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Artificial Intelligence in Education: Teacher and Teacher Assistant Improve Learning Process

Anant Krishna Parab
Academic Research Student, Department of Information Technology, B.K. Birla College of Arts, Science and Commerce (Autonomous) Kalyan, Thane, India

Abstract: Artificial Intelligence is a technology that plays a major role in education. Nowadays AI is a part of our daily life. Many educational organizations work with the government to implement better AI facilities in education. In this paper, I argue that the human teacher is better than the robot teacher. Lack of human contact is the main issue with robot teachers. Robots are advanced but can't replace teachers instead of this if we can use a voice assistant as a teacher assistant. Voice assistants like Alexa, Siri, Amazon Echo can be used by teachers. Voice assistant able to record audio, can make calls, send messages, give GPS information. The main approach of this paper is to help teachers in their routine work, so teachers can more concentrate on students' progress.

Keywords: Artificial Intelligence, Education, Human teacher, Robot teacher, Student, Voice assistant.

I. INTRODUCTION

Artificial intelligence is one of the emerging technology in the 21st century. AI deals with human-machine interaction. It is nothing but training machines to act like human beings. Applications of AI involves NLP (Natural Language Processing), Speech recognition. AI plays a major role in the education field. AI affects almost every branch of education. Nowadays many AI tools are used in schools, which are very useful for teachers and students. Robot teachers having knowledge but cannot replace teachers. Human teachers are more reliable and comfortable. Sometimes students not able to share doubt with teachers but human teachers can be more student-friendly so can explain concepts in ways that the student can understand better. The human teacher is more effective than the robot teacher. Instead of replacing teachers with robots, we can give voice assistant to teachers. It will also increase the teacher's knowledge related to the subject. Teacher and voice assistant can work together for better learning. Now a day's voice assistant like Siri, Alexa, Cortana is used in day to day life. Technologies like NPL, speech synthesis are embedded in voice assistants. Voice assistants are able to record voice, store information. Using voice assistant teachers can set reminders for activities, events. Voice assistant also helpful for students. Voice assistant can solve simple math calculations, can frame sentences, can give information about the subject. So, the voice assistant is best for students as well as teachers.

II. OBJECTIVES

A. To understand the human teacher or robot teacher is best for students in the classroom.
B. To help teachers in their routine tasks.

To achieve the above objective following hypotheses are proposed using survey analysis: -

1) *H1:* "Instead of a robot teacher, a human teacher is more effective in the classroom. The human teacher can understand the student's behavior correctly and guide student's accordingly."
2) *H2:* "The combination of Voice assistant and Teacher within the learning process helps teachers in various necessary tasks. Teachers can more concentrate on students' progress."

III. LITERATURE REVIEW

In [1], Edwards, B. I. et al experimented the use of PERT (Physically – Embodied Robot Teacher) in the classroom due to the shortage of teachers in schools. The authors experimented with the use of the Sota robot in the classroom. The robot was small, legless, and portable. Voice recognition, speech synthesis were some functions of the robot. The robot interacts with students and conducted a quiz in the classroom. Students responded to the quiz using CRC (Classroom Response System). The robot also conducted a discussion session with students regarding the quiz. The research paper tried to prove that the robots were ready to replace teachers. In [2], Edwards, B. I. et al continues research on PERT (Physically – Embodied Robot Teacher) and focus on the benefits of social and conceptual learning in high school. In [3], Sharkey, A. J. C. discuss 4 scenarios of the robot: 1) Robot as classroom teacher 2) Robot as a companion and peer 3) Robot as core – eliciting companion 4) Telepresence robot, etc. and further

discuss ethical concerns about robot teacher like data privacy, lack of human contact, etc. In [4] Ikedinachi A. P. et al stated that AI played important role in a smart classroom.

The main approach of AI was to support teachers and take over their time-consuming tasks such as record-keeping, grading, etc. So, teachers can more concentrate on a one-to-one interaction with every student. In [5], Dousay, T. A., & Hall, C. proposed the use of smart speakers like Alexa, Amazon Echo as a virtual assistant in the classroom for teachers as well as students. These devices could operate through voice commands. The authors proposed the use of Alexa as a teacher assistant which helps teachers in various necessary tasks. Alexa could be used for students as a learning assistant. In [6], Terzopoulos, G., & Satratzemi, M. proposed the use of voice assistant in the classroom to help students and teachers. The authors stated the functions and capabilities of the voice assistant.

IV. METHODOLOGY

Two online surveys were held using Google Forms. The link of the forms was circulated in different social media platform. The questionnaires in the forms were designed to test the proposed hypothesis which verified certain parameters.

1) Participants

2) To test the proposed hypothesis, this study used two conditions i.e. Reliability and Comfort. In the first survey which was held for students where a total of 67 participants data was collected from different states of India. Among the 67 participants, 47.8% were male, and the remaining 57.2% were female. In the second survey which was held for teachers where a total of 48 participants' data was collected from different states of India. Among the 48 participants, 60.4% were male, and the remaining 39.6% were female.

3) Measures

a) Students Survey

b) Observed Value

Gender	Human Teacher	Robot Teacher	Total
Male	24	8	32
Female	30	5	35
Total	54	13	67

Table I

There exists a simple formula to calculate the expected for any value in the above table.

➢ *Formula*

Expected Value = (row total) * (column total) / (grand total)

➢ *Expected Value*

$E_{11} = \frac{32 \times 54}{67}$ $E_{12} = \frac{32 \times 13}{67}$ $E_{21} = \frac{35 \times 54}{67}$ $E_{22} = \frac{35 \times 13}{67}$

$E_{11} = 25.79104478$ $E_{12} = 6.208955224$ $E_{21} = 28.20895522$ $E_{22} = 6.791044776$

Gender	Human Teacher	Robot Teacher	Total
Male	25.79104478	6.208955224	32
Female	28.20895522	6.791044776	35
Total	54	13	67

Table II

Degree of freedom = (Rows-1) x (Columns-1)

= (2-1) x (2-1)

Degree of freedom = 1

The formula for Chi-Square is

$X^2 = \sum \frac{(O_i - E_i)^2}{E_i}$ Where, O_i = Observed Value, E_i = Expected value

$= [\frac{(24-25.79104478)^2}{25.79104478} + \frac{(8-6.208955224)^2}{6.208955224} + \frac{(30-28.20895522)^2}{28.20895522} + \frac{(5-6.791044776)^2}{6.791044776}]$

$= [0.12437811 + 0.516647531 + 0.113717129 + 0.472363457]$

$X^2 = 1.227106227$

Thus, the value for x^2 is 1.227106227

- Teachers Survey
- Observed Value

Gender	Yes	No	Total
Male	24	5	29
Female	13	6	19
Total	37	11	48

Table III

There exists a simple formula to calculate the expected for any value in the above table.

- *Formula*

Expected Value = (row total) * (column total) / (grand total)

- *Expected Value*

$E_{11} = \frac{29 \times 37}{48}$ $E_{12} = \frac{29 \times 11}{48}$ $E_{21} = \frac{19 \times 37}{48}$ $E_{22} = \frac{19 \times 11}{48}$

$E_{11} = 22.35417$ $E_{12} = 6.645833$ $E_{21} = 14.64583$ $E_{22} = 4.354167$

Gender	Yes	No	Total
Male	22.35417	6.645833	29
Female	14.64583	4.354167	19
Total	37	11	48

Table IV

Degree of freedom = (Rows-1) x (Columns-1)

= (2-1) x (2-1)

Degree of freedom = 1

The formula for Chi-Square is

$X^2 = \sum \frac{(O_i - E_i)^2}{E_i}$ Where, O_i = Observed Value, E_i = Expected Value

$= [\frac{(24-22.35417)^2}{22.35417} + \frac{(5-6.645833)^2}{6.645833} + \frac{(13-14.64583)^2}{14.64583} + \frac{(6-4.354167)^2}{4.354167}]$

$= [0.1211745455 + 0.4075886746 + 0.1849506917 + 0.6221089508]$

$X^2 = 1.3358228626$

Thus, the value for x^2 is 1.3358228626.

V. EXPERIMENT

The test scores of independent samples were calculated at the confidence level of 95 percent using the chi-square test. The participants presented multiple questions in the test, in the first survey which is for students' questions like (e.g. have you learned from a robot teacher in the classroom? According to you which teacher is best?). so, the calculated chi value is 1.227106227, and the tabulated chi value is 3.84 at significance level 95 percentage with the degree of freedom 1. In the second survey which is for teachers' questions like (e.g. Have you use any assistant in the classroom? What do you think that a voice assistant will help teachers? Will you use voice assistant as your assistant?) so, the calculated chi value is 1.3358228626 and tabulated chi value is 3.84 at significance level 95 percentage with the degree of freedom 1.

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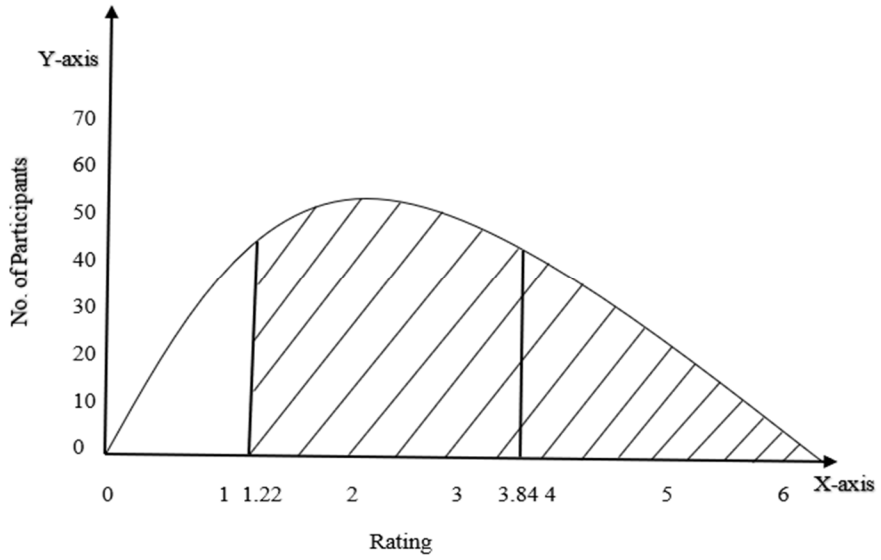

Fig 1: Statistics of Chi-square test for students

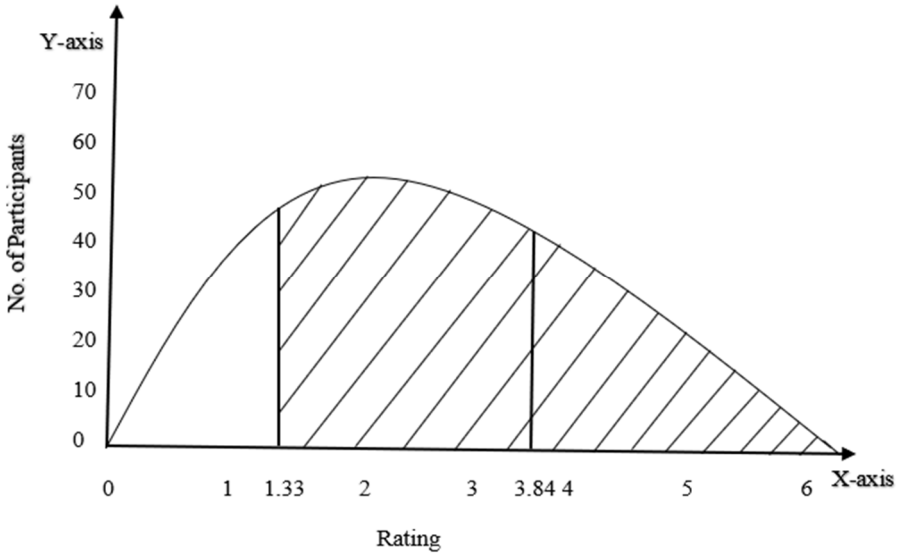

Fig 2: Statistics of Chi-square test for teachers

VI. RESULT

The test scores of independent samples calculated using chi-square test using survey analysis resulted that in the first survey participants(students) more comfortable with a human teacher. The human teacher is more reliable and comfortable for students. The human teacher is more student-friendly and can explain concepts better to students. Therefore, the hypothesis "H1" is accepted. In the second survey participants(teachers) better comfortable with a voice assistant. Voice assistant can help teachers in necessary tasks Thus, the hypothesis "H2" is accepted.

VII. LIMITATIONS And FUTURE SCOPE

This study has many limitations. The research further extended by expanding the population with different levels (e.g. school, college, etc.) of students. At a different level, the perceptions of students might different. The voice assistant is not practically implemented with teachers. Robot teacher is also not practically implemented in the classroom. In the future, researchers can compare robot teachers and human teachers in different qualities. Voice assistant not able to speak all languages. The research on the voice assistant is limited. Teachers need to well-trained in the working of voice assistants. Voice assistant is less secure.

VIII. CONCLUSION

In education, student performance is an important factor that can be completed by human teachers. The human teacher is more reliable and comfortable for students. Human teachers easily understand students' doubts related to the subject. Students having proper communication and understanding with a human teacher which is sometimes not possible by robots. Voice assistant helps teachers in their necessary tasks.

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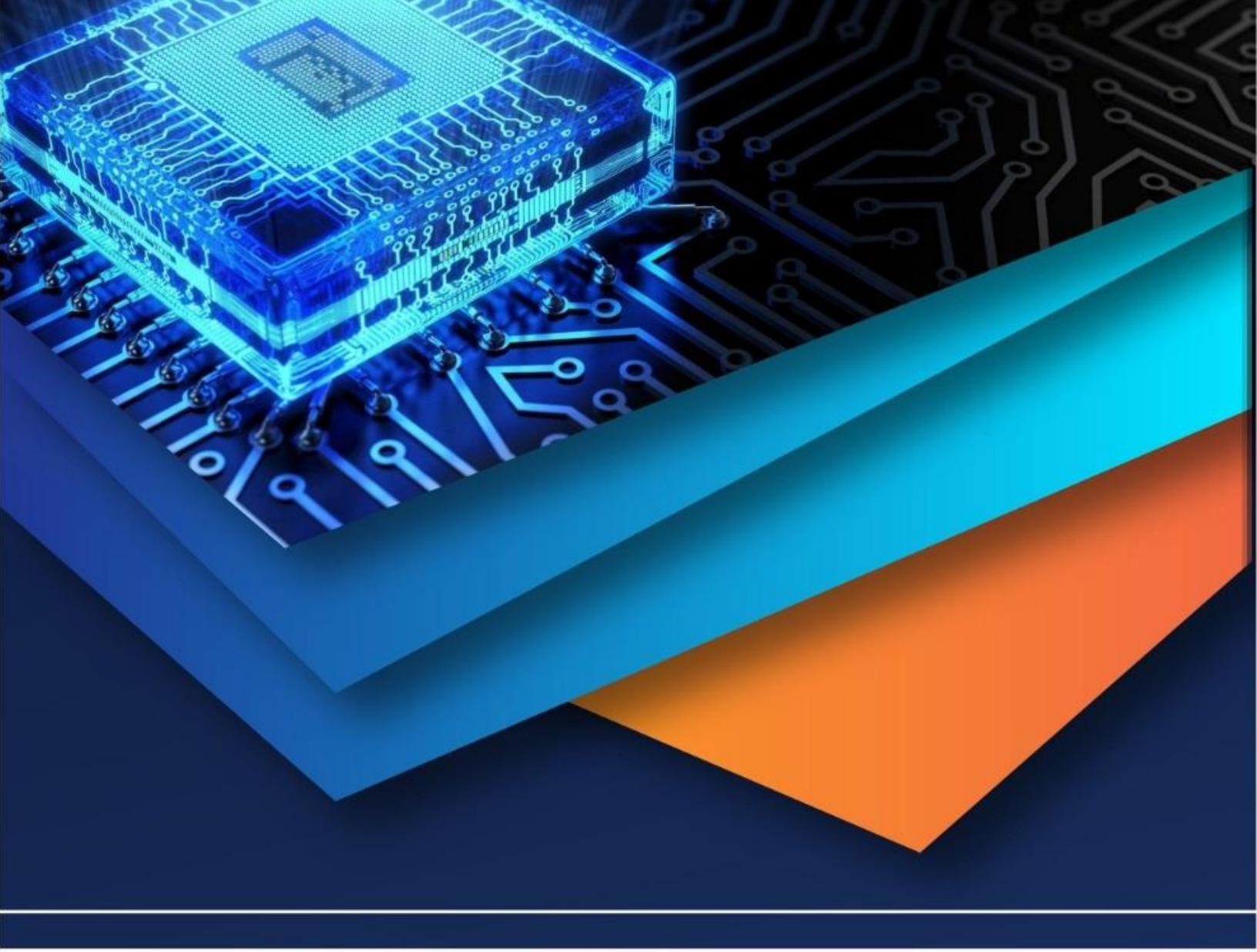
REFERENCES

[1] Edwards, B. I., & Cheok, A. D. (2017). Why not Robot Teachers: Artificial Intelligence for Addressing Teacher Shortage. Imagineering Institute, IDM Lab, Nusajaya, Johor. Malaysia, 1–19. https://doi.org/10.20944/preprints201712.0022.v1
[2] Edwards, B. I., Muniru, I. O., Khougali, N., Cheok, A. D., & Prada, R. (2018). A Physically Embodied Robot Teacher (PERT) as a Facilitator for Peer Learning. 2018 IEEE Frontiers in Education Conference (FIE), 1–9. https://doi.org/10.1109/fie.2018.8658445
[3] Sharkey, A. J. C. (2016). Should we welcome robot teachers? Ethics and Information Technology, 18(4), 283–297. https://doi.org/10.1007/s10676-016-9387-z
[4] Ikedinachi A. P. WOGU, Misra, S., Assibong, P. A., Olu-Owolabi, E. F., Maskeliūnas, R., & Damasevicius, R. (2019). Artificial Intelligence, Smart Classrooms and Online Education in the 21st Century. Journal of Cases on Information Technology, 21(3), 66–79. https://doi.org/10.4018/jcit.2019070105
[5] Dousay, T. A., & Hall, C. (2018). Alexa, tell me about using a virtual assistant in the classroom. Proceedings of EdMedia: World Conference on Educational Media and Technology, 1413–1419. https://www.learntechlib.org/primary/p/184359/
[6] Terzopoulos, G., & Satratzemi, M. (2019). Voice Assistants and Artificial Intelligence in Education. Proceedings of the 9th Balkan Conference on Informatics, 1–6. https://doi.org/10.1145/3351556.3351588
[7] Orlando, S., Gaudioso, E., & De La Paz, F. (2020). Supporting Teachers to Monitor Student's Learning Progress in an Educational Environment With Robotics Activities. IEEE Access, 8, 48620–48631. https://doi.org/10.1109/access.2020.2978979
[8] Ilhan, K., Music, D., Junuz, E., & Mirza, S. (2017). Scarlet - Artificial Teaching Assistant. 2017 International Conference on Control, Artificial Intelligence, Robotics & Optimization (ICCAIRO), 11–14. https://doi.org/10.1109/iccairo.2017.11
[9] Kim, J., Merrill Jr., K., Xu, K., & Sellnow, D. D. (2020). My Teacher Is a Machine: Understanding Students' Perceptions of AI Teaching Assistants in Online Education. International Journal of Human–Computer Interaction, 1–10. https://doi.org/10.1080/10447318.2020.1801227
[10] Morita, T., Takahashi, N., Kosuda, M., & Yamaguchi, T. (2019). A Teaching Assistant Robot Design Tool Based on Knowledge Chunks Reuse. 2019 IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC), 68–73. https://doi.org/10.1109/compsac.2019.10185
[11] Timms, M. J. (2016). Letting Artificial Intelligence in Education Out of the Box: Educational Cobots and Smart Classrooms. International Journal of Artificial Intelligence in Education, 26(2), 701–712. https://doi.org/10.1007/s40593-016-0095-y
[12] Mondal, K. (2019). A Synergy of Artificial Intelligence and Education in the 21st Century Classrooms. 2019 International Conference on Digitization (ICD), 68–70. https://doi.org/10.1109/icd47981.2019.9105727
[13] Popenici, S. A. D., & Kerr, S. (2017a). Exploring the impact of artificial intelligence on teaching and learning in higher education. Research and Practice in Technology Enhanced Learning, 12(1), 1–13. https://doi.org/10.1186/s41039-017-0062-8N
[14] Higuera, C. . d. e. . l. a. (2019). A report about Education, Training Teachers and Learning Artificial Intelligence: Overview of key issues. Universite de Nantes, 1–12. https://www.k4all.org/wp-content/uploads/2019/11/Teaching_AI-report_09072019.pdf
[15] Shi, W., Liu, X., Gong, X., Niu, X., Wang, X., Jing, S., Lu, H., Zhang, N., & Luo, J. (2019). Review on Development of Smart Education. 2019 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI), 157–162. https://doi.org/10.1109/soli48380.2019.8955052
[16] Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? International Journal of Educational Technology in Higher Education, 16(1), 1–27. https://doi.org/10.1186/s41239-019-0171-0
[17] Rajagopal, A., & Vedamanickam, N. (2019). New Approach to Human AI Interaction to Address Digital Divide& AI divide: Creating an Interactive AIplatform to Connect Teachers & Students. 2019 IEEE International Conference on Electrical, Computer and Communication Technologies (ICECCT), 1–6. https://doi.org/10.1109/icecct.2019.8869174
[18] Hernandez-Ortega, J., Daza, R., Morales, A., Fierrez, J., & Ortega-Garcia, J. (2019). edBB: Biometrics and Behavior for Assessing Remote Education. BiDA Lab., Universidad Autonoma de Madrid, Spain, 1–7. https://arxiv.org/abs/1912.04786
[19] Molnar, G., & Szuts, Z. (2018). The Role of Chatbots in Formal Education. 2018 IEEE 16th International Symposium on Intelligent Systems and Informatics (SISY), 000197–000202. https://doi.org/10.1109/sisy.2018.8524609
[20] United Nations Educational, Scientific and Cultural Organization. (2019). Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development. United Nations Educational, Scientific and eCultural Organization, 1–47. https://en.unesco.org/news/challenges-and-opportunities-artificial-intelligence-education



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