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Artificial Intelligence Revolution: Shaping the Future of Millennials

Muhammad Waleed [1], Eman [2], Furrukh Bashir [3], Ismat Nasim[4]

[1] Research Scholar, School of Economics, Bahauddin Zakariya University, Multan, Pakistan.
Email: waleedansari490@yahoo.com
[2] Research Scholar, School of Economics, Bahauddin Zakariya University, Multan, Pakistan.
Email: emanakhter260@gmail.com
[3] Assistant Professor, School of Economics, Bahauddin Zakariya University, Multan, Pakistan.
Email: furrukh@bzu.edu.pk
[4] Lecturer, Department of Economics, The Government Sadiq College Women University, Bahawalpur, Pakistan.
Email: ismat.nasim@gscwu.edu.pk

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ABSTRACT

This paper explores the multifaceted impact of the artificial intelligence (AI) revolution on millennials, examining current research on how AI integration affects millennials in education, healthcare, relationships, and communication. An analysis of 68 articles from academic journals and digital platforms shows that AI is empowering learning through personal platforms, improving access to healthcare through telemedicine, and creating new opportunities and challenges for millennials. The effect of Artificial Intelligence in the form of opportunities and challenges in this study is important because it is relevant to the area of research, artificial intelligence, and millennials. Based on this literature-based analysis, the study finds that AI has a positive impact on millennials' education, health, relationships, and communication.

Corresponding Author's Email: furrukh@bzu.edu.pk

1. Introduction

Think of a world where machines can learn, think, and perform different jobs better than humans perform. This is reality, not science fiction and that is happening right now. Artificial intelligence or AI is changing our lives from education to health to communication and relationships while living in a society. How does this affect the millennials, the generation that grew up in technology? But how will this affect the millennials (1981-1996) who grew up in the technology and now are adults (26-44 years) Peng, Zhu, Wang, and Ren (2020) Pew Research Center (2014)? When automation is discussed, we have to explain two things, Artificial Intelligence (AI) and Robotic Process Automation (RPA). AI is self-learning and it can adapt and learn over time. While RPA cannot perform the tasks itself but could perform those tasks for what it was programmed. It cannot adapt and learn like AI. While AI can perform uncertain and monotonous tasks performed by humans, it also uses logical reasoning that lets it simulate human thinking (SANDA, 2022; Singh, 2021). Those people are called millennials or Gen Y who were born between 1981 and 1996 and in the period of technological progress, they entered into maturity (Pew Research, 2019). The generation before them also witnessed technological advancement in the form of the internet and personal computers while millennials have blossomed into an automated world with the latest technology smartphones and social media (Pew Research Center, 2014). Their characteristics will be explained further. Millennials are the most different generation from the previous ones in history. Researchers are trying to explore the impact of AI on the millennials. They are writing different articles and making publications to look at different sides of this topic. Different challenges are faced by the millennials due to the integration of AI in the different areas of their life such as education, communication relationships, and health. Undoubtedly, AI is changing millennials' lives but the future effects of AI on millennials cannot be predicted completely which are to be seen in the

future. The empirical analysis shows AI has caused changes in spheres like education, health, and communication relationships. In the healthcare industry AI is improving the daily routine tasks of healthcare practitioners allowing them to spend more time with their patients and also raising staff morale and improving retention (McKinsey & Company, 2020).

Millennials benefit from AI-powered applications and chatbots, which provide them with basic health facilities and advice. Telemedicine uses AI remote medical monitoring and consultations. Thus, millennials take comfort in virtual solutions (Chen & Decary, 2020). Some studies show that AI companions and chatbots replacing human emotional connections as well as limiting interpersonal growth (Dhimolea, Kaplan-Rakowski, & Lin, 2022). Chatbots deliver cognitive behavioral therapy (CBT) to millennials or young adults with moderate anxiety and depression while virtual assistants promote healthy eating and physical activities (Fitzpatrick, Darcy, & Vierhile, 2017; Maher, Davis, Curtis, Short, & Murphy, 2020). AI is also helping students as well as teachers in the education sector. With time, the advancements made in AI are making learning easier. The contribution of AI in education in the form of adaptive AI learning platforms is highly appreciated. These platforms help students when they face difficulty in the learning in form of tailored content according to their learning abilities (Liu, Chen, & Yao, 2022). Another example is Google Clouds' Interactive Tutor a student-facing AI-powered app is available which provides personalized learning for students (Butschi, 2021). The Impacts span challenges like reduced human interaction as well as job losses and advantages like personalization and convenience. Experts research across disciplines and their forecasting helps us understand AI's role in shaping millennials future. This paper aims to know the effect of AI, on millennials in different facets of their lives, which are, education, health, relationships, and communication. The effect of AI in the form of opportunities and challenges in this study is important because it is relevant to research, AI, and millennials. It will help the policymakers and stakeholders better understand the problem regarding these opportunities and challenges, so they can create more opportunities and mitigate the challenges for them. This study is ranked into four parts. The first part examines the AI revolution and the understanding of millennial characteristics. The second division investigates AI integration in education, opportunities such as personalized learning, and challenges such as the digital range. The third division concerns the impact of AI on health including the uses of telemedicine and the boundaries of chatbots. The fourth section examines the impact of AI on relationships, and communication, including the benefits gained but tells the risks of diminishing human connections. The last division gives the study methodology using a frequent review to analyze 68 articles on the impact of AI on millennials on education, health, and social dynamics.

1.1. Understanding the Artificial Intelligence Revolution

The latest advances in AI have been encouraged by innovations in computing power, data availability, and machine learning algorithms that allow systems to learn from data (Russell & Norvig, 2010). These advanced AI systems can execute chores such as classification, prediction, speech, and image identification that have historically needed human intellect (Jordan, 2015). The performance of society is transformed by the combination of Artificial intelligence in numerous industries (Bughin, Seong, Manyika, Chui, & Joshi, 2018). Nevertheless, AI methods are restricted in logic, originality, and general intellectual areas (Darwiche, 2018). AI is becoming more commonplace so responsible management and ethical deliberation are essential (Floridi et al., 2021).

1.2. The Millennial Generation: Traits and Characteristics

Understanding the millennial generation is important to know how AI's revolution is uniquely influencing their future. Millennials also known as Generation Y or individuals born between the early 1980s and the mid 1990s, shaped by the socio-economic shifts and technological advancements exhibit the unique traits and characteristics that make them different from previous generations.

1.2.1. Digital Natives

Millennials grow up surrounded by technology and from a very young age, they become proficient in using cell phones, computers, and the internet. Therefore, interacting with digital devices is natural to them and this comfort with technology shapes how they engage with AI

services and platforms. They do not view AI to be alarming instead, AI feels like an extension of the high-technology world in which they were born (Pew Research Center, 2014, 2019).

1.2.2. Purpose-driven

Millennials desire job opportunities that synchronize with their standards, focusing on sustainability and social impact. According to a study, millennials are frequently driven by a feeling of intention and significance in their endeavors (Deloitte, 2020). The capacity of AI to generate advantageous developments and tackle worldwide issues largely resonates with this generation.

1.2.3. Connectivity and social media

Millennials spend most of their time on social media, platforms, or virtual communities like Facebook, Twitter, and Instagram making connections with other people (Nirmala & TK, 2019). Therefore, the reason behind remaining online on Facebook is that they see stuff that is just right for them like posts, videos, and ads (SANDA, 2022). Thanks to the AI smart suggestions, it is like having a personal assistant that knows what they want to interact with.

1.2.4. Continuous learning

Millennials' utmost desire to gain knowledge and their personal as well as professional growth is the heart of this way of thinking. With the concept of lifelong learning, millennials will not only secure their future but also contribute to the future knowledge that can be easily shared and accessible by all. (Kurian, 2017).

2. Education

2.1. AI Integration in Education and Learning

In the past years, artificial intelligence has been used in many areas including artificial intelligence education (AIEd) applications and research is increasing with time. AIEd personalized learning and assessment tools are used to enhance educational efficiency. Millennials are the largest in numbers after the GenXers in education as teachers (Franco, 2023). With the help of AIEd technology, teachers can provide students with educational experiences that are captivating and tailored. AIEd tools are helpful for the students providing one-to-one tutoring in every subject, to each student. It also provides such tools that will be used more in the future making teaching and learning easier. Here, the question arises: 'Will it replace teachers in the future?' The answer is 'NO'. It will not replace teachers in the future. If these AIEd tools are carefully employed teaching skills will be used more leveraged and augmented (Luckin & Holmes, 2016). In the changing scene of the 21st century, man-made intelligence (AI) has turned into a necessary piece of almost every part of our lives, including education and learning. Students with disabilities also get benefits from AI (Duggan & Knyazeva, 2020). This section will explain how AI is changing the learning climate and improving instructive excursions for the millennials.

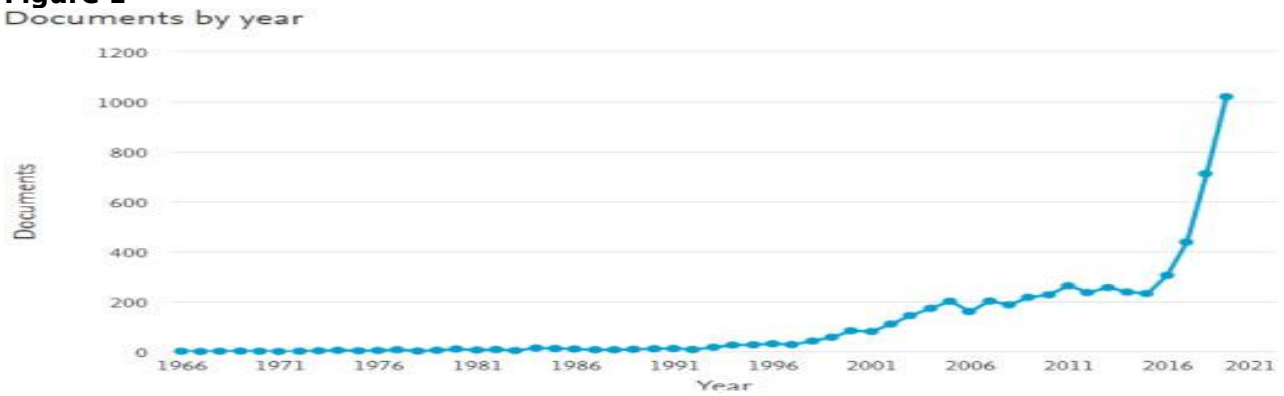
2.2. Personalized Learning Journey

A personalized e-learning system provides enhanced learning to its users, which provides specific content customized for the learners. AI-integrated personalization is a method in which suitable content for each learner is established by grasping the learner's understanding and his or her preferred mode of learning. It is quite different from the traditional e-learning system, which provides similar content (Murtaza, Ahmed, Shamsi, Sherwani, & Usman, 2022). Learning abilities vary from one student to another. Due to advancements in AI now, we can teach them better based on their abilities. With the help of Artificial Intelligence, it is now possible to know how each student is doing in his/her studies and how we can teach them better based on their abilities. For instance, with the use of AI, every student could get lessons based on his/her abilities and also could get help when they need it. Dream Box uses AI algorithms to set math questions based on students' intellect. Statistics: According to a report 93% of educators believed that educational technology with AI has a positive impact in a way that it helps students become engaged more in learning and it definitely improves their results. The other example is Carnegie Learning's Mika, an AI-powered platform that provides individualized lessons and practices according to the student's strengths and weaknesses. When a student struggles with the math concept, Mika provides extra video lessons, extra practice problems, and hints to overcome gaps in understanding. This makes sense, on the other hand, there is one teacher teaching the whole class or one-size-fits-all, like in traditional classrooms (Bill and Melinda Gates Foundation, 2015).

2.3. Virtual Teaching Assistants

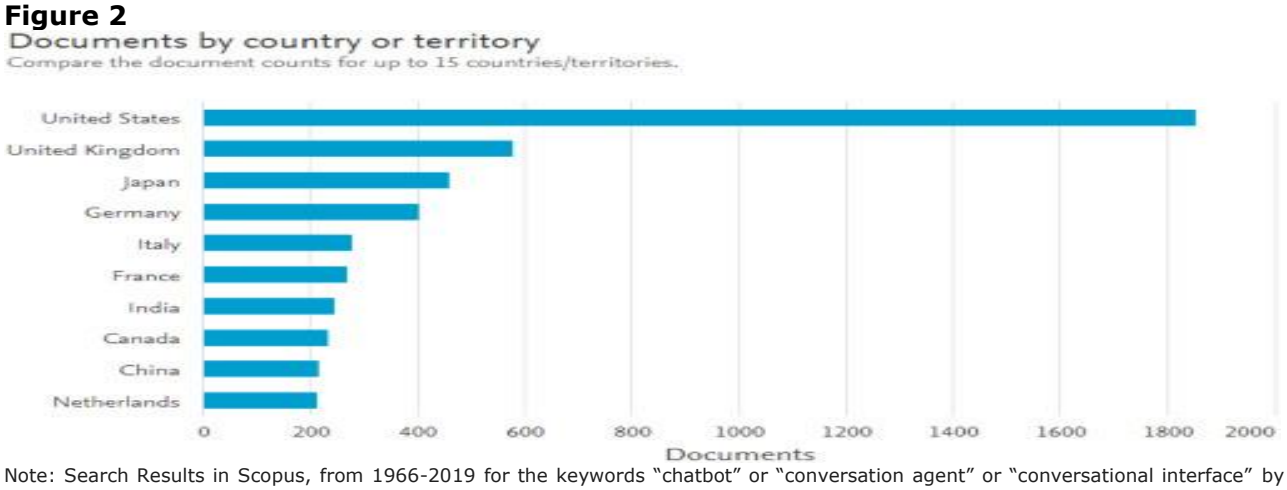
A question asked by Alan Turing in 1950, what if humans could talk with a computer program without realizing that, their conversation partner is not a human? This was the question that was known as the "Turing Test" and considered the productive idea of chatbots. A chatbot is a computer program made to make conversation with human users or with other chatbots with chatty replies to written or verbal texts, over the internet (Khanna et al., 2015). Chatbots like Watson and Mika are AI-powered tutoring platforms, examples of virtual teaching assistants (Adamopoulou & Moussiades, 2020; Bill and Melinda Gates Foundation, 2015). There has been rapid growth in the development of chatbots since 2016 that could be used for different purposes in different areas of life. There has been rapid growth in the development of chatbots since 2016 that could be used for different purposes in different areas of life. The figure below shows the Scopus search results from the evolution of chatbot development history (Adamopoulou & Moussiades, 2020).

Figure 1



Note: Search Results in Scopus, from 1966-2019 for the keywords "chatbot", conversation agent, or conversational interface.

Figure 2



Note: Search Results in Scopus, from 1966-2019 for the keywords "chatbot" or "conversation agent" or "conversational interface" by country.

Students are connected to digital companions around the clock who can help them understand complex ideas, give explanations, or respond to queries. By helping students with administrative responsibilities and academic support, Georgia State University's AI chatbot 'Pounce' facilitates the adjustment to university life smoother, and also proved helpful in increasing enrolment by 3.3 percent with its pre-enrolment targeted instructions reducing stress on the university staff. In education, chatbots are helpful for the students in their learning by providing old lessons they had missed. During the course, chatbots gather information, which improves teaching as well as the learning process. Millennials want to learn through technology-based methods in education and they want to learn things at their own pace. They are early adopters of the technology. As compared with Gen Z, millennial students are more careful and suspicious regarding the use of AI technologies in education (Chan & Lee, 2023). According to the UNESCO Report 2019, Artificial intelligence in education creates the following opportunities and challenges.

2.3.1. Opportunities

AI-integrated learning platforms are like having a teacher who understands you better and knows how you learn best. It can help tailor instruction to individual student's needs and abilities. AI-integrated platforms can connect remote workers for team projects. AI can help in analyzing trends across schools and classrooms to inform system-level policies. Expanding access to education in remote areas through virtual teaching assistants and chatbots. Automating some tasks of student assessment to reduce teacher workload. AI can grade certain assignment types. AI tools can help adults to continuously develop new skills according to the workplace demand. AI can help tailor instruction to individual students' needs and abilities.

2.3.2. Challenges

AI research should be made in education, more relevant to real-world teaching practices and constraints instead of focusing on the development of the programs and algorithms. The need for the development of modern infrastructure for AI, including servers, electricity, and connectivity, poses a significant obstacle for developing countries. Mitigating the digital skills gap for both teachers and students is imperative to enable them to effectively utilize AI technologies. Mere access to AI tools is insufficient. Several education systems lack the capacity for extensive data collection and management. Whereas AI relies on a substantial amount of high-quality data. Offering culturally relevant content, especially in local languages, significantly constrains the utility of AI tools. Promoting ethical and transparent use of student data is essential. There are certain risks regarding privacy, monitoring, and biases integrated into AI systems. A clear governance framework is needed.

2.3.3. Gamified Learning

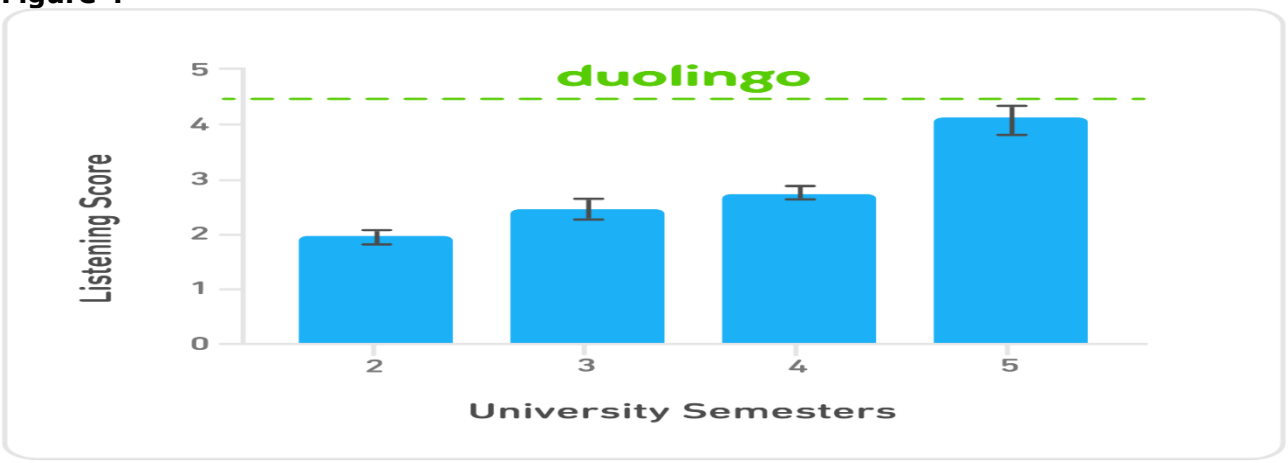
Thanks to artificial intelligence for introducing gamification in education. For example, games like Duolingo make learning fun. They use artificial intelligence to track user performance and adjust the difficulty. They can even predict when a student is more likely to forget something and help you remember things.

Figure 3

Source: Duolingo learners' improvement in reading and listening skills after 34 hours of study. Adapted from "Duolingo Efficacy Study," by Duolingo, 2020, Retrieved October 14, 2023, from http://www.duolingo.com/efficacy.

Duolingo is an online language-teaching platform that provides courses available on the web and mobile apps. According to Duolingo (2020), the average age of respondents was 38 years in 2021 (millennials) who were learning French from Duolingo. The proficiency scores of those learners who were learning from Duolingo were similar to the proficiency outcomes of those who were at the end of their fifth semester in Upper-division US-based university language programs. After learning a new language from such platforms as Duolingo, the learners feel more confident speaking a new language. According toDuolingo (2020), by just completing 5 sections of Duolingo, you could be able to gain knowledge equivalent to what one could learn in 5 semesters of university instruction (Jiang et al., 2021; Jiang, Rollinson, Plonsky, & Pajak, 2020).

Figure 4



Source: Duolingo learners' improvement in reading and listening skills after 34 hours of study. Adapted from "Duolingo Efficacy Study," by Duolingo, 2020, Retrieved October 14, 2023, from http://www.duolingo.com/efficacy.

2.3.4. Smart Content Creation

OpenAI's Generative pre-trained transformer (GPT) is changing the way teachers work. In a survey, both students and teachers agreed on the statement that ChatGPT is a perfect example of why we cannot keep doing things in the traditional way for education. ChatGPT has a positive impact on the teachers, more than half of the teachers used ChatGPT, and 10% of them were using it on their daily use. It generates quality educational content, which enables teachers to spare some time to focus on interactive and engaging classroom activities. Therefore, with AI and teachers both working together, learning stays exciting and human-centered. Tools like GPT-4, Google's Bard as well and Microsoft's Bing Chat made it possible for teachers to be not gatekeepers of knowledge but facilitators (Stansbury). Due to the excessive amount of information available, such platforms were used in the cheating by the students for completing their assignments (*Teachers and Students Embrace ChatGPT for Education*, 2023)(Heaven, 2023). It is expected that the creative AI technology market will grow between 2023-2028 at a growth rate of 58%, according to the S&P Global Artificial Intelligence report.

2.3.5. Empowering Accessibility

AI is removing obstacles for everyone to learn better. The students who cannot see or hear AI provide speech-to-text and text-to-speech technologies that help them in their learning by reading text loud and turning speech into text as well as translation tools and multilingual learning experiences. For example, Microsoft Immersive Reader uses artificial intelligence to help students with dyslexia by reading text loud and showing different parts to understand them. Statistics: Around 2.8 million students in the USA have specific learning challenges, according to the National Center for Education Statistics. Emphasizes the significance of different AI-driven tools that help them learn better (Microsoft Corporation, n.d.)(Microsoft Corporation; Noah, 2023).

3. Social Benefits

3.1. Redefining Communication and Relationships

With advancements in AI over time, it has changed and further changed how millennials make contact with each other and build relationships. This part discusses different sides of AI's impact in this sphere.

3.2. Millennials' Time Saved by AI

AI has made life much easier these days. The adoption of voice technology is increasing at a faster rate among millennials. As shown in Figure 1, a survey conducted by the PwC in 2018 collected data from 1000 respondents between the ages of 18-64 years, 44% of them have already used voice assistants to control other smart devices at their home.

Figure 5

Source:https://www.pwc.com/us/en/advisory-services/publications/consumer-intelligence-series/voice-assistants.pdf page7.

Tasks can be assigned to the AI, which saves a lot of time that could be used in some other activities. This time could also be used for relaxing or working etc. For example, a millennial living in New York City can control his/her home devices like lights and thermostats with AI-powered voice-based virtual assistants (like Amazon Alexa, Google Home, and Apple's Siri, etc.). This saves his/her time to get up and walk around the whole apartment and adjust these devices manually (Buhalis & Moldavska, 2021).

3.3. Personal Recommendations

Machine learning algorithms and artificial intelligence are widely used, getting more advanced through time, and provide personalized recommendations to millennials. According to the study Dabral, Kaushal, Dani, and Kapri (2021) more than 80% of millennials say that there are more chances to buy a product and dine out when the AI suggests it. Millennials like these personalized suggestions made by AI because it saves them time and energy to find new content and products. While many argue that it will create "filter bubbles", artificial intelligence and machine learning algorithms when providing recommendations that are specified according to each user's interests and preferences will unintentionally Isolate the user or narrow the range of information that people are presented with. As time passes, it creates a "filter bubble" effect that users only see content, which makes their existing beliefs and biases stronger (Nguyen, 2020). For example, suppose a millennial having an interest in politics watches videos on YouTube that are biased or support a specific party, group, or ideology leading to a one-sided understanding of the issues (partisan perspective). In that case, YouTube's AI recommendation system will continue showing him similar videos that align with that viewpoint. Millennials should be aware of the filter bubbles and turning AI personalization filters on and off can provide balance (Goodrow, 2021).

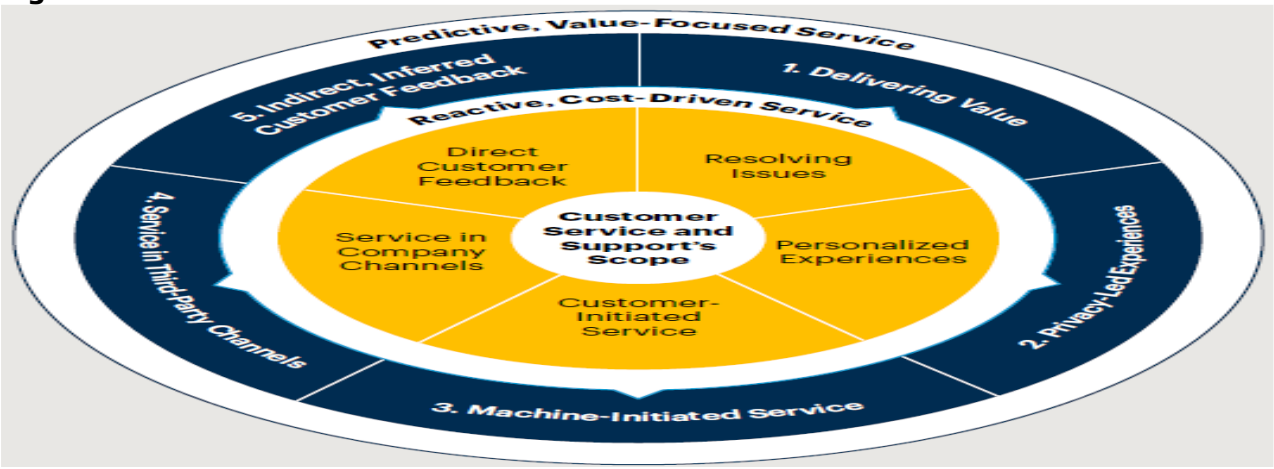
3.4. Automated Customer Service

According to 70.1% of the respondents, the major benefit of AI is identified as its 24/7 availability. A close competition between enhancing performance and more efficiency was selected by 59.7% and 56.7% of people, respectively. There are approx. 47% of our respondents have chosen that AI helps in error reduction (Aggarwal, 2022). According to the Gartner 2022;

- CSS will deliver personalized experiences while also balancing increased customer privacy concerns.
- CSS will respond to requests from machines and connected devices in addition to human customers.
- Customers will look beyond company-owned channels, using service information from third-party sources and websites to resolve their issues.

In Figure 6, Gartner discusses the five trends that will drive this transformation and expand the scope, impact, and responsibilities of service (Gartner, 2022).

Figure 6



Source: Figure 1: From "The Future of Customer Service: 5 Trends Will Transform Customer Service" by Gartner 2022, Gartner, Inc.

3.5. Emotional Conversational Chatbots

The most important benefit of these chatbots is that they provide individualized support to millennials. Instead of wandering in the phone menus or waiting on hold, users can simply type or speak their questions to chatbots and this saves their time and frustration. Before chatbots were able to understand emotions like, when we are sad or need special care, and they were not able to make thoughtful decisions as humans can. Some chatbots like Sir and Alexa are immature and do not provide empathy to the user. Wysa, Tess, and WoeBot are helping depressed and anxious patients (D'Alfonso, 2020). The emotional AI can analyze voice recordings, text messages, and facial expressions to detect human emotions perfectly. Now chatbots have a special skill these days, they can understand our feelings and provide support accordingly (Devaram, 2020). According to a study, the respondents with an average age of 31, were taking benefits from Emohaa (Conversational agent) to reduce their mental stress and it also proved beneficial to reduce depression and insomnia (Sabour et al., 2023).

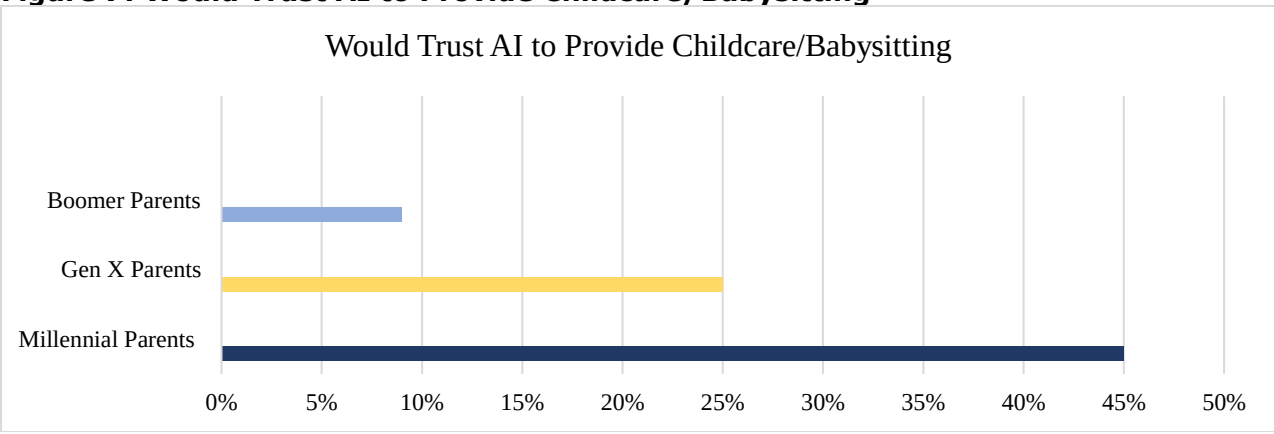
3.6. AI-Powered Dating Apps

There are different online platforms available Tinder, E-Harmony, Viola, and FlirtAR (The Future of Dating, 2018), powered by machine learning algorithms and artificial intelligence that analyze user preferences and interests. On Tinder, when a user swipes right and left, the algorithm reads the activities of a user that the user finds attractive. Based on these preferences and interests (educational background or music tastes), AI suggests similar matches from a larger pool (Smith, 2022).

3.7. AI for Childcare

Millennial parents are more confident than older parents because Millennials themselves grew up with digital technology and are more satisfied with allowing their children to grow up with new technology as well (Weber Shandwick, 2017).

Figure 7: Would Trust AI to Provide Childcare/Babysitting



Source: Weber Shandwick. (2017). Page 2, Figure 2. AI-ready or not: Artificial intelligence here we come! Weber Shandwick. https://webershandwick.com/uploads/news/files/AI_Millennials_2017.pdf

Consumers in our survey were offered a list of 22 tasks and requested which they would trust AI to complete. While childcare drops to the bottom of the list for each generation, parents who are Millennials are particularly more likely than elder generations to trust AI to babysit (45%). A considerable amount of Gen X parents would trust AI (25%), but only 9% of Boomer parents would trust an AI sitter (Weber Shandwick, 2017).

4. Health Benefits

In the healthcare sector, Artificial intelligence (AI) is receiving concentration from researchers and health professionals. Healthcare techniques are difficult and challenging for all organizations, but artificial intelligence (AI) has altered different fields, including healthcare, with the prospect of improving patient care and quality of life (Alowais et al., 2023; Secinaro, Calandra, Secinaro, Muthurangu, & Biancone, 2021).

4.1. AI-Enabled Health Technologies for Millennials

4.1.1. Telemedicine and Virtual Health Services

Telemedicine and virtual health services have witnessed significant growth in recent years, catalyzed by advancements in AI technologies. AI is being integrated into telehealth platforms to enhance diagnostic accuracy, provide personalized treatment recommendations, and improve overall healthcare accessibility. Telemedicine is a health-related service with the help of telecommunicating and electronic information technologies. The most recent advancements in telemedicine technologies include Artificial Intelligence (AI) to help physicians function more effectively. This technology keeps patients updated with wearables and other remote patient tracking resources. Artificial intelligence is unique the particular reason for the circumstance is its image recognition ability to diagnose diseases. Another thing that makes it special is telemedicine, which provides medical services to people living in rural areas (Bohr & Memarzadeh, 2020; Bokolo, 2021; Fernandes, 2022).

4.1.2. Revolutionizing Healthcare: AI-Driven Diagnostics, Personalized Treatments, Remote Monitoring, and Virtual Consultations for Comprehensive Patient Care

AI provides services in the healthcare sector by quickly analyzing CT scans, X-rays, and MRIs, providing perfect and early detection of many conditions that are quite helpful in the healthcare sector. The recommendations in this regard are personalized and are updated with time, making sure that everyone has their effective treatment plans. Such devices provide instantaneous data that allows healthcare specialists, enabling them to intervene immediately (Bajwa, Munir, Nori, & Williams, 2021; Bohr & Memarzadeh, 2020; Bokolo, 2021).

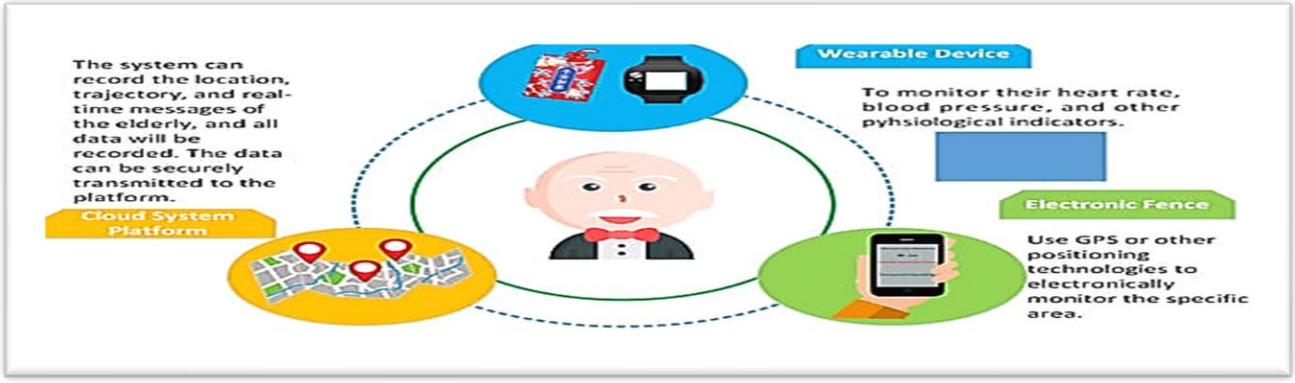
4.1.3. Teleconsultations and Virtual physicians

AI chatbots in healthcare are getting smart enough to give medical advice and initial checkups (Bajwa et al., 2021; Bohr & Memarzadeh, 2020; Bokolo, 2021).

4.2. Artificial Intelligence and the Wearable IoT Care System

The wearable Internet of Things (IoT) care system demonstrates a wide nutrition details base through the utilization of artificial intelligence technology. The system can provide guidance and adjustments based on nutrient intake, enabling them to control their dietary habits and enhance their prevailing health status (Wang & Hsu, 2023).

Figure 8: The Wearable IoT Care System



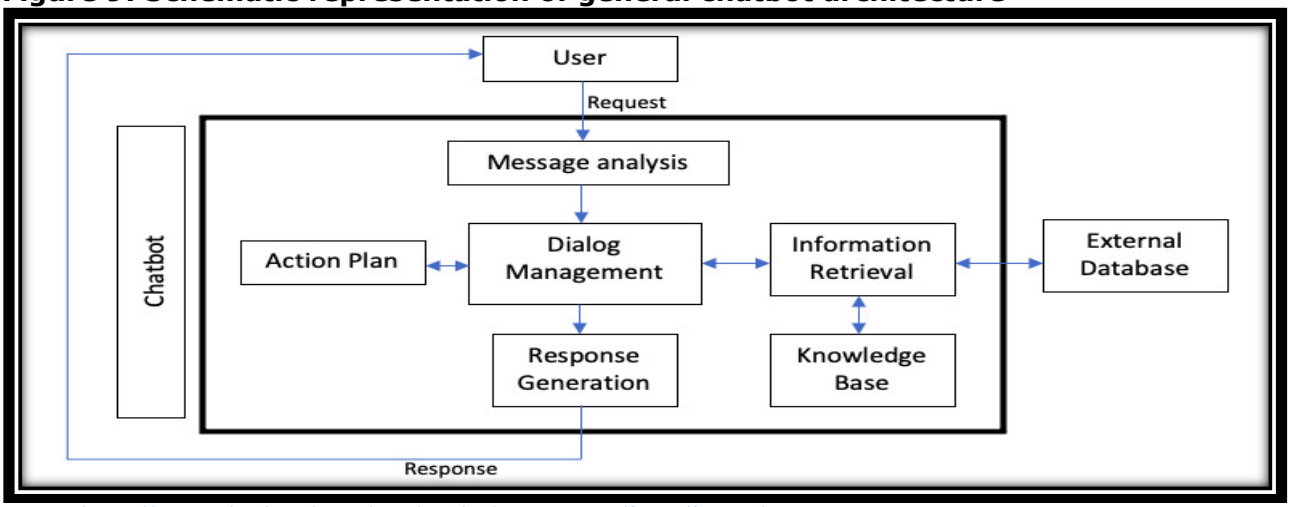
Source:https://www.mdpi.com/sensors/sensors-23 05913/article_deploy/html/images/sensors-23-05913-g002-550.jpg

As explained in the diagram people use wearable devices as watches to monitor their heart rate, blood pressure, and other physiological indicators.

4.3. Artificial Intelligence for Chatbots in Mental Health

Chatbot is a timely topic applied in various fields, including medicine and health care, for human-like knowledge transfer and communication. With the help of artificial intelligence, the way humans can understand each other and respond accordingly is fed into the chatbot systems, i.e., into systems that are supposed to communicate with a user. The bot understands the user's query and triggers an accurate response (Denecke, Abd-Alrazaq, & Househ, 2021).

Figure 9: Schematic representation of general chatbot architecture



Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8669585/figure/figure2/

4.4. Chatbots for Mental Health

Chatbots for mental health come in various forms, with different purposes such as therapy, training, and screening for issues like depression and autism. They often employ AI technology and can be standalone software or web-based platforms. Two popular chatbot platforms are Wysa and SERMO. Wysa is an emotional chatbot with mood tracking and mindfulness exercises, showing improved mood in frequent users. SERMO focuses on cognitive-behavioral therapy (CBT), offering emotional regulation tools and emotional recognition. These chatbots leverage AI and natural language processing (Denecke et al., 2021).

4.5. Role of AI in Mental Health Chatbots

AI plays a vital role in enhancing chatbot interactions. Early chatbots relied on predefined rules and responses. AI technologies, like machine learning and natural language processing, enable chatbots to understand and respond more naturally. Prominent AI frameworks include OSCOVA, IBM Watson, and RASA stack. Machine learning helps chatbots recognize patterns and generate suitable responses, while natural language processing allows them to interpret user input. These capabilities are crucial for understanding user intent and sentiment, making chatbot responses more personalized (Denecke et al., 2021).

4.6. Benefits of Mental Health Chatbots

Chatbots address the scarcity of mental health professionals, offering widespread, cost-effective support. They also serve individuals who hesitate to disclose their issues due to stigmatization. Chatbots are user-friendly and accessible to those with limited computer skills. They can establish therapeutic alliances and enhance user adherence by providing human-like interactions. Studies show that chatbots can effectively improve various mental health conditions, such as depression, anxiety, and even dementia detection (Denecke et al., 2021).

4.7. Challenges

Despite their benefits, mental health chatbots face several challenges.

4.7.1. Technical Limitations

Chatbots need to overcome limitations in remembering past conversations and providing contextually appropriate responses. Generic, repetitive interactions can lead to user annoyance. Self-learning chatbots risk making unpredictable decisions, potentially causing harm (Denecke et al., 2021).

4.7.2. Ethical Challenges

Many mental health chatbots lack clinical evidence and privacy safeguards. Users' sensitive data might not be adequately protected, and there is the risk of over-reliance on chatbots. The deceptive nature of some chatbots aiming to mimic human interactions raises ethical concerns, as users have the right to know they are interacting with a machine (Denecke et al., 2021).

5. Methodology

This study presents a systematic review of previous studies on the artificial intelligence revolution and its impact on millennials in areas including education, health, communication, and relationships. A systematic approach was used to analyze 68 articles from recognized digital platforms. The results of the review provide a complete understanding of existing research corresponding to the use of AI in the concerning areas including information on existing studies, benefits, and challenges. These articles were selected because of their relevance to AI's life-changing effects on millennials. This study considered only those papers published in the English language between 2010 and 2023, using Google Scholar, PubMed, and other digital platforms. Keywords like AI Revolution, AI impact, Millennials, AI in education, health, communication, and relationship, were used to identify the relevant literature. Articles were selected if they were relevant to the influence of AI in different areas of life such as social, education, and health. Those articles that did not contain such information were excluded from the study. We used the rigorous method of content analysis for the selected articles. We identified the common ideas and repeated trends relating to the effects of AI on millennials. This study was conducted systematically to ensure consistency in the interpretation of findings.

There are some barriers to note in this review.

- First, it relied fully on published literature and did not cover primary details collection.
- Second, it did not examine the differential impact of AI on millennials by geographic region, income level, and other demographic factors.
- Third, it did not cover the employment sector. More research on how AI influences millennials in different jobs will give useful insights.
- Fourth, the fast pace of technological change means that ongoing research will be needed to reassess the emerging impact of AI on millennials over time.
- Fifth, this paper discusses the potential of AI more than risks in these areas.

6. Conclusion

Artificial Intelligence integration in education via AI-powered virtual teaching platforms, gamified learning apps, and smart content creation tools has made learning easy for the millennials. This study provides a review of the effects of artificial intelligence in main areas of their lives such as education, health, relationships, and communications. These platforms have significantly improved their educational experience. While there are some challenges to narrowing the digital gap like promoting content relevant to the culture and ensuring their data privacy. In healthcare, telemedicine, virtual physicians, remote monitoring devices, and mental health chatbots have improved access and quality of care. However, over-dependency on the technical limitations of chatbots and the dangers need to be handled. This review points out that the future impact of AI on millennials is meaningful– with increased personalization, productivity, and life, as well as concerns about data ethics, and over-reliance on technology also offered. Policymakers and technologists must collaborate to maximize opportunities and minimize risks. Further interdisciplinary research examining differential effects on demographics would add value. Overall, upholding human value while harnessing the benefits of AI through ethical and responsible development is key to creating a future that empowers, rather than alienates, millennials. Based on this review, we found that AI has a positive impact on millennials' education, health, relationships, and communication. While there were some concerns like data privacy and security. AI in education saves time for teachers so that they

have more time to engage with their students. While mental health chatbots offer great promise, addressing these technical and ethical challenges is critical to maximizing their potential to improve mental health care. Artificial intelligence provides opportunities for millennials to interact with each other. Personalized recommendations provide content tailored to users' interests.

6.1. Policy implications

There are a few important policy implications i.e. Governments should devise a framework governing the use of moral AI in education and healthcare that upholds privacy, clarity, and accountability. To maximize the advantages of AI in education and control the digital range, policies, and investments are needed to provide teachers and students with digital skills. Telemedicine regulations should ensure patient safety while increasing access to care. Educate millennials about the use of AI chatbots and provide them with a suitable environment so they can understand the importance of these tools in enhancing their productivity. Educate millennials so they can use AI-integrated wearables like smartwatches that provide remote monitoring of a patient as well as tailored suggestions. The potential of AI to provide personalized content may lead to social isolation or filter bubbles. It may also result in the development of biased opinions. As AI requires data to provide personalized content tailored for each user, make sure such AI applications promise tailored content while user data is protected and maintained. Address the benefits of emotional AI and acknowledge mental issues as a serious concern. Advocate for the development of empathic chatbots, prioritizing user well-being. Promote developments in AI matchmaking algorithms that should provide transparency to users so they can find matches based on their interests or preferences. Acknowledge millennials' trust in AI for childcare and support responsible use of AI regulations when involved in childcare. Policymakers should team up with tech companies to enlarge chatbot capabilities and clinical inspection.

References

Adamopoulou, E., & Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications, 2*, 100006. doi:https://doi.org/10.1016/j.mlwa.2020.100006

Aggarwal, V., Chaturvedi, K., & Malhotra, C. . (2022). Effects of AI on human learning and decision making in millennials. *International Journal of Scientific & Engineering Research, 11*(9).

Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A. I., Almohareb, S. N., . . . Badreldin, H. A. (2023). Revolutionizing healthcare: the role of artificial intelligence in clinical practice. *BMC Medical Education, 23*(1), 689. doi:https://doi.org/10.1186/s12909-023-04698-z

Bajwa, J., Munir, U., Nori, A., & Williams, B. (2021). Artificial intelligence in healthcare: transforming the practice of medicine. *Future healthcare journal, 8*(2), e188. doi:https://doi.org/10.7861/fhj.2021-0095

Bill and Melinda Gates Foundation, b. (2015). Teachers Know Best: Making Data Work for Teachers and Students.

Bohr, A., & Memarzadeh, K. (2020). The rise of artificial intelligence in healthcare applications. In *Artificial Intelligence in healthcare* (pp. 25-60): Elsevier.

Bokolo, A. J. (2021). Application of telemedicine and eHealth technology for clinical services in response to COVID-19 pandemic. *Health and technology, 11*(2), 359-366. doi:https://doi.org/10.1007/s12553-020-00516-4

Bughin, J., Seong, J., Manyika, J., Chui, M., & Joshi, R. (2018). Notes from the AI frontier: Modeling the impact of AI on the world economy. *McKinsey Global Institute, 4*.

Buhalis, D., & Moldavska, I. (2021). *In-room voice-based AI digital assistants transforming on-site hotel services and guests' experiences.* Paper presented at the Information and Communication Technologies in Tourism 2021: Proceedings of the ENTER 2021 eTourism Conference, January 19–22, 2021.

Butschi, S. (2021). New Google Cloud Student Success Services help educators scale individualized learning. . *Google Cloud Blog*.

Chan, C. K. Y., & Lee, K. K. (2023). The AI generation gap: Are Gen Z students more interested in adopting generative AI such as ChatGPT in teaching and learning than their Gen X and Millennial Generation teachers? *arXiv preprint arXiv:2305.02878*. doi:https://doi.org/10.48550/arXiv.2305.02878

Chen, M., & Decary, M. (2020). *Artificial intelligence in healthcare: An essential guide for health leaders.* Paper presented at the Healthcare management forum.
D'Alfonso, S. (2020). AI in mental health. *Current Opinion in Psychology, 36*, 112-117. doi:https://doi.org/10.1016/j.copsyc.2020.04.005
Dabral, A. P., Kaushal, D., Dani, R., & Kapri, S. S. (2021). Impact of Artificial Intelligence Driven Social Media Marketing on Millennials Dining Out Behavior. *Webology, 18*(2), 2129-2136. doi:https://doi.org/10.29121/WEB/V18I2/18
Darwiche, A. (2018). Human-level intelligence or animal-like abilities? *Communications of the ACM, 61*(10), 56-67. doi:https://doi.org/10.1145/3271625
Deloitte. (2020). Deloitte global Millennial Survey reveals a resilient and purpose-led generation
Denecke, K., Abd-Alrazaq, A., & Househ, M. (2021). Artificial intelligence for chatbots in mental health: opportunities and challenges. *Multiple perspectives on artificial intelligence in healthcare: Opportunities and challenges*, 115-128. doi:https://doi.org/10.1007/978-3-030-67303-1_10
Devaram, S. (2020). Empathic chatbot: Emotional intelligence for empathic chatbot: Emotional intelligence for mental health well-being. *arXiv preprint arXiv:2012.09130*.
Dhimolea, T. K., Kaplan-Rakowski, R., & Lin, L. (2022). Supporting Social and Emotional Well-Being with Artificial Intelligence. In *Bridging Human Intelligence and Artificial Intelligence* (pp. 125-138): Springer.
Duggan, S., & Knyazeva, S. (2020). AI in education: change at the speed of learning; UNESCO IITE policy brief.
Duolingo. (2020). Duolingo efficacy study.
Fernandes, J. G. (2022). Artificial Intelligence in Telemedicine. In *Artificial Intelligence in Medicine* (pp. 1219-1227): Springer.
Fitzpatrick, K. K., Darcy, A., & Vierhile, M. (2017). Delivering cognitive behavior therapy to young adults with symptoms of depression and anxiety using a fully automated conversational agent (Woebot): a randomized controlled trial. *JMIR mental health, 4*(2), e7785. doi:https://doi.org/*10.2196/mental.7785
Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., . . . Rossi, F. (2021). An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. *Ethics, governance, and policies in artificial intelligence*, 19-39. doi:https://doi.org/10.1007/978-3-030-81907-1_3
Franco, A. (2023). Our teacher satisfaction survey spanned generations.
Goodrow, C. (2021). On YouTube's recommendation system. Blog YouTube. In.
Heaven, W. (2023). ChatGPT is going to change education, not destroy it. In: MIT Technology Review.
Jiang, X., Chen, H., Portnoff, L., Gustafson, E., Rollinson, J., Plonsky, L., & Pajak, B. (2021). *Seven units of Duolingo courses comparable to 5 university semesters in reading and listening*. Retrieved from
Jiang, X., Rollinson, J., Plonsky, L., & Pajak, B. (2020). Duolingo efficacy study: Beginning-level courses equivalent to four university semesters. *Duolingo efficacy study: Beginning-level courses equivalent to four university semesters*. doi:https://www.duolingo.com/efficacy
Khanna, A., Pandey, B., Vashishta, K., Kalia, K., Pradeepkumar, B., & Das, T. (2015). A study of today's AI through chatbots and rediscovery of machine intelligence. *International Journal of u-and e-Service, Science and Technology, 8*(7), 277-284. doi:http://dx.doi.org/10.14257/ijunesst.2015.8.7.28
Kurian, S. (2017). Meet the Millennials, KPMG. *CIO Advisory UK (June 2017)*.
Liu, Y., Chen, L., & Yao, Z. (2022). The application of artificial intelligence assistant to deep learning in teachers' teaching and students' learning processes. *Frontiers in Psychology, 13*, 929175. doi:https://doi.org/10.3389/fpsyg.2022.929175
Luckin, R., & Holmes, W. (2016). Intelligence unleashed: An argument for AI in education.
Maher, C. A., Davis, C. R., Curtis, R. G., Short, C. E., & Murphy, K. J. (2020). A physical activity and diet program delivered by artificially intelligent virtual health coach: proof-of-concept study. *JMIR mHealth and uHealth, 8*(7), e17558. doi:https://doi.org/10.2196/17558
McKinsey & Company, m. (2020). Transforming healthcare with AI: The impact on the workforce and organizations.
Microsoft Corporation, m. AI Immersive Reader. Azure.

Murtaza, M., Ahmed, Y., Shamsi, J. A., Sherwani, F., & Usman, M. (2022). AI-based personalized e-learning systems: Issues, challenges, and solutions. *IEEE Access*.
Nguyen, C. T. (2020). Echo chambers and epistemic bubbles. *Episteme, 17*(2), 141-161. doi:https://doi.org/10.1017/epi.2018.32
Nirmala, M., & TK, F. S. (2019). Preference Of Social Media Among Millennials. *Think India Journal, 22*(14), 5736-5744.
Noah, T. (2023). The importance of teaching all students about tech accessibility features. Edutopia.
Peng, Y., Zhu, Q., Wang, B., & Ren, J. (2020). A cross-sectional study on interference control: age affects reactive control but not proactive control. *PeerJ, 8*, e8365. doi:https://doi.org/10.7717/peerj.8365
Pew Research Center, p. (2014). Millennials in adulthood. Pew Research Center.
Pew Research Center, p. (2019). Where Millennials end and Generation Z begins | Pew Research Center.
Russell, S. J., & Norvig, P. (2010). *Artificial intelligence a modern approach*: London.
Sabour, S., Zhang, W., Xiao, X., Zhang, Y., Zheng, Y., Wen, J., . . . Huang, M. (2023). A chatbot for mental health support: exploring the impact of Emohaa on reducing mental distress in China. *Frontiers in Digital Health, 5*, 1133987. doi:https://doi.org/10.3389/fdgth.2023.1133987
SANDA, E. (2022). Artificial Intelligence Algorithms and the Facebook Bubble. *Fostering Recovery through Metaverse Business Modelling*, 559.
Secinaro, S., Calandra, D., Secinaro, A., Muthurangu, V., & Biancone, P. (2021). The role of artificial intelligence in healthcare: a structured literature review. *BMC medical informatics and decision making, 21*, 1-23.
Singh, P. (2021). What Are AI and RPA: The Differences, Hype, and When to Use Them Together? UiPath Blog.
Smith, M. (2022). A Swipe to the Right: Exploring Tinder Use in College Students.
Wang, W.-H., & Hsu, W.-S. (2023). Integrating artificial intelligence and wearable IoT system in long-term care environments. *Sensors, 23*(13), 5913.
Weber Shandwick, w. (2017). Weber Shandwick. (2017). AI-ready or not: Artificial intelligence here we come! *(Report No. 2017-01). Weber Shandwick*.