Attitude of University Students and Teachers towards Instructional Role of Artificial Intelligence

Dr. Irshad Hussain
Professor
Department of Education, IUB
irshad_iub@yahoo.com

Abstract

The present study evaluated the attitude of university students and teachers towards instructional role of artificial intelligence. It was a descriptive study and the researcher used survey approach for data collection. The data was collected from 323 university students and 196 university teachers by using two questionnaires developed (one for students and one for teachers) on five point rating (Likert) scales. Descriptive statistics i.e. percentage was used for data analysis. This study demonstrated positive attitude of university students and teachers towards AI and its instructional role. It appeared to be encouraging for the respondents as well as for the administrators and policy makers. The study suggested higher education institutions to formulate a feasible policy to get benefits of instructional role of AI in higher education.

Keywords: *Artificial Intelligence, Innovation, Digital Technologies, Instructional Role, Personalized Learning*

1. Introduction

Knowledge, information, and information & communication technologies (ICTs) appear to be the dominating traits of the 21st century. In the light of a universal phrase that, "There is always room for improvement"; the ICTs are being improved in terms of their capacities and capabilities with advanced features. It spurs enormous opportunities and opens up a great number of avenues for applying the advanced ICTs in all areas life along with education and training (Chassignol, Khoroshavin, & Bilyatdinova, 2018; Hussain, 2005). In education and training, there seems a greater demand of advanced ICTs particularly for instruction, assessment and the award of the degrees or credentials to the graduates individually and their recognition across the globe (Hussain & Cakir, 2020). It seems to be nourishing for flourishing the internationalization featured with learning and working environments of competitive nature. It requires new skills for learning and new ways of working. Apparently, it is creating massive opportunities of human's interaction with technology which is often said *"human-technology interactions"* (PwC, 2018; Hussain & Durrani, 2012). Similarly, the advanced ICTs i.e. the digital technologies have seemingly transformed the scenario of education and training through novel pedagogy and assessment methods (Alnahdi,

2019); and the ways of awarding the degrees and/ or credentials or credentialing (deBittencourt, Goedert, Sharma & Bortolozzi, 2020). These innovative methods of instruction and the award of credentials consist of capturing, recognition, and validation of the learning outcomes which in broader sense would be of varied nature and associated as a lifelong learning process with graduates (Hussain & Cakir, 2020; VanLehn, 2011; Woolf, 2009; AAAI, 1994).

Our present is a digital era where instruction and instructional process becomes a skillful task and teachers have to learn (and/ or upgrade their) skills of teaching with technologies (Hussain, 2012). Traditionally, teacher-based instruction has been the norm of educational institutions including the universities (Hussain, 2013). But the innovations seemingly have introduced student-based instructional process and intelligent teaching system –intelligent tutoring. Now the intelligent system –the artificial intelligence facilitates the teacher even in the classroom (AAAI, 2008) by providing accommodating and individualized learning opportunities (Srinivasan, & Chawla, 2017) which justifies the learning demands of learners in 21st century.

Keeping in view this backdrop one can observe some innovative and popular instructional platforms or tools including the 'Google Classroom'. Similarly, the sophisticated learning tools like 'Virtual Reality' (VR), 'Augmented Reality' (AR) and 'Artificial Intelligence' (AI) appear with their instructional role in education and training. One can witness through training in delicate and sophisticated areas like surgery, training of pilots and astronauts etc. (Chassignol, Khoroshavin & Bilyatdinova, 2018, p. 17; QANU, 2015). However, artificial intelligence seems to be more appealing for students and more promising for instruction and instructional process (Ma, Adesope, Nesbit, & Liu, 2014). By observing its potential role, Tuomi (2018) anticipated the future of instruction to be associated with AI. It suggests the institutions of higher education and universities to be empowered with it to meet the learning demands of students by changing the ways and means of instructional delivery according to the changing learning contexts or environments (Ma, 2019; US GAO, 2018).

1.1. The Artificial Intelligence and Its Instructional Role

In 1986 Henry M. Half the Chief Scientist at Half Resources Inc. informed about the tutoring capability of computer programs (Half, 1986, p.24). In its accordance, now the artificial intelligence which is regarded as a newest advancement in ICTs is being used successfully in education and training (Cowen, 2019) for instructional purpose. It is machine intelligence which

works like human intelligence to solve problems and make appropriate decisions. It is computer based intelligence which works in close association with human mind (Shabbir & Anwer, 2015; Hussain, 2005). The human mind is its architect and it works like it for the humans.

The knowledge is stored in computers through specific programs or programming in such a way that it works like human intelligence when applied to solve the problems (Moursund, 2006). AI is widely used by instructors and learners through its applications (apps) like [instructional] robots (Ma, 2019; Nwana, 1990) and/ or tools. Such tools are also being used in education –content development, student assessment, and communication along with their instructional use (Chassignol, Khoroshavin & Bilyatdinova, 2018) and students' [academic] support services – guiding and facilitating them (Zeide, 2019; Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). Hence, undoubtedly, in future the higher education will depend on AI (Contact North, 2018).

The artificial intelligence (AI) is being used in education at an enhanced momentum. It plays an important role in effective instructional process at university level (Garrido, 2012). It is promoting opportunities of personalized, flexible and customized learning (Srinivasan & Chawla, 2017), meaningful feedback on students' performance and makes instructional process more interesting (Popenici & Kerr, 2017; Mason, Khan & Smith, 2016) to involve students. It makes instructional process easy and efficient by presenting information in a logical-way (Hearst, 1994; Luger, 2009; Russell, & Norvig, 2010).

Opening up a number of avenues in education (Sisodiya & Singhal, 2019) it can facilitate the potential researchers and [educational] practitioners to work in a better way (Langley, 2019, p. 9676). It has classroom implications as teachers can use it to know the students' understanding level of the discussed lessons in the class (Borge, 2016). Besides, it is found to be a viable [tool] methodology for professional activities of a teacher which resultantly improves the creative educational environment (Vlasova, Goncharova, Barakhsanova, Karpova, & Ilina, 2019) for effective teaching and learning. Apparently, different tools and technology-enhanced system have been created to cater the instructional needs of teachers and learning demands of students. Amongst others, the automated writing evaluation (AWE) system [which is an AI tool] was found to be effective tool in helping university students in improving their writing in English [language] in China. It appeared to be time saving, created interest among students, and provided instant and

clear feedback for improvement (Lu, 2019). AI appeared as an opportunity in education to facilitate teachers by helping them particularly in instructional tasks (Zeide, 2019; Popenici, & Kerr, 2017). Generally, tutoring (which also called Intelligent Tutoring Systems –ITS), personalized learning, testing and automating tasks are the AI-based functions in education. AI promotes personalized learning or tailoring instruction to fit individually with student's learning needs; and blended instruction i.e. embracing technology in face-to-face interaction (Sisodiya, & Singhal, 2019; Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). It would increase learning performance and decrease gaps of achievement among students. The personalized learning is advised to increase independence and motivation of students to learn and their engagement in academic activities for better achievement (Sisodiya, & Singhal, 2019; Lu, & Harris, 2018; Woolf, 2015).

The worthwhile developments and innovations in AI regarding its application in education seem to be useful and promising for instructional purpose. But at the same time it is unlikely and unrealistic that AI can replace the 'human teaching' (Ocaña-Fernandez, Valenzuela-Fernandez, & Garro-Aburto, 2019) which is of much more significance in the age of machines. Although AI can transfer knowledge i.e. can teach in a better way than people or humans but character building i.e. cultivation of pro-social behavior, ethics and morality polished with love and affection are still big challenges to meet by AI (Zeide, 2019; Zhao & Liu, 2018).

1.2. Objectives of Study

This study was conducted to (a) ascertain the attitude of university teachers and students towards the role of artificial intelligence in imparting personalized instruction; (b) discern the perception of university teachers and students on the role of AI in creating adapted groups of students for effective learning; (c) examine the attitude of university teachers and students about the role of AI in maintaining objectivity and equality in instructional process; and (d) determine the perspective of university teachers and students about the role of AI in saving time and making instructional process efficient and productive.

2. Methodology

This study adopted the research methodology already used by the researchers (Hussain, Cakir & Candeğer, 2018) for study of alike nature. This study was conducted to determine the instructional role of AI as perceived by the university teachers and students; and hence it was a non-experimental and exploratory-descriptive in nature. It is based on the assertion that such

studies describe the situations in detail (Polit, Hungler & Beck, 2001); and the descriptive research portrays the situation(s) in natural way (Burns & Grove, 2003). Descriptive studies, in social sciences are commonly conducted to describe and/or explain the situation(s) as it/ these exist (Gay, 1999; Frankfort-Nachmias & Nachmias, 1996). Justifiably, it can be used to make judgment(s) after going systematically through the current situations and/ or practices. Therefore, keeping in view its significance as described by (Hussain, Cakir & Candeğer, 2018), the descriptive research method was used to ascertain the perception of university teachers and students about the instructional role of artificial intelligence at university level. This small scale study was delimited to the students and teachers of from the departments of social sciences, The Islamia University of Bahawalpur, Pakistan. Therefore, the researcher used survey approach for data collection as it is considered appropriate in social sciences (Blaxter, Hughes, & Tight, 2002; Polit, Hungler & Beck, 2001) for exploratory studies.

2.1. Population and Sampling

This study consisted of two cohorts of population i.e. university students and their teachers i.e. university teachers. The students of Bachelor Studies Programmes from the Departments of Social Sciences and who were studying in their final semesters were selected as one of the two cohorts of population of the study. The university teachers or faculty who were teaching to these students was taken second cohort of the population of study. The researcher selected subjects of the study through convenient-cum-purposive sampling technique(s) because of the two reasons; firstly, students and their teachers who were using internet and AI tools (search engines, Google translator etc.) daily and who have an android phone (with smart applications or apps) during their university life were included in the sample; and it justifies purposive sampling; and secondly, it was managed by the researcher himself without any sponsorship from any organization or individual and it had its constraints of time and cost. It justifies convenient sampling technique for the study (Hussain, Cakir & Candeğer, 2018).

Firstly the researcher contacted university teachers and explained to them the purpose of the research, its methods and scope individually in their respective departments. Different aspects of the study, research tools and modalities of data collection were negotiated and finally they agreed to participate in the survey. After getting consent of the teachers; the researcher contacted university students in their respective departments after their class time with the permission and

help of their respective class teachers. They were also briefed about the survey i.e. its objectives, process of data collection and confidentiality of the data. A total of 380 Bachelor Studies Students and 220 their teachers who were using internet and AI tools (search engines, Google translator etc.) and having an android phone (with smart applications or apps) were agreed to participate in the survey on volunteer basis.

2.2. Tool for Data Collection

It was a quantitative study of the descriptive and exploratory nature which was based on sample-survey for data collection. After literature review two questionnaires on five-point rating scale were prepared by the researcher. The questionnaires were prepared according to the objectives and nature of the study; and the main themes identified during literature review by the researcher. These themes are given as headings of the tables in 'findings' section. Both of the tools were validated through their pilot testing on 30 students and 10 teachers' and through the expert's opinion. The tools were finalized according to results of pilot testing and experts' opinion by modifying and rephrasing some statements. The reliability coefficient was .78 for the questionnaire of university students and .81 for those of their teachers. A thorough proof reading of the tool was done before its implementation for data collection.

2.3. Procedure of Data Collection and Implementation of Research Tools

The data was collected with the help of two M. Phil and two Ph. D students who trained as data collectors. A training session on "procedure of data collection" was organized by the principal researcher in the Department of Education for data collectors. Thus trained data collectors implemented the research tools for pilot testing under the supervision of the principal researcher. After this exercise and finalization of the tools; and by getting permission of the respondents and mutually deciding the formalities of data collection the data collectors administered the research tools and collected data from the respondents. The respondents participated in the survey on volunteer basis. The participants were being briefed about the study and procedure of data collection by the data collectors. The confidentiality of the data was also ensured to the participants of the study. The tool was administered on 380 Bachelor Studies Students and 220 their teachers but the response rate was 85% and 89% for university students and their teachers as 323 and 196 questionnaires completed in all respects were received back respectively.

2.4. Considering Research Ethics

The researcher and data collectors fully observed ethics of research in social sciences.

2.5. Data Analysis Techniques

After completing the process of data collection the data collectors entered the data in MS Excel data sheets which already were coded according to the questionnaires. The data of both of the questionnaires was entered separately in the respective coded sheet. As the present study was conducted to evaluate the perception of university teachers and students about instructional role of artificial intelligence; hence descriptive statistics i.e. percentage was used for data analysis. It explains the situation in a simple without any technical difficulty. The scale values from highest 05 strongly agreed (SA) to lowest 01 strongly disagreed (SDA) were used for the purpose. The analyzed data is presented in tabular form along with findings of the study in the next section of the paper.

3. Data Analysis

1. Data Analysis of the Questionnaire of University Students

The data analysis and findings of the study are given below:-

Table 1. Opinion of university students about the role of artificial intelligence in promoting personalized learning and instruction

Statement	Level of agreement									
	SA		A		UNC		DA		SDA	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Personalized Instruction										
Identify potential of individual student	136	42.11	94	29.10	12	3.72	53	16.41	28	8.67
Individualized instruction	142	43.96	97	30.03	9	2.79	43	13.31	32	9.91
Accommodating diversified learning styles of students	151	46.75	96	29.72	11	3.41	38	11.76	27	8.36
Easy instructional delivery	149	49.23	93	28.79	7	2.17	35	10.84	29	8.98

Innovative instructional styles	133	41.18	112	34.67	13	4.02	37	11.46	28	8.67
Maintaining interest of students	138	42.72	101	31.27	8	2.48	46	14.24	30	9.29
Overall Average	141.5	44.33	100.5	31.11	10	3.10	42	13	29	8.98

N=323

Table 1 shows opinion of university students about the role of artificial intelligence in promoting personalized learning and as well as personalized instruction. According to the data given in the table 71.21% and 74% of the respondents were of the opinion that artificial intelligence helps their teachers in identifying learning potential of the students and in imparting instruction on individual basis respectively. Similarly, 76.45% and 78.02% of university students viewed that it (artificial intelligence) facilitates university teachers in accommodating diversified learning styles of their students and in instructional delivery in an easy way respectively. According to 75.85% of the respondents artificial intelligence plays an important role in adopting innovative instructional styles whereas, 74% were of the opinion that it maintains interest of students in their studies. In overall majority (75.44%) of the university students were of the view that artificial intelligence promotes personalized learning as well as personalized instruction.

Table 2. Opinion of university students on the role of artificial intelligence in creating adapted learning groups of students for effective learning

Statement	Level of agreement									
	SA		A		UNC		DA		SDA	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
		earning G Learners								
Enhancing technologybased learning skills	103	31.89	133	41.18	9	2.79	51	15.79	27	8.36
Developing motivation	120	37.15	128	39.63	10	3.10	37	11.46	28	8.67
Offering difficult learning tasks through easy activities	119	36.84	143	44.27	6	1.86	21	6.50	34	10.53

Accommodat ing learners' pace	162	50.15	116	35.91	7	2.17	16	4.95	22	6.81
Enhancing learning capacity of individual students	137	42.41	118	36.53	8	2.48	26	8.05	34	10.53
Fulfils learning needs of students	109	33.75	143	44.27	12	3.72	23	7.12	36	11.15
Overall Average	125	38.7	130.17	40.3	8.67	2.69	29	8.98	30.17	9.34

N□=323

Table 2 indicates views of the university students on the role of artificial intelligence in creating adapted learning groups of students for their effective learning. The data analysis reveals that 73.07% and 76.78% of the respondents affirmed useful the role of artificial intelligence in enhancing technology-based learning skills and in developing motivation among students respectively. Whereas, 81.1% and 86.06% of the university students were of the opinion that it plays an important role in offering difficult learning tasks through easy activities and in accommodating learners' pace respectively when teachers use it for instructional purpose. Even so, 78.94% and 78.02% of the respondents asserted that it aids instructional process by enhancing learning capacity of students individually and fulfilling their learning needs respectively. In overall majority of the university students (79%) affirmed the role of AI in creating adapted learning groups of students for their effective learning.

Table 3. Opinion of university students about the role of artificial intelligence in maintaining objectivity and equality in instructional process

Statement	Level of agreement									
	SA		A		UNC		DA		SDA	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Objectivity and equality in instructional process										
Dissemination of right information to all students	99	30.65	155	47.99	9	2.79	27	8.36	33	10.22

Dissemination of up-to-date information to all students	112	34.67	153	47.37	5	1.55	22	6.81	31	9.60
Useful for inclusive classroom	137	42.41	140	43.34	4	1.24	17	5.26	25	7.74
Performing unbiased role in instructional process	166	51.39	113	34.98	6	1.86	14	4.33	24	7.43
Maintaining pace of instructional process	157	48.61	109	33.75	5	1.55	33	10.22	19	5.88
Facilitate students round the clock	149	46.13	122	37.77	6	1.86	29	8.98	17	5.26
Overall Average	136.67	42.31	132	40.87	5.83	1.8	23.67	7.33	24.83	7.69

$N=323$

The table 3 demonstrates perception of university students about the role of artificial intelligence in maintaining objectivity and equality of and/ or in the instructional process. The table depicts that 78.64% and 82.04% of the respondents acknowledged the role of artificial intelligence in disseminating the right and up-to- date/ latest instructional information respectively to all students without any discrimination. Similarly, 85.75% and 86.37% of the respondents affirmed that artificial intelligence plays useful role for challenged students in inclusive classrooms and makes instructional process unbiased and/ or equitable respectively. Likewise, 82.36% and 83.90% of the respondents acknowledged the role of artificial intelligence in instructional process in maintaining pace of the instruction and in facilitating students objectively round the clock respectively. In overall majority (73.18%) of the university students affirmed the role of artificial intelligence in maintaining objectivity and equality of and/ or in the instructional process.

Table 4. Opinion of the respondents about the role of artificial intelligence in saving time and making instructional process efficient and productive

Statement	Level of agreement									
	SA		A		UNC		DA		SDA	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Time saving										

Efficient instructional process	140	43.34	127	39.32	7	2.17	27	8.36	22	6.81
Intelligent tutoring system	146	45.20	126	39.01	5	1.55	25	7.74	21	6.50
Provide customized support and instruction	98	30.34	143	44.27	12	3.72	32	9.91	38	11.76
Anytime tutoring	128	39.63	132	40.17	3	0.93	23	7.12	37	11.46
Bridges gap of technology skills of students	99	30.65	137	42.41	4	1.24	48	14.86	35	10.84
Timely feedback on students' work	119	36.84	143	44.27	6	1.86	21	6.50	34	10.53
Useful feedback on students' work	151	46.75	96	29.72	11	3.41	38	11.76	27	8.36
Overall Average	125.86	38.96	129.14	39.88	6.86	2.13	30.57	9.47	30.57	9.47

$N=323$

The table 4 describes the attitude of the respondents towards the role of artificial intelligence in saving time and making instructional process efficient and productive. The data analysis affirmed that 82.66% and 84.21% of the respondents were of the view that the use of artificial intelligence makes instructional process more efficient and responds well through its intelligent tutoring system (ITS) respectively. Similarly, 74.61% and 79.80% of the respondents were of the opinion that AI provides customized support & instruction to the students and extends facility of tutoring round the clock respectively. Even so, 73.06% of the university students acknowledged its role in bridging the gap of technology skills of the students as they can learn through ITS. Likewise, 81.11% and 76.47% of the respondents were of the opinion that by using artificial intelligence in instructional process their teachers provide timely according to the schedule and useful & objectivity-based feedback respectively on their work. In overall majority (78.84%) of the university students demonstrated their positive attitude towards the role of artificial intelligence in saving time and making instructional process more efficient and more productive.

2. Data Analysis of Questionnaire for Teachers

Findings from the data analysis of the questionnaire for university teachers are given below:-

Table 5. Opinion of university teachers on the role of artificial intelligence in promoting personalized instruction

Statement	Level of agreement									
	SA		A		UNC		DA		SDA	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Personalized Instruction										
Identify potential of individual student	82	41.84	98	50.0	2	1.02	11	5.61	3	1.53
Individualized instruction	78	39.80	102	52.04	3	1.53	7	3.57	6	3.06
Accommodating diversified learning styles of students	87	44.39	99	50.51	2	1.02	5	2.55	3	1.53
Easy instructional delivery	76	38.78	82	41.84	8	4.08	18	9.18	12	6.12
Innovative instructional styles	79	40.31	83	42.35	6	3.06	11	5.61	17	8.67
Maintaining interest of students	88	44.90	101	51.53	00	00	4	2.04	3	1.53
Overall Average	81.67	41.67	94.17	48.04	3.50	1.79	9.33	4.76	7.33	3.74

N□=196

The data analysis given in the table 5 reflects opinion of the university teachers on the role of artificial intelligence in facilitating them for personalized instructional delivery. According to the data given in the table 5; in overall 91.84% and 91.84% of the respondents were of the opinion

that artificial intelligence helps them in identifying learning potential of their students and imparting instruction on individual basis respectively. Similarly, 94.90% and 80.62% of university teachers viewed that it (artificial intelligence) facilitates them in accommodating diversified learning styles of their students and instructional delivery in a stress-free way i.e. it helps them in instructional delivery with peace of mind. According to 82.66% of the respondents artificial intelligence plays an important role in adopting innovative instructional styles (blended learning) whereas, 96.43% were of the opinion that it maintains interest of their students in their studies. In overall majority (89.71%) of the university teachers acknowledged the role of artificial intelligence in facilitating them for personalized instructional delivery.

Table 6. Opinion of the university teachers on the role of artificial intelligence in creating adapted groups of their students for their effective instruction

Statement	Level of agreement									
	SA		A		UNC		DA		SDA	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Creating Adapted Groups of Students/ Learners										
Enhancing learning skills	66	33.67	112	57.14	4	2.04	6	3.06	8	4.08
Developing motivation	59	30.10	113	57.65	3	1.53	9	4.59	12	6.12
Offering difficult learning tasks in easy way	60	30.61	109	55.61	5	2.55	8	4.08	14	7.14
Accommodating learners' pace	66	33.67	112	57.14	00	00	6	3.06	12	6.12
Enhancing learning ability of individual students	76	38.78	111	56.63	1	0.51	2	1.02	6	3.06
Fulfils learning needs of students	76	38.78	114	58.16	00	00	3	1.53	3	1.53
Overall Average	67.17	34.27	111.83	57.06	2.16	1.10	5.67	2.89	9.17	4.68

N=196

The table 6 indicates perception of the university teachers on the role of artificial intelligence in creating adapted learning groups of their students –for effectiveness of their instructional delivery and learning of students. The data analysis reveals that 90.81% and 87.75% of the respondents affirmed the role of artificial intelligence in enhancing technology-based learning skills and in developing motivation among their students respectively. Whereas, 86.22% and 90.81% of the respondents asserted that it plays an important in offering difficult learning tasks through easy activities and in accommodating learners' pace respectively when they [teachers] use it for instructional purpose. Even so, 95.41% and 97.94% of the respondents acknowledged that it aids instructional process by enhancing learning ability of their students individually and in fulfilling their learning needs respectively. In overall a prominent majority (91.33%) of the university teachers were of opinion that AI plays a useful role in creating adapted learning groups of their students –for effectiveness of their [teachers'] instructional delivery and learning of students.

Table 7. Opinion of university teachers about the role of artificial intelligence in maintaining objectivity and equality in instructional process

Statement	Level of agreement									
	SA		A		UNC		DA		SDA	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Objectivity and equality in instructional process										
Dissemination of right information to all students	77	39.29	117	59.69	00	00	2	1.02	00	00
Dissemination of up-to-date information to all students	78	39.80	118	60.20	00	00	00	00	00	00
Useful for inclusive classroom	86	43.88	110	56.12	00	00	00	00	00	00
Performing unbiased role in instructional process	96	48.98	99	50.51	00	00	1	0.51	00	00

Maintaining pace of instructional process	93	47.45	101	51.53	1	0.51	1	0,51	00	00
Facilitate students round the clock	90	45.90	103	52.55	2	1.02	1	0.51	00	00
Overall Average	86.67	44.22	108	55.1	0.5	0.26	0.83	0.42	00	00

N□=196

The table 7 demonstrates the viewpoint of the university teachers about the role of artificial intelligence in maintaining objectivity and equality in instructional process. The table portrays that 98.98% and all i. e. 100% of the respondents acknowledged the role of artificial intelligence in disseminating the right and up-to- date/ latest instructional information respectively to all of their students without any discrimination. Similarly, all (100%) and 99.49% of the respondents affirmed that artificial intelligence plays a useful role for the challenged students in inclusive classrooms and it makes the instructional process unbiased and/ or equitable respectively. Likewise, 98.98% and 98.45% of the respondents acknowledged the role of artificial intelligence in instructional process to be useful in maintaining pace of the instruction and in facilitating their students round the clock. In overall almost all (99.23%) of the university teachers acknowledged the role AI in maintaining objectivity and equality in instructional process.

Table 8. Opinion of the respondents about the role of artificial intelligence in saving time and making instructional process efficient and productive

Statement	Level of agreement									
	SA		A		UNC		DA		SDA	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Time saving										
Efficient instructional process	89	45.41	106	54.08	1	0.51	00	00	00	00
Intelligent tutoring system	81	41.33	98	50.0	00	00	11	5.61	6	3.06
Provide customized support and instruction	86	43.88	98	50.0	2	1.02	4	2.04	6	3.06

Anytime tutoring	83	42.35	105	53.57	1	0.51	3	1.53	4	2.04
Bridges gap of technology skills of students	97	49.49	98	50.0	1	0.51	00	00	00	00
Timely feedback on students' work	105	53.57	91	46.43	00	00	00	00	00	00
Useful feedback on students' work	102	52.04	94	47.96	00	00	00	00	00	00
Overall Average	91.86	46.87	98.57	50.29	.71	0.36	2.57	1.31	2.29	1.17

N□=196

The table 8 illustrates perception of the respondents about the role of artificial intelligence in saving time and making instructional process more efficient and more productive. The data analysis acknowledged that 99.49% and 91.33% of the respondents were of the view that the use of artificial intelligence makes instructional process more efficient and responds well through its intelligent tutoring system (ITS respectively to facilitate the students. Similarly, 93.88% and 95.92% of the respondents were of the view that it provides customized support & instruction to their students and extends the facility of intelligent tutoring round the clock (according to demand or need of the students) respectively. Even so, 99.49% of the university teachers acknowledged its role in bridging the gap of technology skills of their students as they can learn through ITS. However, all i. e. 100% of the respondents were of the opinion that by using artificial intelligence in instructional process they [i. e. teachers] provide timely according to the schedule and useful & objectivity-based feedback respectively on the work of their students. In overall the prominent majority (97.16%) of the university teachers affirmed the role of AI in saving time and making instructional process more efficient and more productive.

4. Discussion and Conclusion

This study demonstrated positive attitude of university students and teachers towards AI and its instructional role which is encouraging not only for the respondents but the administrators and policy makers also. The study affirmed that in overall majority (75.44% and 89.71%) of the university students and teachers were of the view that artificial intelligence promotes personalized

learning as well as personalized instruction. This corresponds with the assertion of the AAAI (2008) and results of the study of Srinivasan, and Chawla (2017) that the intelligent system –the artificial intelligence facilitates the teacher even in the classroom (AAAI, 2008) by providing "more flexible and personalized models of learning" which is demand of the students in 21st century (Srinivasan, & Chawla, 2017, p.4). Similarly, this study affirmed that majority (79%) of the university students and a prominent majority (91.33%) of the university teachers were of opinion that AI plays a useful role in creating adapted learning groups of their students –for effectiveness of their [teachers'] instructional delivery and learning of students. Alike finding were reported by corresponding studies which asserted that AI promotes personalized learning or tailoring instruction to fit individually with student's learning needs; and blended instruction i.e. embracing technology in face-to-face interaction (Sisodiya, & Singhal, 2019; Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). It would increase learning performance and decrease gaps of achievement among students. The personalized learning is advised to increase independence and motivation of students to learn and their engagement in academic activities for better achievement (Sisodiya, & Singhal, 2019; Lu, & Harris, 2018; Woolf, 2015).

Even so, it was acknowledged by the overall majority (73.18%) of the university students and almost all (99.23%) of the university teachers acknowledged the role AI in maintaining objectivity and equality of and/ or in the instructional process. Likewise, this study asserted that the overall majority (78.84%) of the university students and a prominent majority (97.16%) of the university teachers demonstrated their positive attitude towards the role of artificial intelligence in saving time and making instructional and learning process more efficient and more productive. The results of the study are supported by the results of some previous studies which described that artificial intelligence (AI) is being used in education at an enhanced momentum. It plays an important role in effective instructional process at university level (Garrido, 2012). It is promoting opportunities of personalized, flexible and customized learning (Srinivasan & Chawla, 2017) meaningful feedback on students' performance and makes instructional process more interesting (Popenici & Kerr, 2017; Mason, Khan & Smith, 2016). It makes instructional process easy and efficient by presenting information in a logical-way (Hearst, 1994; Luger, 2009; Russell, & Norvig, 2010). This situation urges particularly the institutions of higher education and universities to be empowered with innovations i.e. new digital technologies –the artificial intelligence to meet the

learning demands of students by changing the ways and means of instructional delivery according to the changing learning contexts or environments (Ma, 2019; US GAO, 2018).

Reasonably, here one may raise a questions that, "Would artificial intelligence replace human teaching"? The answer wouldn't be affirmative as in current scenario it seems unlikely and unrealistic to happen that AI can replace the 'human teaching' (Ocaña-Fernandez, ValenzuelaFernandez, & Garro-Aburto, 2019) which is of much more significance in the age of machines' learning. Although AI can transfer knowledge i.e. can teach in a better way than people or humans do but character building i.e. cultivation of pro-social behavior, ethics and morality polished with love and affection are still big challenges to address (Zeide, 2019; Zhao & Liu, 2018). It may work as a direction for the future researcher(s) to address these issues.

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