business functional areas. They submit strategy, management report, and instructor's approval for simulated decision for course grading.	[36]
69	Mind mapping	Students use diagrams to visualize connections between several ideas. They put ideas into paper or blackboard and then use lines and curves to connect them.	[22]
70	Models	Medical students use anatomical models in their learning.	[31]
71	Multiple intelligence	Howard Gardner developed this concept in the 1980s which asserts that people possess several types of intelligence. Multiple intelligence theory can be applied in teaching where the use of different bits of intelligence to teach a concept allows students a chance to succeed in learning.	[80]
72	Online-only group	Students receive all educational materials online that include online interactive videos and recorded simulation session.	[29]
73	Peer learning	Students interact with one another to learn a particular subject area. This is a method of student-to-student mentoring.	[5]
74	Perceptual teaching	Instructor gives an intuitive understanding of complex topics which enables students to form conceptual structures through perception of empirical meanings.	[50]
75	Practical sessions	Practical session makes links between theory and practice. It includes clinical tests and laboratory work.	[5, 46]
76	Problem-solving	Students are divided into small groups and are engaged in a set of problems where they use their previous learning and experience for a solution.	[17, 24, 26, 30, 72]
77	Problem-based learning	The problem drives the learning. Students in a small group learn within the context of the issues that are supervised by the instructors.	[5, 27, 46, 50, 75, 81–89]
78	Project-based learning/ group project	PBL organizes learning around projects. It supports students' learning by doing where they apply existing knowledge and learn new things through project works.	[5, 15, 18, 32, 33, 50, 68]
79	Prosection and demo	Anatomy students get actual hands-on experience from prosection and demo.	[31]
80	Real-life case	Students come across a real situation where they develop real-time learning.	[26]
81	Research-oriented teaching	Students conduct research projects to identify new findings. Research-oriented teaching develops students' ability to make questions and find answers using scientific research.	[5, 16, 50, 90]
82	Role model	In business education, "real-life" entrepreneurs are symbolized as role models who are more effective than classroom instructors. They motivate students to explore their true potentials and look for success.	[26]
83	Role playing	The instructor gives the students a scenario based on a case. He defines the problem and students' roles clearly. Students then are divided into several groups to present their roles. Participants analyze the incidents with a discussion.	[4, 24–26, 30]
84	S-lecture	S-lecture means student lecture. The course material is divided among students to create their own lecture. Students share their works among others.	[18]

TABLE 1: Continued.

Sl. no.	Teaching methods	Description	Reference
85	Self-analysis	It is helpful for student learning. Students conduct a self-analysis assignment to analyze their own soft and communication skills. With this analysis, students understand their strengths and weaknesses.	[64]
86	Self-study sessions	Students practice self-study. They make their study without having any direct supervision of the instructor.	[46]
87	Seminar/workshop	It is a group event where a student presents his academic work followed by structured discussion.	[5, 15, 30]
88	Serious games	It is an interactive computer application through which the users acquire knowledge and specific skills. It differs from video games as its main objective is to provide learning.	[28, 74]
89	Simulated international conference	The conference is organized in the classroom. Students gain scientific research skills from the simulated conference.	[54]
90	Simulating conditions of industry	Students have industry experience using this method.	[5]
91	Small group	This method involves small groups of students of two to twenty participants. It includes tutorials, seminars, and problem-solving	[5, 30, 35, 75]
92	Structured lectures	In this method, the instructor focuses mainly on difficult and inaccessible topics to the students. The instructor uses slides, diagrams, and illustrations and covers most of the syllabus.	[46]
93	Tape-slide programs	The instructor uses tape-slide programs that are the audiovisual presentation in the classroom.	[72]
94	Task-teach-task	TTT is a student-centric teaching method where the students complete their tasks without the instructor's help. The instructor identifies the problems, suggests solutions, and assigns other tasks.	[91]
95	Teaching through the classics	Instructors use classical literature, philosophy, and essays to help students understanding entrepreneurship in business education.	[4]
96	Teaching with real patients	Contact with real patients plays an important role in ME. An experienced surgeon supervises the teaching with real patients in a medical facility. Students observe the patients and take notes.	[74]
97	Team-based learning	It is an active teaching method that increases students' interaction and engagement. Here small group of students work in the same team independently throughout the semester.	[92-94]
98	Theoretical-practical seminars	Theoretical-practical seminars are conducted in medical setups for better student understanding.	[27]
99	Total physical response	Dr. James J Asher developed this method which is based on teaching and learning through physical action. In TPR, instructors command the students in a foreign language, and students respond with appropriate physical movement.	[95-97]
100	Tuition	The instructor provides coaching to an individual student or a small group of students.	[75]
101	Use of animal models	In ME, instructors use animal models for student learning.	[74]
102	Video/video recorded lecture	The instructor displays a short video in the classroom on a topic. Students participate in class discussion after watching the video.	[4, 15, 16, 30, 35, 64, 65]
103	Video + handout	The instructor displays a short video in the classroom on a topic. He also distributes hard copies of notes among the students, and later, they participate in class discussions.	[65]

TABLE 1: Continued.

Sl. no.	Teaching methods	Description	Reference
104	Video and microlecture	The instructor displays videos in the classroom on a topic followed by a microlecture.	[54]
105	Virtual classroom	A virtual classroom is conducted in an online platform that allows live interaction between the instructor and the students.	[26, 98]
106	Virtual internship	Virtual internship simulates engineering problems and practices in a web-based learning platform.	[99]
107	Virtual simulation program	Here students are involved in class activities that are not possible in a physical classroom setup.	[100]
108	Visual thinking strategies	In this method, students visualize pieces of art in a museum or classroom setting. The VTS instructor makes questions and the students answer. Students also share their thoughts about the piece of art. This method improves students' critical thinking, visual literacy, and communication skills.	[101]
109	Web-based laboratories	Increased class size, limited resources, and distance learning force universities to use web-based laboratories. The lab sessions use online video clips and simulations, and labs are controlled over the Internet.	[5]
110	Work-based learning	Work-based learning addresses real working contexts. Students study part-time and work on real-time problems.	[5]

TABLE 2: TMs exclusively being practiced in each discipline.

AH	ME	SE	SS
Artists' talks	CAL and tape/slide	Activity	Applied projects
Communicative	Clinical case	Blog	Behavioral simulation
Language teaching	Didactic teaching	Both activity and lecture	Business plan creation
Consultancy	Dissection by students	Dialogic	Development of new venture creation project
Data-driven learning	Experiments	Extended analogy	Discussion and debates
Desuggestopedia	Hybrid group	Face-to-face	Expert script
Discovery method	Hybrid tutorial	Group work	Group presentation
Event-based learning	Living and radiological	Homework	Guest speaker
Grammar-translation method	Models	In-class discussion	In-class exercises
Live projects	Online-only group	Invited expert lecture	Individual presentation
Multiple intelligence	Prosecution and demo	Jigsaw	Individual project
Peer learning	Self-study sessions	Lecture handouts	Interview
Simulating conditions of industry	Serious games	Lecture with collaborative exercises	Journal article
Task-teach-task	Structured lectures	Lecture with PowerPoint	Lecture/discussion combination
Total physical response	Tape-slide program	Low-tech hands-on	Library exercise
	Teaching with real patients	Making/reading peer reviews	Life stories
	Theoretical-practical seminars	Perceptual teaching	Management simulation
	Tuition	S-lecture	Mind mapping
	Use of animal models	Simulated international conference	Real-life case
	Video + handout	Video and microlecture	Role model
	VTS teaching method	Virtual internship	Self-analysis
		Web-based laboratories	Teaching through the classics
			Virtual classroom
			Virtual simulation program

study [29] in an educational setting suggested that students find more learner satisfaction in hybrid groups that combines online materials and short in-person simulation than

online-only groups. Another study [66] found the hybrid tutorial to be successful because of increased student involvement and accountability.

FIGURE 3: Number of significant TMs in each discipline.

It is evident that medical students require clinical tests and laboratory work. Therefore, students preferred structured lectures more than self-study [46]. Besides, using clinical cases, theoretical-practical seminars, and experiments, students participate more actively in their own learning process [27].

Moreover, teaching with real patients is limited by manpower shortage, and patients' safety, and similarly, the use of animal models is limited to a few medical facilities. Studies [28, 74] found that serious gaming could be ideal for overcoming these limitations. Working under a simulated environment prevents medical error, and thus, students acquire skills before practicing on real patients.

Tuition was used occasionally [75] and "video + handout" was significantly effective [65] for the medical students. Interestingly, one TM, VTS, from the humanities was used for training family medicine residents who found this method valuable in working together as a group [101].

3.2.3. Science and Engineering. For SE, we reviewed 27 articles, the maximum number of articles among all. We found 22 TMs used extensively while teaching the academic courses in this discipline. An interactive method like activity is useful for the classes that do not have a laboratory component. This was the most favorite method among other studied methods, and it encouraged the students to think. Although the lecture method is widely criticized [3], modification of this method like "lecture with collaborative exercises" was beneficial, and teachers can supervise a large-sized class through group exercises [78]. In contrast, "both activity and lecture" and "lecture with PowerPoint" method were the least preferred by the students [16].

A recent study [18] in an engineering program compared the perceived effectiveness of different learning methods in one graduate and one undergraduate course. Graduate students were positive towards s-lecture, but they were undecided for making/reading peer reviews. On the other hand, undergraduate students found homework, lecture handouts, and s-lecture to be useful. Though the blog is an innovative method, students were undecided of its utility in

their learning. They were also undecided for making/reading peer reviews.

Another method, extended analogy, helps students in understanding and retaining technical concepts. The researchers [49] suggested using extended analogy to hold students' attention in the learning process. Similarly, teachers can use dialogic technique [43, 44], in-class discussion [35], and group work [5] to involve students. Teachers can also use the traditional face-to-face method to deliver complex theoretical topics in the classroom and perceptual teaching to conceptualize empirical meanings [50]. Besides, a study [54] found invited expert lecture to be popular and more active than expected, and simulated international conference to be positive.

Carpenter [33] conducted pretest and posttest studies of the students using five different TMs. The researcher found that all five of the methods positively affected students' scores, and students improved the most using the jigsaw method. However, despite the improvement, students considered the jigsaw method to be the least valuable. On the other hand, Perkins and Saris [70] also found that students' perceptions of the jigsaw method were very positive.

In some situations, the low-tech hands-on technique can improve students' performance more than high-tech tools [79]. Nevertheless, analyzed data suggested that the high-tech method, as the virtual internship, can develop students' design thinking and understanding in engineering [99], and today universities are using web-based laboratories to combat the increase in class sizes and the drain on resources [5].

3.2.4. Social Science. Social Science is one of the broader disciplines in higher education. In this discipline, we selected 25 articles for detailed analysis. We found 25 exclusively used TMs, the highest number of TMs in the four disciplines. In a study, Casado [17] investigated TMs preferred by the students. Surprisingly, most of the students preferred group presentation, and the combination of lecture and discussion more than applied projects, in-class exercises, and guest speakers as a TM. Similarly, Lonappan [15] conducted another research to compare the perception of different

methods in teaching entrepreneurship education. In that study, only 12% and 5% of the students preferred individual presentation and action learning, respectively, which are less than other practice-based approaches. Besides, behavioral simulation, business plan creation, new venture creation projects, expert script, life stories, real-life case, role model, and individual project are widely used for teaching entrepreneurship [4, 23, 26, 32]. Carrier [4] also suggested that entrepreneurship can be taught using classical literature. Students can assimilate lessons from the characters of the novels and other essays. Another study [30] found that some methods might be enjoyable but not effective for a specific course. "Discussion and debate" and group presentation were rated high, but library exercise was rated low because of its limited connection to the course.

However, Anthony and Garner [64] found guest speakers to be very much influential. In contrast, Casado [17] found guest speaker as the least-liked method, and Lonappan [15] reported that only 15% of the students opted for the guest speaker. On the other hand, self-analysis and journal articles were found to be helpful. Surprisingly, students reported interviewing a boss or a manager to be least helpful [64]. Moreover, students perceived management simulation as a valuable instructional method for business courses [36], and mind mapping to be beneficial for learning business English [22]. Lastly, two tech-based methods, virtual classroom and virtual simulation program, are found to be interactive that increase student engagement in learning [26, 98, 100].

3.2.5. Teaching Methods across the Disciplines. Among the 110 TMs, we found 28 methods to be used across the disciplines. These are the methods that were not being used exclusively for a specific discipline. They can be adapted to diverse circumstances. E-learning, lecture, and problem-based learning were found to be in all four disciplines. Furthermore, 10 TMs were applied in three disciplines in different combinations. Table 3 lists the TMs that have been used across the disciplines.

4. Discussion

The question that incepted our study was, "How TMs are important in each discipline?" This led us to find out the TMs that were employed in different disciplines in higher education. Research for this was done, and we classified our findings into four major disciplines: AH, SE, SS, and ME. Numerous data gathered from different sources influenced us to narrow down our scope of research, and subsequently, we decided to pursue "What are the potential TMs being practiced in higher education?" and consequentially we investigated, "What are the TMs exclusively being practiced in four major disciplines?"

A self-contained study incorporating TMs across the four disciplines in higher education is hardly found in the academic arena. Individually cited articles focused on a small number of teaching methods used in each discipline, and hardly those articles discussed methods used across the

TABLE 3: TMs across the disciplines.

Sl. no.	Teaching methods	Educational disciplines
1	Brainstorming	AH, ME, SS
2	Business/computer/game simulations	AH, ME, SS
3	Case-based teaching method	SE, SS
4	Cooperative learning group	AH, SS
5	Demonstration	AH, SE
6	Discussion sessions	AH, ME, SS
7	E-learning/web-based learning	AH, ME, SE, SS
8	Flipped classroom	AH, ME, SE
9	Game-based learning	SE, SS
10	Group discussion	AH, SS
11	Handout	ME, SS
12	Individual written report	SE, SS
13	Industrial training	SE, SS
14	Inquiry-based learning	AH, SE, SS
15	Keller method	ME, SE
16	Lab work	ME, SS
17	Lecture	AH, ME, SE, SS
18	Practical sessions	ME, SE
19	Problem-solving	AH, ME, SS
20	Problem-based learning	AH, ME, SE, SS
21	Project-based learning/group project	AH, SE, SS
22	Research-oriented teaching	SE, SS
23	Role playing	AH, SS
24	Seminar/workshop	AH, SS
25	Small group	ME, SE, SS
26	Team-based learning	AH, ME, SS
27	Video/video recorded lecture	ME, SE, SS
28	Work-based learning	AH, SE

disciplines. Researchers have ignored the age-old methods, e.g., lecture, Keller plan, and lecture with collaborative exercises, although they might have some potential in certain scenarios. The current study allows learning about potential TMs which are being practiced for decades in the academic arena. Moreover, it also enumerates new and contemporary methods that are evolving alongside emerging technologies, e.g., computer simulation, web-based learning, and virtual internship.

This study lists 110 TMs, which are explained briefly individually and narrowed down to identify exclusive TMs from each discipline. This process helps teachers understand the useful contributions of these methods in teaching and learning in their respective disciplines. If they need a more practical understanding of these methods, they can access the cited articles and get extensive understanding. Furthermore, comfortably they can get help from this article if they want to know about some identical and new methods.

While collecting data, we came across a number of articles in different disciplines; however, narrowing down our search, we studied a total of 90 research articles. Of the 90 articles, 84 articles focused on specific disciplines, whereas 6 articles discussed several disciplines and their associated TMs.

Of the 110 methods that we have enumerated from 90 articles, there has been varied distribution of these among

different disciplines. Twenty-six (i.e., 27%) of the articles were in reference to AH, and 18 articles (19%) were pertaining to ME; similarly, 27 articles (28%) discussed SE, and 25 articles (26%) were related to SS.

These findings resulted in 14 methods in AH, 21 methods for ME, 22 methods for SE, and 25 for SS that were exclusively used for each of the disciplines. The word “exclusively” used here is our way of saying that these methods did not overlap with the other disciplines. The findings also include 28 TMs across all four disciplines.

Surprisingly, only three methods were common with all four disciplines, i.e., lectures, e-learning, and problem-based learning. Lectures have been the age-old method of conveying the intent verbally. Even though it is a passive method of conveying information, it is effective when the number of participants is great and when the same information has to be conveyed to all at the same time. Problem-based learning is a relatively newer method of teaching which has become very popular due to its vocational approach. E-learning is another method which has been used by all disciplines in higher education due to the fact that it is effective in distance learning and convenient for study time suitability.

In reality, however, the TMs covered in this study would not be all the methods that exist in the four major disciplines. To the best of our efforts, we could find these methods after searching more than 1200 research materials.

5. Limitations

The study has identified a wide variety of TMs employed in four disciplines, as mentioned. Apart from focusing on practicing TMs in higher education, a few teaching approaches were also considered, as they have been used in all the four disciplines under study interchangeably. On the other hand, TMs that are employed in primary and secondary education were not included, as the study would be voluminous. The study's limitation also includes that only reputed journals, e.g., ISI, Scopus, and other peer-reviewed, were considered where some accepted methods might not have been reported.

6. Conclusion

This study has been conducted to methodically explore the most practicing TMs used in higher education. Attention was focused on four major disciplines that included AH, ME, SE, and SS. In our approach, we found that a broad spectrum of TMs has been practiced, and lecture is the most common method employed in the four disciplines. In the age of emerging technologies, electronic dependent modern TMs, like e-learning and computer-based simulations, are also employed massively across the disciplines.

The present study, though enlists TMs used in four disciplines, also admits its inefficiency in ensuring generalizability across every discipline in higher education. Future studies, in this regard, should include more disciplines to obtain a more holistic and comprehensive picture. Further studies employing questionnaires, interviews, and class observation data could be conducted to investigate essential

factors influencing teachers' decisions to use TMs. Primary and secondary education levels could also be studied to this end. Moreover, there is much scope for future research in terms of the pedagogical dimensions that impact upon learners' classroom experiences. Relatedly, studies in this area could further focus on identifying pedagogical strategies that create, value, operate, and support a positive and inclusive classroom learning environment. Investigating the compatibility between TMs and assessment strategies used in the higher education level is another avenue for further research. The knowledge generated from this study, thus, potentially intends to bridge the literature lacuna, calls for attention to the current teaching practices, and provides critical insights for further research in higher education.

Data Availability

This article does not include any third-party data. It only includes the articles that have cited and listed in the reference section.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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