Artificial Intelligence in Education: Fears and Faiths

Latifa Douali, Sabah Selmaoui, and Widad Bouab

***Abstract*—Artificial Intelligence (AI) aims to develop models with human-like cognitive functions. Since its conception in the mid-50s, it has achieved big success in almost all areas and domains, starting from games to autonomous robotic surgery, and it is evolving rapidly. Indeed, AI-based machines pervade all domains and it is used for many purposes. In developing countries, it is widely used in almost all everyday life tasks. Yet, the idea that machines can act as humans and make decisions on behalf of individuals scares many people and raises many concerns and controversies. This tends to be the case in Morocco as well. Over the past few years, AI has made its way in the field of education and it is revolutionizing it. In this survey study, we probed the opinions of Moroccans about AI and their fears and hopes towards AI and its use in education. The majority of the respondents to the survey expressed serious worries about the future of using AI, especially in the early childhood education. Nevertheless, they seem to be rather cautiously optimistic about using AI in providing technical assistance in teaching-related tasks.**

***Index Terms*—Artificial intelligence, education, autonomous, values.**

I. Introduction

"The 20th century Grail was oil. The 21st is the data" has declared Jalil Bensouda [1], a Moroccan managing director (precisely Casablanca Sector General Manager of McKinsey & Company)

Artificial Intelligence (AI) gains a big worldwide interest. It is one of the fastest growing fields. It pervades many domains [2]. It continues to make big advances, especially with the emergence of powerful computers and the availability of big data. The idea behind AI is to use the strengths of computers in order to process collected data (experiences) to draw conclusions [3]. In other words, it consists of making computers learn from past experiences and make decisions. Relying on robust algorithms and successful pattern-recognition and optimization, AI has come a long way and made considerable progress in several domains [4]. Its applications achieved big successes. AI has been widely used in games, e-commerce, face, voice and pattern recognition, security, transportation, ... etc. [5], [6]. Recently, it makes its way in the world of education [7].

AI can perform perfectly human-like tasks, even better than humans, especially when high precision is needed or big data processing is involved.

With the development of AI and the increasing growth of AI applications, many questions have raised about their benefits and the risks they may involve. Considerable concerns and controversies arouse worldwide. While there are people who strongly believe in its effectiveness and its role in easing human life and augmenting human capacities, there are some people who totally deny attributing any positive effect to AI. The usage of AI and the potential negative effects these technologies might bring remain controversial. We, humans, from the point of view of the partisans, can benefit widely from their rapidity and their ability to reduce time, efforts and costs in complex tasks. AI applications are perfectly suited to people with special needs [8]. We can take advantage of their pattern-recognition in many domains such as defense, transportation and medical diagnosis [9], [10]. In contrast, many challenges of AI feed the opponents' point of view [11]. According to them, AI will lead to bad consequences on human-being life and existence. Many authors advocate to constrain their actions and regulate their usage [12]. Others propose a "stop mechanism" to prevent AI from causing harm and risks to humans [13]. In fact, these conceptions added to the degree of knowledge about AI will have an impact on their usage and their development.

AI has been integrated recently in the educational field and it is evolving rapidly [14]. The shift from the behaviorist theory perspective in learning to a focus on constructivism and cognitive learning theories has largely hastened this integration.

AI in education may be implemented to handle pedagogical problems or to provide infra-structural assistance. It has an impact on learning experiences of learners and makes a revolution in the way of learning, reasoning and problem-solving.

AI applications in education has been introduced to provide enhanced learning experiences. Besides the intelligent robots, we can distinguish two main types: intelligent tutoring systems and adaptive learning systems.

Intelligent tutoring systems: Systems that use AI to assist or guide the learner in his learning activities. Activities are presented to the learner according to his own goals and performances. These systems perform tutoring tasks such as analyzing learner's performances, selecting and presenting appropriate activities to improve these performances. In other words, they learn from learner's experiences to draw conclusions on how to improve their performance. They help

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so to create individualized programs, without human intervention.

Adaptive learning systems: The implementation of these systems intends to provide learners with specific assistance and learning material according to their special skills and needs. These systems collect data on the learners and they can adapt themselves to the learner's cognitive abilities using the concept of "cognitive scaffolding". They are essentially used when web-based systems are used. Collected data on learners are stored in databases and the proposed solutions are also retrieved from available datasets.

Intelligent robots were largely introduced in education. Learners can interact and communicate with intelligent robots in a human-like manner. Many experiences were described in the literature. They provide support to learners in many steps of learning process and activities. It was reported that children can be too trusting of robots [15]. Children can be even influenced by them [16].

There is a considerable interest and ongoing research to develop AI applications in education and their effectiveness, especially in developing countries. As several countries, Morocco starts taking giant steps towards technological advances involving intelligent systems. So, there should be an effective involvement of educational system. Policy makers tend then to develop adaptive educational strategies to go along with these efforts. Education is a socio-cultural phenomenon [17] and the question is: To which extent the public opinion accepts the integration of AI in education?

The present study seeks to investigate the public viewpoint about the usage of AI, especially in education. It was first important to broaden our context and to probe the awareness and understanding of AI as well as the conceptions about AI.

Many surveys have been carried out in different countries to explore opinions of individuals on AI, their understanding and awareness and their opinions on some AI usage [18]-[22]. However, as far as we are aware of, no previous survey has been conducted in Morocco, nor in Africa on AI. This is the first survey made in Morocco to probe the public opinion on AI and especially on usage of AI in education. In this study, we try to address several questions:

- What Moroccans know about AI?
- Are Moroccans fearful about AI? If so, what are their fears?
- Is there any apprehension about AI?
- To which extent Moroccans are optimistic to the usage of AI in education

II. Methodology

A. Developing the Questionnaire

For the purpose of this study, survey information was collected using a questionnaire con-structed of different types of questions. We are persuaded that close-ended questions may fall short of providing the type of information we seek in this survey study. We consider that open questions help to gather plenty of information. There are no restrictions on respondents' thoughts. Respondents use their own words and this allows gaining more insight into their own conceptions [23]. Hence, close-ended questions, multiple-response questions as well as open questions have been employed to collect data. In-person interviews were also conducted.

Several steps were performed to design and to adjust the questionnaire items. To assess the questionnaire questions, that is to validate our survey, we ran a pilot test with randomly chosen individuals representing the target population. This step helped us to regulate the questionnaire and to refine some questions to be more applicable to a wider population.

Besides the questionnaire, we conducted several semi-constructed interviews to further clarify individuals' ideas and to gather more information. These interviews were conducted whenever was possible.

The survey was carried out between the middle of December 2019 and March 2020. Random sampling was adopted. Initially, the individuals were invited to fill in paper-forms. When COVID-19 began to spread and the lockdown was established in the country, other alternatives were investigated and used such as phone calls and online forms. Even if it was time-consuming, we could get more respondents using the in-person and the paper-form method.

B. The Target Population

To answer the questions we arose earlier, 336 individuals, in a simple random sampling, participated in the survey, 44% of them are females. We should mention here that as described by Cochran's formula [24], [25], 336 is an appropriate sample size that is representative of the Moroccan population at 95% confidence level and with ± 5% of precision.

Another strategy we adopted to determine the appropriate sample for this study was to get a diversified sample, that is to gather information from a diversified population reflecting the demographic, educational and social diversity of Moroccan people.

The participants originated from different regions in Morocco (Marrakech, Essaouira, Casablanca, Mohammedia, Tangier, Safi, Rabat, Laayoun, Khuribga, Fnideq, Benslimane).

TABLE I: The Distribution of the Population according to Their Age Groups

Age group	13-18	19-30	31-50	51-70
Percentage	4 %	53 %	32 %	10 %

As illustrated in Table I, individuals belonging to several age groups participated in this survey.

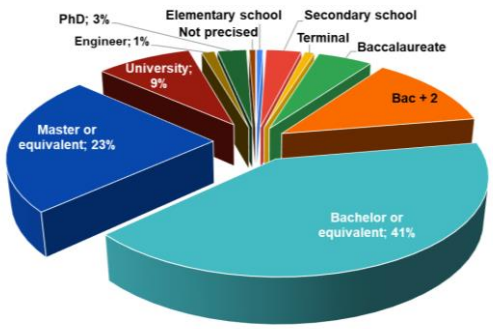

Fig. 1. Distribution of the respondents according to their educational attainment.

It is noticeable that the largest proportion of population, about 53%, aged between 19 and 30 years since Morocco is considered as a demographically young country. The median age in Morocco is 29.5 years [26]. Moreover, the population in this study is richly diverse as per their educational attainment. They belong to different levels basically primary, secondary school and postsecondary levels This latter refers to diplomas or certificates awarded by universities or other educational institutions, obtained or not yet. Respondents with higher educational levels are also represented. Engineers and PhDs participated as well in the survey study as 1% and 3% respectively (Fig. 1).

Our survey accounts for the full Moroccan population's diversity by age, gender, educational attainment, and by employment status as well, students, teachers, civil servants, business owner and other employees participated in the survey.

III. Results and Discussion

A. Are Moroccans Aware of AI?

As a first question, we were inquiring about the respondent's knowledge of AI. The respondents were asked if they already heard about AI and if they know what it is about. Three options were then listed as possible answers:

- No, I have no idea
- Yes, and I know what it is about
- Yes, but I don't know what is about

The results show that 39% of the respondents know AI and they know what it is about, 25% have never heard about AI while 36% reported that they have already heard about AI, but they do not know what it is about.

This awareness may vary according to the respondent's age group. To know more about the respondents that asserted they have already heard about AI, and those who have had any idea about it, we report in Fig. 2 the distribution of the population's awareness of AI in each age group.

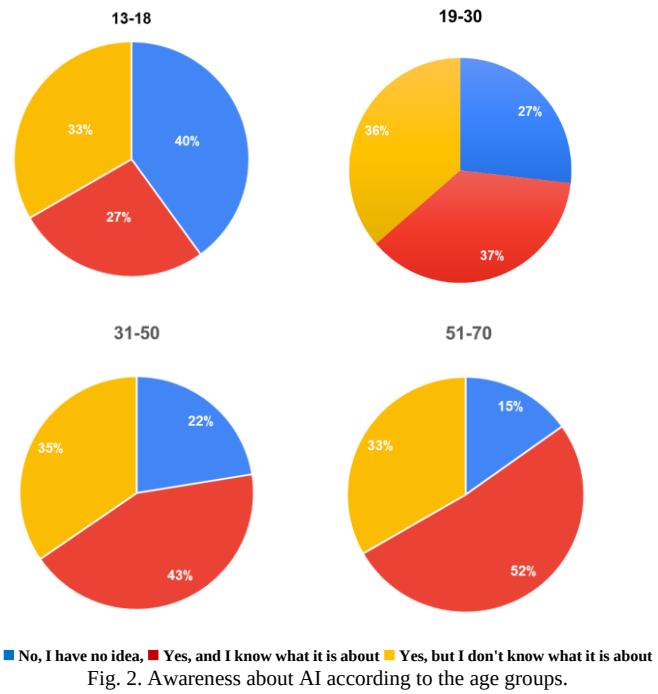

Fig. 2. Awareness about AI according to the age groups.

In Fig. 2, we can notice that more than half of the population aged 19-30 (about 73%) had heard about AI, but only 37 % knows what is about. However, 40% of the population aged 13-19 and 27% of the population aged 19-30 had never heard about AI.

From Fig. 2. We can also notice that the majority of individuals belonging to the age groups 31-50 and 51-70 (population aged between 31 and 70 years) were the most aware of AI. In fact, people belonging to these groups are the people who substantially pay close attention to and keep up with current events. They are more aware about the development and the transformations made in the society. They have the characteristics to follow the news from anywhere in the world, on different platforms: TV, newspapers or internet and to conduct discussions and change views with people in their cohort, mostly on topics disclosed by news. Although they are not digital natives, they can be considered as multicultural that show a big interest to any new event or change in the society and technology. It does not mean that they accept everything 'new', but one can say they closely scrutinize every new item, they think thoroughly and watch carefully the development. It is crucial here to note that these persons usually hold a position of authority and responsibility in their families and in the society as well. They play a major role in any change.

B. What Moroccans Know about AI?

The respondents were invited to answer the open question "Which definition would you give to AI?". Respondents were invited so to use their own words. Although some respondents made it clear that they had no idea (4%), others gave no answer (34 %). In general, respondents attribute many definitions to AI. The answers were far from being rationally constructed, but they contained interesting ideas. Globally, the answers encompassed both optimism and fear. Some respondents defined AI by straightforwardly expressing their fear towards AI. We can mention here this conspicuous answer: "Personally I think it is a new discovery. However, it will be a bad thing for human being that will totally destroy it". Another stated that "By means of technology, we increase intelligence out of the ordinary, which will have bad impacts". "This is the fact of using another means replacing the human being" declared another respondent. Other answers were however more precise (10 %) or very close (7 %) to the rational definition showing the high awareness of these people of AI. Such answers may be provided as well by individuals dealing already with AI at work or studies. For example, the following definitions were provided by some respondents to describe the AI: "Algorithms that allow automatic machines to learn and simulate human intelligence". "These are computer algorithms that tend to self-improve according to the needs, these codes will learn at each execution to auto-adapt: Machine Learning". We noticed, however, that more likely the respondents' definitions comprehend positive or negative sentiments towards AI like this answer: "Creating intelligent robots without human intervention to help human life" or this statement "every machine that can replace human functions".

Using the text mining technique, derived from machine learning, we analyzed the participants' answers. We report in

Table II the analysis of some representative answers.

TABLE II: ANALYSIS OF SOME RESPONDENTS' ANSWERS

Category	Respondents' answer
Related to learning, thinking	• Algorithms that make automatic machines learn and to simulate human intelligence • To program machines and develop algorithms so that they can self-learn and be cognitively autonomous • Make machines able to learn from the environment that will let it perform intelligent tasks and solve complex problems. • Set of algorithms and computer systems that learn from your habits and facilitate life • Techniques elaborated to simulate the human intelligence
Related to artificial	• development of intelligence by artificial means • Intelligence produced by an artificial brain • Everything artificial and related to modern revolution
Related to technology	• New technologies that let machines imitate a sort of real intelligence • Everything in relation with technology • I have no idea, but I think it is technology
Related to computer science	• It is an information system that that simplify many tasks • Simulating human intelligence by computer sciences • A mix of algorithm and information system used to learn your habits and simplify your life.
Related to robots	• Replacing humans by robots • Allow to make advances in the robotic field • Construct robots able to act and think like humans
Related to positive feeling toward AI	• Technology that helps humans and take the best decisions • Developing hardware and software solutions to improve your enterprise productivity • IT domain that facilitates every human task in an intelligent way
Related to negative feeling toward AI	• Research done to enhance the machines' abilities in order to replace humans • Replacing workforce by robots I think it is a new discovery. However, it will be a bad thing for human being that will totally destroy it

In addition to the definition of AI, the survey explored participants' knowledge about the starting date of AI. The choices comprehend the dates “1800”, “1910”, “1956”, “2000” and “Recently”. We report the results in Fig. 3.

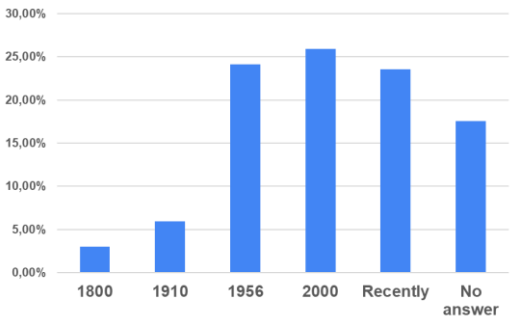

Fig. 3. The starting date of AI according to our respondents.

Respondents were divided over whether AI started on 2000, 1956 or recently. Quarter of the participants (precisely 26 %) answered that AI exists since 2000. An equivalent percentage (24%) answered that the starting date of AI is 1956 or recently. And only few participants answered by choosing 1800 (3 %) or by choosing 1910 (6 %). It is true, that the birth of the term “Artificial intelligence” is considered to be in 1956, by John McCarthy during a conference at Dartmouth College in Hanover, New Hampshire, US, but its use was mainly limited, during decades, to specific intellectual environments. Its use was primarily predominant in research. The up and down periods of AI persisted till the 1980s (AI winter) where AI started to make successes and to raise debates and challenges. AI started then to attract attention and investment, but this was in developed countries. It was just “recently” that AI has gained widespread interest and the applications of AI started to proliferate and have become more numerous [27], [28]. It is just recently that we notice a growing interest in AI by the public media and this is more likely why a large number of respondents opted for 2000 or 'recently' as an answer to this question.

C. *Are Moroccans Fearful of AI?*

Whether we like it or not, AI invaded almost every domain. In recent years, the AI started to be applied in the education field as well. Some voices encourage actively to get engaged in the integration of AI in education [29]-[31]. Many examples of AI integration in education exist. For example, we can cite here the PopBots [32], the MIT AI-based robot which is already used in the early childhood education, the DeepTutor [33], the intelligent tutoring system [34] and many others.

We asked the participants if the AI is already used in education, they had three options to choose from: Yes, No, and I don't know. The majority of the participants (51 %) responded yes, they know that AI is used in education, and 32 % declared that they don't know if AI is used in education. However, 6 % gave no answer.

While there are many definitions of education [35], [36], Moroccans distinguish between two definitions of education:

- Education that aims the acquisition of knowledge and skills, provided at school, in other words schooling or teaching;
- Education that aims the acquisition of good attitudes and human qualities necessary to live in family and society and the maintenance of the human being existence, provided at home and schools in the early age.

We asked then the participants the following question: “can you rely on AI in children's education?”, the respondents had four answers to choose from: 1) Absolutely not, 2) Rather no 3) Rather yes 4) Absolutely yes. The results are reported in Fig. 4.

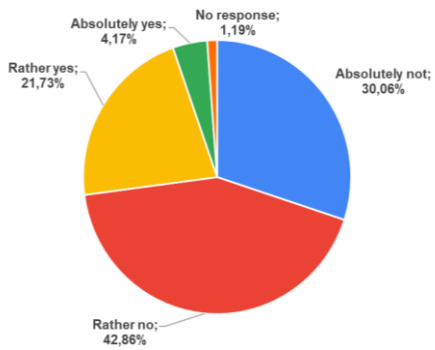

Fig. 4. Respondents' answers to the question “Can you rely AI in education of children?”

From the analysis of Fig. 4, it seems that the large majority of participants reject firmly the use of AI in education. The majority of the respondents (73 %) can not rely on AI in early childhood's education. Explicitly, about 30 % said that they absolutely can not trust AI in education and roughly 43 % answered by 'rather no'.

So far, the respondents are concerned about AI and its implementation in their children's education. The issue here, as many participants stressed, is essentially of values, principals and ethics which are quite sensitive for individuals when talking about children's education. "I can not entrust my children to a machine programmed by others" declared many participants we interviewed. Moroccans do not have confidence in machines or more precisely programs developed by others or "strangers" to deal with their children's education, let alone autonomous machines that set their own rules and make decisions. "Our aim is to raise children with strong familial and social values; it is necessary to teach them how to respect each other especially the elderly and superintend them. Nowadays, individualization increases with the new technologies, and it will certainly exacerbate with autonomous machines".

"If we entrust our children to this upcoming intelligence, we might end up with inhuman beings" asserted some participants. "What about altruism and helping others in need, especially your sibling? Can a machine teach them that? I don't think so" claimed a respondent.

Actually, every aspect of educational process is highly influenced by a system of values aiming to develop moral, intellectual, and spiritual life. There is incontrovertible evidence that education aims to develop strong values. That means "the principles that guide human actions" [37]. Actually, it was difficult for the respondents to admit that artifacts without moral status, can provide children with values such as ultimate values (e.g. beliefs), intrinsic values, which include personal (e.g. fairness, dignity, politeness, honesty), core and community values. These values are considered to be very important in raising new generations. They are making the social identity and delineate the traits of the social culture and ensures its sustainability. It is strongly believed that AI will increase minds-control to the detriment of human-being principles and ethics. "It will instill odd values and behaviors in our children; like individualism, materialism and violence, as the current technologies do. These technologies compete against us in educating our children".

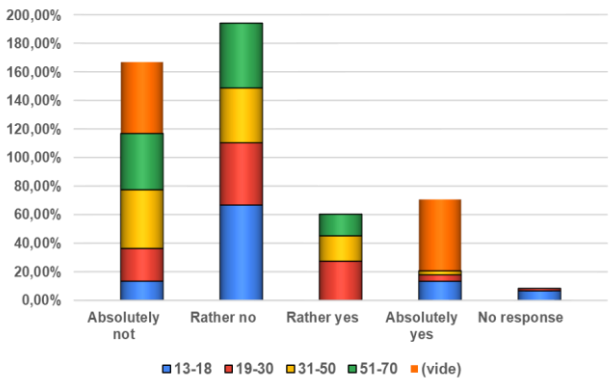

Fig. 5. Trust in AI in education according to age groups.

According to the results depicted in Fig. 5, it can be concluded that there was a consensus between almost all age groups.

The participants who choose the answers "absolutely not and rather no" belong to all age groups. Interestingly, the majority of the population aged between 51 and 70 years responded by "absolutely not" or "rather no" to this question.

Another analysis leads to explore the trust of the respondents in the usage of AI in education. We investigated the responses according to the respondents' awareness about the AI. The histogram of Fig. 6 represents the results.

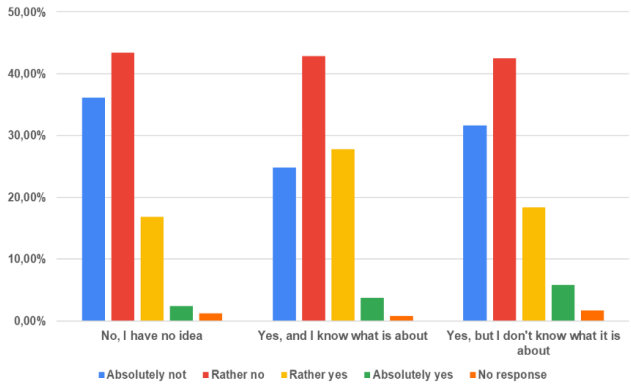

Fig. 6. Trust in AI in education according to the awareness about AI.

According to the results depicted in Fig. 6, "Rather no" is the major response of all participants regardless of their awareness about AI. From this diagram, we notice as well that the highest number of individuals asserting that they have absolutely no trust on AI in education belong to the category that have no idea about AI (36 % versus 25 % and 31 % respectively). Those who know AI and what it is about seemed to be relatively optimistic and about 28% of them responded by "rather yes"

D. To Which Extent Are Moroccans Optimistic towards AI?

In contrast to what it can be expected from a relatively liberal society, values, for most of Moroccans, are red lines that can not be crossed. "No matter how efficient it is, it would not reach human perfection, especially as far as human qualities and values are concerned. "We could trust its technicality, but not its 'humanity'" stated a participant. Parents and teachers are keen to raise "real humans" who take very good care of human relationships, ethics and principals and far from being materialistic. Another concern was issued by this respondent who asserted that "it is known that any new technology grows in different way than what we expected or designed for the first time; we should then be very cautious about using these technologies". He was pointing to the abuses that might come with long-term development of AI. It seems that Arendt's statement [38] "education can not forgo either authority or tradition" is true for a country like Morocco. We should just mention that we are talking here about authority of parents that are controlling the children's education and won't allow artifacts to deal with it, and tradition to what these parents are attached.

Yet, there is slightly higher public confidence in use of AI in teaching as it can be seen in Fig. 7.

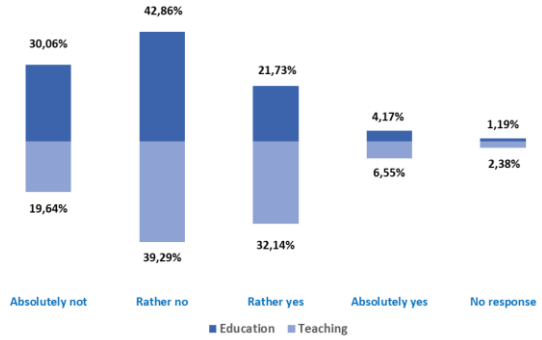

Fig. 7. Respondents' answers to the question "can you rely on AI in teaching?" compared to their answers to the question "can you rely on AI in education?".

Interestingly, 32,14 % of the respondents declared that they rather trust AI in teaching against only 21,73 % trusting AI in education. 6,55 % stated that they absolutely trust AI in teaching versus only 4,17 % relying absolutely on AI in education. 30 % do not absolutely trust AI in early childhood education and only 19,64 % do not absolutely trust AI in teaching

According to many respondents' points of view, AI might be useful in teaching to help in administrative tasks, assessment process, Learning Management Systems (LMS) in the case of online teaching. In other words, it would be accepted only in providing organizational and technical assistance. We should note here that it is admitted that using the AI in teaching would serve better the educational system at the universities or at special higher institutions, which deal with young students [39].

It seems that the participants in this survey are sceptic about the AI because of their artificial reasoning and decision-making capabilities. Actually, decision-making is the ability to make one action among many options. It is about to decide on one of many available possibilities after an assessment and judgement which is tightly related to consciousness of the actor. Admitting that machines, without consciousness, will make decisions on behalf of humans, especially in education, might look unreasonable to many individuals.

Decision-making deals with the sense of the "right" and the "wrong". Clearly, the sense of the "right" and the "wrong" may vary from culture to another. It might even differ from person to another. Our own sense of "right" affects our acceptance of the fact that others may take decisions on our behalf. Like in this study, individuals have difficulty to accept unconscious machines to make decisions, in a topic as thorny as education, using their own "right" sense.

IV. Conclusion

In this study, we conducted a survey aiming to collect data about knowledge, conceptions and feelings of Moroccans towards AI and their opinions in using AI in educating and teaching children. 336 individuals from many Moroccan cities with several educational and occupational backgrounds participated in the survey ensuring a rich diversity of the target population and reflecting the demographic, educational and social diversity of Moroccan people. Interestingly, a survey conducted in a developing country such as UK showed that 83 % of the respondents were aware of AI. However, the present survey showed that only 39 % of respondents were aware of AI and they had knowledge about it. Although this proportion seems to be modest, it points to the economical context of the country and the modest involvement of AI in the immediate surrounding and daily life of Moroccans. Most importantly, individuals that play significant roles in the society and have high impact were aware of AI.

Like in many countries in the world [11], [18], [22], [40], many people express their concerns about the usage of AI and its impact on the human being life. Even the definitions the respondents gave to the AI encompassed positive or negative feelings towards AI. In many instances, respondents expressed explicitly or implicitly their fear toward it. The self-learning aspect in AI scared the respondents. According to the respondents' point of view, learning from "suspicious" experiences may result in far-reaching fatal consequences. Being unable to expect the eventual power of this AI on humans frightened them more and lead them to reject it firmly in an attempt to avoid unforeseen outcomes.

The use of AI in education was discussed largely with the respondents and it revealed the fear Moroccans have toward AI. Education deals with many values and personality characteristics and it is risky to entrust to unconscious machines. These conceptions and fears will have automatically an impact on the usage of AI and their development.

There is a cautious optimism about these technologies. AI-based technologies should be fearful since they are here to totally destroy humans or feed children with suspicious values contradicting the Moroccan values and principles (core, family and community values) according to some respondents' viewpoints. Specifically, there is no controversy about rejecting the usage of AI in early childhood education. The values, to which education is very dependent, are the essence of human lives and they are considered, by the participants, as red lines to not cross. They are considered to be the traits to define the social identity and the pillars ensuring the human being existence and shouldn't be altered. Parents and teachers maintained these values for decades. And their overriding concern now is a moral and ethical upheaval. Nonetheless, Moroccans are likely more confident in using AI-based technologies in teaching to serve the educational system. The AI-based technologies can be used in assisting administrative tasks, assessing process, assisting students to make decision on their orientation and in online learning.

Indeed, values are socio-cultural dependent. Developers and AI algorithms should take into account ethical and socio-cultural features to build these decision-making systems even though this will open the discussion about local cultural specificity as well as issues related to globalization.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

All authors contributed equally to this work.

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