



# Article Is the Education System Prepared for the Irruption of Artificial Intelligence? A Study on the Perceptions of Students of Primary Education Degree from a Dual Perspective: Current Pupils and Future Teachers

Alba Lozano <sup>1,2</sup> and Carolina Blanco Fontao <sup>3,\*</sup>

- Department of Mining, Topography and Structures, University of Leon, 24007 León, Spain; alozl@unileon.es
   Vice Rectorate of Research, University of Barcelona, Gran Vía de les Corts Catalanes, 585,
  - 08007 Barcelona, Spain
- <sup>3</sup> Department of General and Specific Didactics and Theory of Education, University of Leon, 24007 León, Spain
- \* Correspondence: cblaf@unileon.es

**Abstract:** The recent irruption of ChatGPT, a powerful chatbot that uses a "Chat Generative Pretrained Transformer" language model, could revolutionize education worldwide since it can greatly affect the competence development that students need to achieve for their professional future. The aim of this work is to assess the level of knowledge of ChatGPT and the perception of its possibilities of use in education by students studying the Primary Education Degree at the University of León (Spain) from a double perspective: as students and future teachers, respectively. For this purpose, a descriptive, cross-sectional, non-experimental, and quantitative research design was carried out, with the design and elaboration of a questionnaire. The questionnaire data were statistically processed by calculating relative frequencies. The main results highlight that students have a positive perception of ChatGPT use, with potential applications in education, and do not perceive it as a threat to the deterioration of the educational system as long as the sources of the data generated by the tool are verified. In addition, as students and future teachers, they need more knowledge about the operation of ChatGPT to ensure its correct use and maintain the quality of the education system. Thus, to overcome ChatGPT irruption in education, digital literacy is crucial at all educational levels.

**Keywords:** artificial intelligence; AI; teacher training; educational improvement; ChatGPT; education system; digital literacy

# 1. Introduction

Nowadays, society is undergoing unprecedented technological development in many areas (e.g., industrial, economic, social, and educational), which implies a continuous and strong adaptation to new technologies. In particular, artificial intelligence (AI) has undergone significant development in recent years.

Despite its current explosion, AI has its origins in the mid-20th century. The first AI that was publicly released was released in 1957 by American researchers, when the development of this discipline began at Dartmouth University [1]. This event gave rise to other AI areas of research and knowledge, such as machine learning, deep learning, neural networks, and data management (big data). Since then, different AI technologies have been evolving throughout the 20th century until the beginning of the 21st century, when they have had a much more accentuated development [2]. The development of AI in recent years has led to applications in different fields of work, such as healthcare [3] or sustainable industry development [4]. Another field that is being strongly affected is education [5]. There is so much interaction between AI and education that three main areas of linkage between the two have been defined [6]: (1) the use of AI as a learning tool in the classroom,



Citation: Lozano, A.; Blanco Fontao, C. Is the Education System Prepared for the Irruption of Artificial Intelligence? A Study on the Perceptions of Students of Primary Education Degree from a Dual Perspective: Current Pupils and Future Teachers. *Educ. Sci.* 2023, *13*, 733. https://doi.org/10.3390/ educsci13070733

Academic Editors: Rosabel Roig-Vila, Miguel Cazorla and Víctor González-Calatayud

Received: 5 June 2023 Revised: 7 July 2023 Accepted: 16 July 2023 Published: 18 July 2023



**Copyright:** © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). (2) learning how to use AI and its technologies; and (3) digital literacy of the citizenship to reach an ethical and technical criterion in the use of AI. This has implied that society identifies different definitions or conceptions of this technology. In this way, some authors refer to AI as a personalized and automated orientation of information management [7], but most define it as a computer system that can engage in human-like processes such as learning, adaptation, synthesis, self-correction, among others, [8] and thus generate the feeling as interacting with another person [9,10].

The increasing use of AI in education has boosted research on its impact in different areas and fields of study, with the common goal of improving the teaching-learning process. [5]. These fields include robotics [11], e-learning environments [12], virtual reality (VR) [13], online self-learning platforms [14], and intelligible conversational software agents, generally known as chatbots [15] or text or content generators [16].

Among these application areas, the use of chatbots is the discussion subject in classrooms nowadays, especially since ChatGPT 3.5 was released publicly for worldwide use in November 2022. ChatGPT, created by OpenAI, is an artificial intelligence tool based on the Generative Pre-trained Transformer (GPT) language model that is used to create responses similar to those of a human interacting with it (OpenAI). The controversy generated in the education sector is due to the fact that although it offers great benefits to the teaching and learning praxis, it can also have detrimental consequences for teaching-learning processes and skills and competencies development [17].

One of the most important advantages of the AI (especially ChatGPT) outbreak in education is its great potential for communicative use between teachers and students. It can be used as a tool that provides innovative methodologies and improves teaching-learning processes and hence increases student performance [14]. Other examples of its many beneficial applications include the role of AI in special education due to the ability to personalize learning in real-time [18], the ability to adapt and individualize learning [19], the increase in teacher-driver interaction in the development of the teaching-learning process from the classroom [20], and the development of intelligent tutoring systems [21,22]. Additionally, the use of AI has had a positive impact on academic performance, especially on increasing motivation and improving the teaching-learning process [23]. Likewise, AI is presented as an opportunity for teachers with respect to the creation of content, activities, and assessments [24].

However, weaknesses are also being identified in contrast to the positive aspects of the use of AI. ChatGPT may pose a threat for education. For example, the teachers' request for a written text by students is doomed to disappear. This is because such texts can be totally generated by ChatGPT instead of students. A consequence of this is the increase in plagiarism by students, which is considerably difficult to detect and a time-consuming activity for teachers [17,25]. Additionally, these problems can be aggravated by the generation of incorrect information. ChatGPT generates answers based on the stored data with which it has been trained, but it is not able to understand what writes or makes complex reasoning of specific and especially technical topics, as has been demonstrated in a case study in the health field [26]. This would lead to a devaluation of the quality of the educational system, since it implies a setback in the teaching-learning processes, without taking into account the destruction of the commitments to honesty and authenticity from the point of view of the students' work [27]. All of this makes the ChatGPT implementation process around the world an educational challenge and, despite the continuous up-to-date studies, it requires further analysis from educational research [23].

These facts predict that in the coming years, there will be a substantial change in the educational model, especially in teaching methodologies, so that some tasks such as the current written work and evaluations will have to be rethought. Since the paradigm shift in education affects all levels and participants, as a first step towards adapting to these changes, it seems essential to know the perceptions of this type of AI-based technology from a dual perspective: students and teachers, in order to subsequently study the implications which may impact the educational system.

Thus, the general objective of this work is to assess the perception of Primary Education students at the University of León regarding the possibilities of using ChatGPT in education from the double vision that these students can offer, as current students and future teachers. For this purpose, the following specific objectives are established:

- Objective 1: Study the level of previous knowledge and use of ChatGPT by the students.
- Objective 2: Evaluate the perception of the application by students.
- Objective 3: Evaluate the perception of the application as future teachers.

#### 2. Materials and Methods

# 2.1. Participants and Sample

The target population was 118 second-year students of the Primary Education Degree who were taking the subject Teaching and Learning of Experimental Sciences I during the 2022/23 academic year. Primary Education students were selected because they can provide information from a double perspective: as current students and as future teachers. Previously to conducting this research, the students answered some questions about their previous knowledge of ChatGPT through a Google form, with the intention of detecting their previous knowledge and use of it before use in the classroom (corresponding with Block 2 and explained with more detail in Section 2.2). After answering that, the participants in this study carried out a classroom activity in which they used the ChatGPT tool. The students were asked to use ChatGPT to establish a conversation with scientists of great historical significance to ask them about their discoveries, as well as their perceptions of the social context in which they lived and developed their findings. After that, students had to subsequently evaluate the degree of veracity of the information received and contrast it with other sources by giving an oral presentation in the classroom.

The study consisted of a sample of 81 students from the Primary Education Degree, who carried out the activity with ChatGPT and represented 68% of the initial study population. The sample showed a mean age of  $19.7 \pm 1.3$ , with 73% girls, 26% boys, and 1% non-binary.

#### 2.2. Study Instrument: Characteristics and Application

In order to carry out this study, a non-experimental, descriptive, cross-sectional, and quantitative research design was carried out through the elaboration of a questionnaire that was answered by the 81 second-year students from the Primary Education Degree.

The questionnaire was divided into 4 blocks (Appendix A Table A1). The first block was composed of demographic questions, with the first two questions identifying the gender and age of the participants, respectively. Block 2 consisted of two questions to study the participants' knowledge prior to the use of the application (this block was administered to students prior to the start of the activity). Block 3 dealt with the study of the students' perceptions of ChatGPT access and use, as well as the identification of possible advantages and disadvantages for its use. This block consisted of ten questions with a 5-point Likert scale, in which value 1 corresponded to totally disagree, 2 to disagree, 3 to neutral, 4 to agree, and 5 to totally agree. In addition, this block was completed with 2 multiple-choice questions. Block 4 dealt with the students' perceptions of the use of ChatGPT as future teachers and consisted of seven questions with a 5-point Likert scale, similar to what has been previously described. Questions in Blocks 3 and 4 were divided into three categories: A: Access and use of the application; B: Sources and quality of the information obtained; and C: Knowledge of how the tool operates, in order to study the perception of these aspects from a dual perspective: students and teachers (these two last blocks of the questionnaire were answered by the students two months after having carried out the activity so that they could have a broader vision of ChatGPT and AI).

For the drafting of the questionnaire items, we initially brainstormed with a group of 10 experts in different fields of education. Thus, an initial draft was prepared with different questions that tried to correspond to the categories we wanted to analyze. After that, the

questionnaire was validated through the Delphi method [28–30], in which the panel of experts assessed the relevance, pertinence, and univocity of each question in two rounds. In the first round, modifications were proposed when questions did not fit the criteria cited in the first round. In the second round, an exclusion criterion was established based on the discordance of criteria of two or more experts (the total number of initial questions was 25 and the final number was 18, as shown in Table A1). The literature confirms the effectiveness of the Delphi method for the construction and validation of instruments, mainly in the field of Educational Sciences [31,32], which positions it as an ideal method for the study presented here.

To check the reliability of the instrument, Cronbach's alpha was calculated, which was 0.801, so its confidence level is considered very good [33].

It should be noted that the questionnaire of perceptions was administered to the students two months after the activity was carried out. Therefore, students who were not familiarized with it at the beginning were able to familiarize themselves with it to a greater extent and become more aware of the possibilities of ChatGPT.

#### 2.3. Statistical Analysis

Data collected from the questionnaire were processed with version 26 of the SPSS (IBM) computer software, first implementing descriptive statistics by calculating response percentages and then applying the calculation of relative frequencies (%) to each question of the blocks into which the questionnaire is divided. For the multi-response questions, the relative frequencies were calculated considering the total number of responses to each item.

#### 3. Results

#### 3.1. Prior Knowledge about ChatGPT

The results obtained for Block 2 of the questionnaire about previous knowledge of ChatGPT indicate a great lack of knowledge of the tool by the students of the the Primary Education Degree. Thus, the majority of the students (76%) stated that they did not know ChatGPT from previous use through the activity carried out in the classroom, as described above. However, 14% of the students affirmed they knew about it, but they had not used it to perform tasks or search for information. Only 10% said that they knew about it and had used it previously to perform tasks in other subjects of the degree.

#### 3.2. Perception of ChatGPT Use among Students

The results of the students' perception of the use of ChatGPT correspond to Block 3 of the questionnaire and have been divided into three categories: (A) Perception of access and use (Table 1), (B) Source and quality of the information provided, and (C) Knowledge of how the tool operates (Table 2).

CAT.	Question	<b>QUESTIONS */LIKERT SCALE</b>	1	2	3	4	5
A.	1	I was surprised by its potential when have used it.	1	1	2	38	57
	2	It is a tool easy to access and use.	0	5	9	40	47
	3	I find that ChatGPT saves much more time on doing tasks than with other online resources or textbooks.	1	1	11	35	52
	4	I find that ChatGPT can be a personalized learning tool, since it specifically answers each question.	0	1	14	44	41

**Table 1.** Block 3 of the questionnaire (first part): Perception of access and use. CAT. Categories. A. Access and use. Responses of Likert scale (1–5) in %.

\* Rate from 1 to 5 how much you agree with the following statements regarding the use of ChatGPT in class. 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree.

With respect to the questions of category A, Access and use, all of the answers in this block have a majority of response percentages corresponding to Likert scale points 4 and 5, which means that the students agree or strongly agree with the aspects related to the use of

ChatGPT (Table 1). Thus, adding together the percentage of results for points 4 and 5 of the Likert scale (agree and strongly agree), it can be said that 87% of the students consider ChatGPT a tool that is easy to access and use (question 1), 77% of the students think that its use can save time in the tasks compared to other digital resources or books (question 2), and it allows the completion of tasks in a personalized way (85% of students, question 3). As a consequence, it is noteworthy that 95% of the students surveyed say that they were surprised by its potential for use (question 4).

**Table 2.** Block 3 of the questionnaire (second part). CAT. Categories: B. Sources and quality of the information and C. Knowledge of the tool. Responses of Likert scale (1–5) in %.

CAT.	Question	<b>QUESTIONS */LIKERT SCALE</b>	1	2	3	4	5
В	7	I have asked ChatGPT to generate the sources of information used to generate a work.	25	17	22	26	10
	8	The quality of the work done with ChatGPT is the same as with other online resources or textbooks used so far.	0	25	33	28	14
	9	The sources used by ChatGPT to generate the work are reliable.	0	2	41	47	10
С	10	As a student, even if ChatGPT performs the task given I must ensure that I understand the work.	2	1	2	11	83
	11	I understand how the artificial intelligence that ChatGPT uses works and therefore how it generates my tasks.	11	21	14	28	26

\* Rate from 1 to 5 how much you agree with the following statements regarding the use of ChatGPT in class. 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree.

The analysis of category A, Access and use, was completed with two multi-response questions intended to identify the major benefits and drawbacks of ChatGPT use by students. The responses obtained are shown in Figure 1. The most beneficial aspects of using ChatGPT (question 5) identified by students are the speed in completing tasks (a) and the generation of support material (b), both accounting for 71.7% of the total responses (Figure 1A). The least benefits identified are the use of ChatGPT to check their learning, and as a tutor or virtual support (c and d, both related). In contrast, the main disadvantages associated with the use of ChatGPT (question 6) identified by the students are the lower capacity to search for information (a), critical analysis (b), and the greater capacity for plagiarism (d), being 74.3% of the total number of responses (Figure 1B). In this case, the disadvantages least detected are the least capacity for synthesis (c) and the greatest difficulty in defending a work in the classroom.

Regarding questions in category B, Sources and quality of information (Table 2), only 36% of the students claim to have asked ChatGPT to generate information references used to do the work in class (question 7), while 57% of the students agreed or strongly agreed that references used from ChatGPT were reliable (question 8). In addition, 42% of the students considered the quality of the work completed comparable to what they normally accomplish with other resources such as textbooks or online resources (question 9).

Finally, with respect to the questions in category C, Knowledge of how the tool operates (Table 2), it stands out that almost all the students (94%) are aware of the necessity to understand the completed work (question 10), but only 54% think that they understand how it generates the tasks (question 11).

### 3.3. Perception of ChatGPT Use as Future Teachers

Results obtained about the perception of ChatGPT use as future teachers correspond to Block 4 of the questionnaire and are shown in Table 3, where the three previously mentioned categories of the study (A, B, and C) have been included. Thus, the results are described in the same way as for Block 3, presenting the sum of the percentages of items 4 and 5 of the Likert scale.



Question 5. Benefits of using ChatGPT as student

Figure 1. Results on the perception of the benefits (A) and drawbacks (B) of the use of ChatGPT by students (Category (A)).

Table 3. Block 4 of the questionnaire: Perception of the use of ChatGPT from the point of view of teacher performance. CAT. Categories: A. Access and use, B. Sources and quality of information, C. Knowledge of the tool. Responses of Likert scale (1-5) in %.

CAT.	Question	<b>QUESTIONS */LIKERT SCALE</b>	1	2	3	4	5
A	12	ChatGPT can be a threat to the teaching job.	15	26	28	22	9
	13	ChatGPT can be a very useful tool to use in my future teaching work.	1	5	21	35	38
	14	As a future teacher, I believe that ChatGPT will force us to change the approach to certain tasks.	4	6	12	49	28
В	15	As a teacher, I could use ChatGPT to generate high quality content, as long as I corroborate the sources.	1	1	16	41	41
	16	ChatGPT could lead to a devaluation of the quality of the education system.	4	27	36	14	20
С	17	As a future teacher, I must know the tool in order to know how to approach the tasks and to be able to evaluate it in a way that prevents/detects plagiarism.	2	1	0	22	74
	18	As a future teacher, I must know how artificial intelligence works to understand how the students can use it in their tasks.	1	2	2	26	68

\* Rate from 1 to 5 how much you agree with the following statements regarding the use of ChatGPT in class. 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree.

With respect to the questions in category A, Access and use, only 36% of the students believe that ChatGPT will pose a threat to their future teaching practice, while 41% of them disagree and 28% are neutral, which shows the variety of opinions on this aspect (question 12). In contrast, 71% of the students affirm that it can be a useful tool for their future teaching work (question 13) and 78% of them consider that it will force them to change their approach to the tasks asked of students (question 14).

Regarding category B, Sources and quality of information, 81% of the total number of students consider that, as teachers, they could generate high-quality content with ChatGPT, as long as the sources are corroborated (question 15). Given this result, it seems coherent that only 33% of the students consider that ChatGPT could lead to the devaluation of the quality of the educational system when they work as teachers (question 16), although there is a disparity in the results, with 36% of the students expressing neutral opinions and 27% disagreeing.

To conclude this block with questions in category C, Knowledge of how the tool operates, it should be noted that 96% of the future teachers consider it necessary to know the new artificial intelligence tools in order to better prepare and evaluate the tasks so that the students reach the desired competencies (question 17). In addition, 94% of future teachers consider it necessary to have knowledge of the basic operation of artificial intelligence in order to better understand how students can use it properly in their tasks (question 18).

#### 4. Discussion

The results of Block 2 of the questionnaire show that the students' prior knowledge of ChatGPT (Objective 1) was generally very low. This significant lack of knowledge in the students is striking since new AI applications (such as ChatGPT) have been mediatized, occupying numerous national and international news. However, one possible explanation is that the use of ChatGPT was not initially oriented towards education. Despite this, the level of prior knowledge of ChatGPT has been much higher in students studying other university degrees such as Business degrees, reaching 80% [34], which could be due to the higher affinity of this type of degree with technology in comparison with the Primary Education Degree.

The results of Block 3 of the questionnaire show that from the students' point of view (Objective 2), there is a positive perception of ChatGPT. With respect to access and use, the positive results are in agreement with other studies where it has been shown that the student perceives greater ease of access and use of ChatGPT through different technological platforms such as computers, tablets, or cell phones, which increases accessibility to information [18]. Similarly, the personalization of tasks, which has been one of the prominent uses of this tool, is already widely considered in education [9,17,18]. The reasons for this are mainly the instant acquisition of information and its adaptation to the specific requirements requested. All of these reasons have led the students to be surprised by the high potential of this application.

Students have indicated the speed of the work and the time saved as the main advantages of using ChatGPT, which was similarly observed in previous studies [17,18]. In contrast, one of the drawbacks identified by the students of using ChatGPT is its limitation for critical analysis. However, this drawback is contrary to what has been observed in previous studies. ChatGPT has difficulties with the generation of responses that require higher-order cognitive processes such as critical analysis [35,36], which prevents it from generating text with deep and complex explanations. Fergus et al. [37] identified incorrect answers generated by ChatGPT to questions that involved actions such as "applying" or "interpreting" a given text. Therefore, and contrary to students' perception, it is considered necessary that students should use critical analysis skills to contrast the information and review the content and meaning of the text, regardless of the type of task given to ChatGPT.

Finally, students are of the opinion that ChatGPT generates good-quality texts and uses reliable sources, although they are aware that they should be critical and contrast the information. It should be noted in this aspect that previous studies have identified a lack of authorship of the sources/references [38] and the generation of biased data [17], problems that are of great concern in the educational community.

The results of Block 4 show that from the point of view of future teachers (Objective 3), there is a very positive perception of ChatGPT. Regarding its access and use, the teachers in training do not consider this tool as a threat. Instead, they have verified its potential for creating content with a carried-out activity in class. This is in accordance with the generation of teaching materials such as rubrics or activities to implement in the classroom and even questionnaires of a certain quality, as recognized by other authors [17,27]. However, the generation of such content may be limited, especially if evaluation-type or critical analysis-type activities are required of ChatGPT, which can only provide limited responses as previously stated. Therefore, future teachers should critically evaluate the generated resources in order to adjust the content and context for the targeted learners [24].

The personalization of tasks is a great advantage from the teaching point of view, and ChatGPT can greatly facilitate this work. In this way, education is increasingly considering the Universal Design for Learning (UDL) in classrooms. This fact entails a huge amount of work for teachers, but the use of this type of application could greatly reduce the preparation time of tasks addressing the individual differences found in classrooms. Thus, ChatGPT can be presented as a great opportunity for education system improvement. Beyond the personalization of students' tasks, AI can also be used to generate personalized applications in education in a broader sense. In this way, they can be used to detect vocational interests in students and guide them in their studies or, in the case of people with disabilities, to generate methodological strategies to facilitate their learning [39], which allows an improvement in education from a holistic and integrative point of view.

Faced with the critical situation for teaching practice that may lead to a paradigm shift in education, future teachers have to be aware of the change they will have to make in terms of task design and evaluation criteria in order to avoid or detect plagiarism. One of the proposals to solve the problems caused by this new educational approach is teacher training to provide them with technological training in AI and in general, in order to provide the educational community with digital literacy, as evidenced in recent research in education [9,17], especially at higher education levels [40].

Comparing categories between the perspectives of students and teachers, it can be observed that in the category of use and access, both are optimistic and consider that Chat-GPT shows great potential for improving the education system, without being perceived as a threat to it. Regarding the quality of the information and sources, they were more skeptical. This perception can be considered a positive aspect since as it has been explained that data generated by ChatGPT require a contrast processing of information and critical analysis. Finally, regarding the knowledge of how ChatGPT operates, both consider that they do not deeply understand its operation and that they should be trained in it.

It should be noted that the use of ChatGPT will increase in all areas, including education, due to its potential, so it is essential to convey to students the limits that should not be exceeded with its use and the consequences this may have for the education system. In addition, it is necessary to address this topic in the classroom in order to analyze weaknesses in its use. The objective should be for students to improve their learning process so that they are able to critically analyze texts generated by ChatGPT.

From the point of view of the teacher, it is absolutely necessary to implement teacher training to increase and improve teaching knowledge, and hence to better identify fraud by the students. This aspect is of great importance nowadays and should be carried out urgently to avoid a deterioration of the system. Finally, it is urgent for all countries to establish legal and ethical limits on AI use in many areas of work, especially in education, which is the area that concerns us.

#### Study Limitations and Future Prospects

This study may present limitations in the sample size with which it has been carried out. However, the objective was to obtain information from a group of people who currently have a dual perspective on the subject of study because they are university students who are training to become future teachers. In addition, it has been carried out with students specialized in experimental sciences, due to the important connection between the educational and scientific fields and the veracity of the sources of information.

As future lines of research, it seems necessary to study the perceptions of active teachers, since their perceptions may be different from those of teachers in training due to different factors such as age or affinity for technology. It is also considered necessary to identify the needs in technological and specific literacy in the use of artificial intelligence since if teachers are aware of the potential of their uses, applications, and limitations, they will be able to teach them to their students so that they can make rational and ethical use of them. Finally, it would be interesting to extend the study to other educational levels such as secondary school or university teachers.

#### 5. Conclusions

Data presented in this work can provide valid information to enable current and future teachers to respond to the influence of ChatGPT in the education field.

Related to objective 1 of the study, it could be observed that most of the students had never used ChatGPT before carrying out the activity in the classroom, a remarkable aspect since this technology has occupied an important space in the media due to its potential since its appearance.

After the activity was carried out using ChatGPT in a teacher-training classroom, the students envisioned the potential use and improvement of the teaching-learning process through ChatGPT due to its multiple applications for both students and teachers. The perception from the student's point of view is positive; however, nowadays there is great concern about the generation of incorrect data and great potential for plagiarism of the texts generated by this tool. To minimize the negative impact, or even reverse it, it is necessary to identify and explain to the educational community the consequences of plagiarism both in education and in professional development and real life. Therefore, students must be made aware of the ethical use of the tool, but teachers must also be trained to possess knowledge of artificial intelligence from various approaches to identify fraud by the students so that this type of tool does not have a negative impact on the education system.

These range from the functioning of artificial intelligence, the possibilities of using different tools such as ChatGPT in the classroom and for their own teaching efficiency, as well as updated information on how many advances or limitations these applications have in teaching use. All of this will provide adequate training with an ethical and critical sense to both current teachers and the students who will form the free societies of the future, who will become teachers at the end of their university careers.

**Author Contributions:** Conceptualization, A.L. and C.B.F.; methodology, A.L.; software, C.B.F.; validation, A.L. and C.B.F.; formal analysis, A.L. and C.B.F.; investigation, A.L. and C.B.F.; resources, A.L.; data curation, A.L.; writing—original draft preparation, A.L.; writing—review and editing, C.B.F.; visualization, A.L.; supervision, C.B.F.; project administration, C.B.F.; funding acquisition, C.B.F. All authors have read and agreed to the published version of the manuscript.

**Funding:** The APC was funded by Universidad de León. A. Lozano contract is funded by the Ministry of Universities and the European Union Next GenerationEU/PRTR.i and by the Recovery, Transformation and Resilience Plan.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** Data is contained within the article. Additional data are available on request from corresponding author.

**Conflicts of Interest:** The authors declare no conflict of interest.

# Appendix A

 Table A1. Self-made and validated questionnaire (Google Forms application).

		BLOCK 1. DEMOGRAPHIC DESCRIPTION OF PARTICIPANTS
	*	Gender: boy/girl/non-binary
	*	Age:
	*	Studies:
		BLOCK 2. PRIOR KNOWLEDGE ABOUT CHATGPT
	*	Did you know ChatGPT before having use in the class? Yes/No
	*	Have you previously used ChatGPT for other subjects? Yes/No
		BLOCK 3. STUDENTS PERCEPTION OF CHATGPT
Rate fro	om 1 to 5 hov	w much you agree with the following statements regarding the use of ChatGPT in class. 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree.
CAT.	Nº	QUESTIONS */LIKERT SCALE 1 2 3 4 5
	1	I was surprised by its potential when have used it.
	2	It is a tool easy to access and use.
	3	I find that ChatGPT saves much more time on doing tasks than with other online resources or textbooks.
	4	I find that ChatGPT can be a personalized learning tool, since it specifically answers each question.
		MULTI-ANSWERS QUESTIONS: Choose the options that you consider in the following questions.
	5	What could be more beneficial from using ChatGPT as a student?
А		(a) Faster completion of a work.
		(b) Generation of supporting study material.
·		(c) Use as a tutor or virtual support teacher.
		(d) Use as a check of my learning process.
	6	What could be the worst drawback from using ChatGPT as a student?
		(a) Less development of information search and analysis capacity.
		(d) Greater capacity for plagiarism in a work.
		(b) Less capacity for critical analysis.
		(c) Less synthesis capacity when carrying out a work.
		(e) Greater difficulty in defending a work in the classroom.
CAT.	Nº	QUESTIONS */LIKERT SCALE12345
	7	I have asked ChatGPT to generate the sources of information used to generate a work.
В.	8	The quality of the work done with ChatGPT is the same as with other online resources or textbooks used so far.
	9	The sources used by ChatGPT to generate the work are reliable.
C	10	As a student, even if ChatGPT performs the task given I must ensure that I understand the work.
	11	I understand how the artificial intelligence that ChatGPT uses works and therefore how it generates my tasks.

BLOCK 4. FUTURE TEACHERS' PERCEPTION OF CHATGPT							
Rate fro	om 1 to 5 hov	v much you agree with the following statements regarding the u 2: disagree, 3: neutral, 4: agree, 5: strongly ag	ise of Cha gree.	tGPT in o	class. 1: st	rongly d	isagree,
CAT.	Nº	QUESTIONS */LIKERT SCALE	1	2	3	4	5
A	12	ChatGPT can be a threat to the teaching job.					
	13	ChatGPT can be a very useful tool to use in my future teaching work.					
	14	As a future teacher, I believe that ChatGPT will force us to change the approach to certain tasks.					
B	15	As a teacher, I could use ChatGPT to generate high quality content, as long as I corroborate the sources.					
	16	ChatGPT could lead to a devaluation of the quality of the education system.					
C	17	As a future teacher, I must know the tool in order to know how to approach the tasks and to be able to evaluate it in a way that prevents/detects plagiarism.					
	18	As a future teacher, I must know how artificial intelligence works to understand how the students can use it in their tasks.					

Table A1. Cont.

\* Rate from 1 to 5 how much you agree with the following statements regarding the use of ChatGPT in class. 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree.

# References

- 1. Ganascia, J.-G. Inteligencia Artificial: Entre el Mito y la Realidad. Inteligencia Artificial, Promesas y Amenazas; El Correo de la UNESCO: Paris, France, 2018.
- Guerrero, J.M. The History of Modern Artificial Intelligence. In Mind (Susnjak, 2022) Mapping and Artificial Intelligence; Academic Press: Cambridge, MA, USA, 2023; pp. 131–161. [CrossRef]
- Xu, L.; Sanders, L.; Li, L.; Chow, J. Chatbot for Health Care and Oncology Applications Using Artificial Intelligence and Machine Learning: Systematic Review. JMIR Cancer 2021, 7, e27850. [CrossRef]
- Peksen, M.; Spliethoff, H. Optimising Pre-Reforming for Quality r-SOC Syngas Preparation Using Artificial Intelligence (AI) Based Machine Learning (ML). *Int. J. Hydrogen Energy* 2023, 48, 24002–24017. [CrossRef]
- Zawacki-Richter, O.; Marín, V.I.; Bond, M.; Gouverneur, F. Systematic Review of Research on Artificial Intelligence Applications in Higher Education—Where Are the Educators? *Int. J. Educ. Technol. High. Educ.* 2019, 16, 16–39. [CrossRef]
- 6. UNESCO. The Sustainable Development Goals Report; UNESCO: Paris, France, 2020.
- Song, P.; Wang, X. A Bibliometric Analysis of Worldwide Educational Artificial Intelligence Research Development in Recent Twenty Years. Asia Pacific. Educ. Rev. 2020, 21, 473–486. [CrossRef]
- 8. Popenici, S.A.D.; Kerr, S. Exploring the Impact of Artificial Intelligence on Teaching and Learning in Higher Education. *Res. Pract. Technol. Enhanc. Learn.* **2017**, *12*, 22. [CrossRef] [PubMed]
- Ocaña-Fernández, Y.; Valenzuela-Fernández, L.A.; Garro-Aburto, L.L. Inteligencia Artificial y Sus Implicaciones En La Educación Superior. Propós. Y Represent. 2019, 7, 536–552. [CrossRef]
- 10. Yang, Y.; Zhuang, Y.; Pan, Y. Multiple Knowledge Representation for Big Data Artificial Intelligence: Framework, Applications, and Case Studies. *Front. Inf. Technol. Electron. Eng.* **2021**, *22*, 1551–1558. [CrossRef]
- 11. Jawaid, I.; Javed, M.Y.; Jaffery, M.H.; Akram, A.; Safder, U.; Hassan, S. Robotic System Education for Young Children by Collaborative-Project-Based Learning. *Comput. Appl. Eng. Educ.* **2020**, *28*, 178–192. [CrossRef]
- 12. Singer-Brodowski, M.; Brock, A.; Etzkorn, N.; Otte, I. Monitoring of Education for Sustainable Development in Germany–Insights from Early Childhood Education, School and Higher Education. *Environ. Educ. Res.* **2019**, *25*, 492–507. [CrossRef]
- 13. Kasapakis, V.; Dzardanova, E.; Agelada, A. Virtual Reality in Education: The Impact of High-Fidelity Nonverbal Cues on the Learning Experience. *Comput. Educ. X Real.* **2023**, *2*, 100020. [CrossRef]
- 14. Moreno Padilla, R.D. La Llegada de La Inteligencia Artificial a La Educación. Rev. Investig. Tecnol. Inf. 2019, 7, 260–270. [CrossRef]
- 15. Schachner, T.; Keller, R.; von Wangenheim, F. ArtificialIintelligence-Based Conversational Agents for Chronic Conditions: Systematic Literature Review. J. Med. Internet Res. 2020, 22, e20701. [CrossRef]
- 16. Eke, D.O. ChatGPT and the Rise of Generative AI: Threat to Academic Integrity? J. Responsible Technol. 2023, 13, 100060. [CrossRef]
- 17. Lo, C.K. What Is the Impact of ChatGPT on Education? A Rapid Review of the Literature. Educ. Sci. 2023, 13, 410. [CrossRef]

- Farrokhnia, M.; Banihashem, S.K.; Noroozi, O.; Wals, A. A SWOT Analysis of ChatGPT: Implications for Educational Practice and Research. *Innov. Educ. Teach. Int.* 2023, 1–15. [CrossRef]
- 19. Guilherme, A. AI and Education: The Importance of Teacher and Student Relations. AI Soc. 2019, 34, 47–54. [CrossRef]
- 20. Drigas, A.S.; Ioannidou, R.-E. A Review on Artificial Intelligence in Orthopaedics. In *Comunications in Computer and Information Science*; Springer-Verlag: Berlin/Heidelberg, Germany, 2013; pp. 365–369. [CrossRef]
- Cheung, B.; Hui, L.; Zhang, J.; Yiu, S.M. SmartTutor: An Intelligent Tutoring System in Web-Based Adult Education. J. Syst. Softw. 2003, 68, 11–25. [CrossRef]
- Yilmaz, R.; Yurdugül, H.; Yilmaz, F.G.K.; Şahin, M.; Sulak, S.; Aydin, F.; Tepgeç, M.; Müftüoğlu, C.T.; Ömer, O. Smart MOOC Integrated with Intelligent Tutoring: A System Architecture and Framework Model Proposal. *Comput. Educ. Artif. Intell.* 2022, 3, 100092. [CrossRef]
- García-Martínez, I.; Fernández-Batanero, J.M.; Fernández-Cerero, J.; León, S.P. Analysing the Impact of Artificial Intelligence and Computational Sciences on Student Performance: Systematic Review and Meta-Analysis. J. New Approaches Educ. Res. 2023, 12, 171. [CrossRef]
- 24. Cooper, G. Examining Science Education in ChatGPT: An Exploratory Study of Generative Artificial Intelligence. J. Sci. Educ. Technol. 2023, 32, 444–452. [CrossRef]
- 25. Perkins, M. Academic Integrity Considerations of AI Large Language Models in the Post-Pandemic Era: ChatGPT and Beyond. J. Univ. Teach. Learn. Pract. 2023, 20, 7. [CrossRef]
- Sinha, R.K.; Kumar, N.; Mondal, H. Applicability of ChatGPT in Assisting to Solve Higher Order Problems in Pathology. *Cureus* 2023, 15, 335237. [CrossRef] [PubMed]
- 27. Tlili, A.; Shehata, B.; Adarkwah, M.A.; Bozkurt, A.; Hickey, D.T.; Huang, R.; Agyemang, B. What If the Devil Is My Guardian Angel: ChatGPT as a Case Study of Using Chatbots in Education. *Smart Learn. Environ.* **2023**, *10*, 15. [CrossRef]
- López-Gómez, E. El Método Delphi En La Investigación Actual En Educación: Una Revisión Teórica y Metodológica. *Educ. XX1* 2018, 21, 17–40. [CrossRef]
- 29. Álvarez, M.R.; Fonseca, M.T. El Métod Delphi. REIRE Rev. D'innovació I Recer. Educ. 2016, 9, 87–102.
- 30. Lund, B.D. Review of the Delphi method in library and information science research. J. Doc. 2020, 76, 929–960. [CrossRef]
- Bakieva, M.; Jornet, J.M.; González, J.; Leyva, Y.E. Colegialidad docente: Validación lógica del instrumento para autoevaluación docente en España y México. *Estud. Sobre Educ.* 2018, 34, 99–127. [CrossRef]
- 32. Cabero, J.; Infante, A. Empleo del Método Delphi y su empleo en la investigación en comunicación y educación. *Edutec Rev. Electrón. Tecnol.* **2014**, *48*, a272. [CrossRef]
- 33. Tirado, F.; Santos, G.; Tejero-Díez, D. Motivation as an Educational Strategy a Study in the Teaching of Botany. *Perfiles Educ.* 2013, 35, 79–92. [CrossRef]
- Salgueiro, A.M.; Ares, L.R.; Sestayo, R.L.; López, S.F. Conocimiento, Uso y Percepciones Del Alumnado Sobre ChatGPT. In 2n. International Congress: Education and Knowledge; Octaedro Editorial: Barcelona, Spain, 2023; p. 588.
- Anderson, L.W.; Krathwol, D.R. A Taxonomy for Learning, Teaching and Assessing. A Revision of Bloom's Taxonomy of Educational Objectives; University of Kentucky: Lexington, KY, USA, 2001.
- 36. Rudolph, J.; Tan, S.; Tan, S. ChatGPT: Bullshit Spewer or the End of Traditional Assessments in Higher Education? *J. Appl. Learn. Teach.* **2023**, *6*, 1–22. [CrossRef]
- Fergus, S.; Botha, M.; Ostovar, M. Evaluating Academic Answers Generated Using ChatGPT. J. Chem. Educ. 2023, 100, 1672–1675.
   [CrossRef]
- Hapsari, I.P.; Wu, T.T. AI Chatbots Learning Model in English Speaking Skill: Alleviating Speaking Anxiety, Boosting Enjoyment, and Fostering Critical Thinking. In *Innovative Technologies and Learning*. 5th International Conference on Innovative Technologies and Learning; Springer-Verlag: Berlin/Heidelberg, Germany, 2022; Volume 13449, pp. 444–453. [CrossRef]
- García-Peña, V.R.; Mora-Marcillo, A.B.; Ávila-Ramirez, J.A. La Inteligencia Artificial En La Educación. Dominio Las Cienc. 2020, 6, 648–666.
- 40. Susnjak, T. ChatGPT: The End of Online Exam Integrity? *arXiv* 2022, arXiv:2212.09292.

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.