Robots as Teachers: From the Lens of College Professors and Students

Patricia T. Insail[1], Amelia M. Bonotan[2] & Ferdausia I. Namli[3]

[1]Tawi-Tawi Regional Agricultural College, Bongao, Tawi-Tawi, Philippines
[2]Cebu Normal University, Cebu City, Philippines
[3]Tawi-Tawi Regional Agricultural College, Bongao, Tawi-Tawi, Philippines
patriciainsail2020@gmail.com[1], bonotana@cnu.edu.ph[2], secretarydr2017@gmail.com[3]

Abstract
As the use of robot teachers in the classroom has become widespread in some developed countries, several studies on the applicability of robots in education have been conducted. But in the Philippines, adopting robots in the classroom and their consequences in education are not yet explored. Thus, this basic qualitative study was undertaken during SY 2019-2020 in Tawi-Tawi, to address this gap of knowledge and explore some stakeholders' views, specifically, of the college students and professors/instructors, on the applicability of robots in education. The researchers conducted interviews with 29 college instructors and graduating education students at a state college in Tawi-Tawi, Philippines. The findings revealed the following themes from the lens of the (a) college students: (1) "students' veneration for teachers versus disparagement for robots"; (2) "balancing robot's positive features with negative outcomes;" and (3) "adverse impact on students' personality;"(b) college instructors or professors, (4) prognosis of negative implications on education"; (5) "robot's limitations/shortcomings inappropriate for a noble profession"; and (6) "teacher's concern over student's welfare." The researchers recommend the conduct of similar study with college students and professors of other disciplines to substantiate the initial findings.

Keywords – Basic qualitative study, classroom robot, education, educational technology

INTRODUCTION

Toffler, a futurist American writer, remarked in the 1970s that someday computers would replace teachers [1]. True enough, in 2010, CNN.com Global Connections reported that "robot teachers invade South Korean classrooms." These robots taught English in two elementary schools as part of an experimental program initiated by the South Korean government. In this high-tech country, robots have been a huge help in education given that they can serve a range of educational purposes; that is why their government is determined to push on with its plans to expand its robot learning, or "R-learning," program [2]." While at the British Science Festival in September 2017, a British education expert, Anthony Seldon, claimed that "robots will replace teachers by 2027" [3]. Seemingly, this brave assertion is not far from impossible because in 2018, a news article in the

New York Post detailed that "Finland schools are testing out robot teachers" [4]. It further stated that "Elias," a humanoid robot, teaches language at a Finnish primary school in Tampere, Finland. Accordingly, this humanoid robot has the extraordinary ability to comprehend and communicate in twenty-three different languages. It is furnished with software that enables it to recognize students' needs, assist them, and encourage them to learn. Another article published in 2018 declared that "robot teachers joined the ranks of educators" as more than 600 kindergartens across China used these robots as teaching assistants with its makers hoping to expand into Greater China and Southeast Asia [5]. India Times in its August 2019 issue, also states that in a Bengaluru school, "robots teach" as a humanoid robot named Eagle 2.0 was conducting lessons as a teacher assistant at Indus International School [6].

As the use of robot teachers in the classroom has become widespread in highly developed countries, several studies on the use of robots in education were conducted by numerous researchers worldwide. Prominent among these research studies is the substantive review paper on the applicability of robots in education from the Netherlands, which reported that robots are becoming an essential element of society and have huge potential in being utilized as an educational technology [7]. In Korea, a similar study was conducted wherein it revealed that educational or pedagogical robots were well-received as they enhanced children's motivation to learn compared to other media [8]. In Taiwan, another study of which the implications of using robots to teach a second language by computer science researchers has been well documented where it stated that" children are not as hesitant to speak to robots in a foreign language as they are when talking to a human instructor [9].

Yet, despite numerous researches on pedagogical robots, reports from educational institutions are not readily available [7]. In the Philippines, adopting robots in education and their consequences are not yet explored. This spurred the researchers to conduct this basic qualitative study to address this gap of knowledge, through an inductive exploration of the perspectives of college professors and students, on the applicability of robots in education. As educators, we have to fathom the varied effects of using robots in education because scholars have raised ethical concerns about children interacting with robots [10]. Before we fully accept educational technology in our educational setting, it is imperative that we first contemplate about "where robots can and should be used, and where they would be best avoided, before we travel too far along a path towards complete automation" [11]. Thus, this study is significant to all the stakeholders of education as it explores the salient issues and concerns and, most of all, the consequences of utilizing robot teachers.

Objective of the study

This study explores the views and opinions of the stakeholders of education on having robots as classroom teachers. Specifically, it aimed to determine the teachers' and students' perceptions at "Tawi-Tawi Regional Agricultural College on the applicability of robot in education" conducted during SY 2019-2020.

Theoretical Underpinning

This study is anchored on the constructionisttheory of learning by Seymour Papert (1990)which is in line with the primary purpose of using robotics to enhance student learning. Aside from being an expert and a pioneering researcher in both artificial intelligence and child development, Papertwas a passionate advocate of using educational technologysuch as computers not only to deliver information and instructionbut enable students to explore and learn in new ways [12]. He posits that a constructionist teacher is not the 'sage on the center stage, but a guide on the side'; that is a facilitator of learning who prepares students in attaining their goals [13]. Constructionist theory of learning advances the idea that "teaching" students is replaced by "assisting" them; thus, the teacher's role is not to be a lecturer but a facilitator.Hence, it is assumed that a robot teacher can take on an instructor's role.

MATERIALS AND METHODS

Research Design

The study utilizes the qualitative research methodology, specifically, the basic qualitative design. Basic qualitative research design, also known as a generic or interpretive qualitative research, is the most common form of qualitative research wherein the overall purpose is to probe deeper how participants interpret the meanings of their experiences [14], or how individuals make meaning of a phenomenon or a situation, which in this case is the presence of robot teachers in the classroom.

Participants

The researchers used the purposive sampling technique in choosing the participants based on the following selection criteria: (a) college professors handling professional courses in education or fourth year education students in their teaching practicum at Tawi-Tawi Regional Agricultural College where the lead researcher works as permanent professor, (b) ample knowledge and understanding of the study's phenomenon. It is presumed that these prospective participants possess a broad knowledge and exposure of varied classroom scenarios. A total of 29 participants - consisting of ten (10) college instructors/professors, and nineteen (19) students gave their informed consent to participate in the study. In a qualitative research approaches like this study, purposive sampling is most suited to use wherein data analysis is being done simultaneously with the data collection process. That is why the sample size depends on the theoretical saturation or the point in data collection when new data no longer bring additional insights to the research questions [15].

The participants of this study were the students and teachers at Tawi-Tawi Regional Agricultural College, Tawi-Tawi, particularly the instructors with teaching loads in the Agricultural Education Department and students taking up Bachelor of Science in Agricultural Education. Table 1 and 2 show the profile of the teacher participants and the student participants, respectively.

Table 1. Profile of the Teacher Participants

Teacher Participant	Sex	Age	Civil status	Number of years teaching	Religion
1	Male	27	Married	6	Islam
2	Female	36	Married	14	Islam
3	Male	35	Single	14	Islam
4	Female	43	Married	20	Islam
5	Female	30	Single	4	Islam
6	Female	29	Married	6	Islam
7	Male	28	Single	3	Islam
8	Female	55	Married	25	Roman Catholic
9	Female	38	Married	14	Islam
10	Female	60	Married	29	Islam

Table 2. Profile of the Student Participants

Student Participant	Sex	Age	Religion
1	Female	21	Islam
2	Female	22	Islam
3	Female	21	Islam
4	Female	23	Islam
5	Female	22	Islam
6	Female	21	Islam
7	Male	22	Islam
8	Male	22	Islam
9	Female	21	Islam

10	Female	22	Islam
11	Male	22	Islam
12	Female	22	Islam
13	Male	21	Islam
14	Female	22	Islam
15	Female	22	Islam
16	Female	21	Islam
17	Female	22	Islam
18	Female	21	Islam
19	Female	22	Islam

Ethical Consideration

The researchers wrote a letter to the Chairman of the Education Department of the Tawi-Tawi Regional Agricultural College, where two of the researchers in this study are employed, asking for permission for the conduct of the study. Once the request was granted, they started approaching the college professors and graduating education students who were in their teaching practicum phase. The merits of the study was explained to the prospective participants andthe informed consent to participate in the study were solicited. Before the interview, each participantwas briefed about the study and assured of anonymity and confidentiality.

The data gathering was done through a semi-structured interview with the study participants. Interviews lasted between 15–20 minutes, were audio-recorded using a cellular phone, and subsequently transcribed. The participants' responses using other languages and dialects were translated to English.

Research Instrument

This research study utilized a semi-structured interview, which was designed to foster conversation and stimulate explanations. The researchers requested three (3) graduate school professors, experts in qualitative research to review their proposed interview guide questions for content validity. Some of the final interview questions were: (1) "How do you view having robots as teachers?" with some follow-up questions such as "How would educational technologies like robots likely affect the teaching and learning process?" (2) "What do you think are the advantages of having robots as teachers?" (3) "What about some possible disadvantages?" (4) "Any other ideas related to having robots as teachers?"

Data Analysis

The data gathered in this qualitative study was analyzed following the six- stages of thematic analysis by Braun and Clarke (2013) such as (1) familiarization through reading and re-reading the interview transcript; (2) generating the initial codes; (3) Creating the initial theme; (4) reviewing the themes; (5) naming and defining the themes; and (6) writing the final report [16]. The data were

coded and analyzed guided by the study's objective to explore the teachers' and the students' perceptions on the applicability of robots in education.

RESULTS AND DISCUSSION

The findings of this study are presented here in two parts. Part 1 covering the students' perspectives, and Part 2 the teachers' perspectives on the applicability of robots in education.

Part I. Robots as Teachers from the Lens of College Students

The findings revealed three major themes (1) "Student's veneration for teachers versus disparagement for robots," 2) "Balancing robot's positive features with negative aspects," and (3) "May have adverse impact on student's personality."

THEME 1: STUDENTS' VENERATION FOR TEACHERS VERSUS DISPARAGEMENT FOR ROBOTS

The students expressed their high regard for teachers which made them hesitant to accept the idea of robots replacing their highly esteemed teachers.

Code 1: Teacher as the second parent while the robot is just a teaching tool

The student participants in this study expressed their regard for their teachers as second parents at school. They claimed that teachers mold and help them to recognize their talents and reach their goals. The teachers would correct the pupils if something would go wrong, like what they do to their own children. The teachers also play a significant role in shaping the pupils' lives under their care, treat their students like their own children, and watch out for them, making sure they always do their best.

"However, it is also good to have robots to function as an aid in the classroom… as stimulating and engaging educational tool." (Student Participant # 11)

"The teacher is our second parent in school, and a parent will nurture us with love and support, and the robot can't." (Student Participant 12)

This finding concurs with the study [17] which acknowledged that among the school-related factors affecting a students' academic performance, the teacher factor matters most.

Moreover, the student participants expressed that for them, robots could never be second parents because they cannot show compassion. They cannot guide the students in their journey through life as they are merely teaching tools programmed to give information and facts.

A study about educational robot designs proposed that the robots should be programmed to know their needs and emotional features to provide appropriate educational responses [18].

Code 2: Teacher is noble creation of God, while the robot is a creation of man

Most student participants look up at their teachers and think of them as God's noble creation, while the robot is just a creation or invention of man. Students can't seem to deal with the idea that a lifeless robot would become their teacher. It is evident in the following statements:

"No, I am very against this issue. For I know, the mentor that leads your life must be a higher rank among God's creation, and that is a human being... there's nobody worthier than man! The reason is that the "man" is pure, priceless, and genuine among all Allah's creation." (Student Participant # 14)

"As we can see, robots are made by human beings… so, probably the human is more than brilliant than the robot." (Student Participant # 16)

"A teacher has four domains that is created by God, it has body and soul. . . but robots are made by scientists…"(Student Participant #28)

"… and remember the creation of Allah is better than the creation of human, maybe robots are genius, but humans are the real genius because they created the robots." (Student Participant #15)

Code 3: Teacher with humane characteristics while the robot is just a machine

Teaching is the noblest profession, and only those who have humane characteristics would do the job well. A teacher should have patience, perseverance, and understanding. And since a robot is just a "machine," it wouldn't be able to do the job well, as implied in the following statements:

"No, I disagree, because robots are only machines controlled by its processor… not like a teacher, have emotions controlled by the brain and the heart. A human teacher can empathize with and encourage the learners, especially those who need special attention, and understand the ups and downs of the learners, while a robot does not have that humane characteristic." (Participant 23)

"Maybe robot can tell us good, sweet words like our parent do, can also guide us, but remember a robot is just made up of mechanical things, and that is the big difference from us, as a human being." (Participant # 12)

Code 4: Teachers have ideas to share while robots have only information

The best teachers do not just rely on what is written in textbooks. They also relate the lessons to real-life scenarios and, if needed, would share life experiences that will inspire their students to become successful in life. This is what the student participants admire most in their teachers. In comparison, robots are just programmed to feed information and can never give insights on this matter. This code was generated from the statements below:

"We all know that the robots are only programmed for their jobs, and they have no insights to share." (Participant #29)

"In a human being, you can talk to her/him about personal information for instance, and can feel what we feel, but in a robot, although it has a lot of data and information that can transfer to us . . . because when we say robot it is a very high tech and well equipped. . . they cannot feel of what we feel…" (Participant 20)

"Teachers are there to share their experiences in life, to relate to the students as one human to another human. (Participant #11)

"I think, it's not good for the students, although it is high-tech, it has a limitation with regards to personal information that they have, especially about realities and life experiences… in teaching, having the knowledge is not enough to make teaching-learning effective. Like what I said, their abilities are limited because it is just created by a human being. And the robot is also under the control of people. It cannot use some other technology to support their knowledge, unlike human beings who can think and conceptualize because robots are just a human creation."(Participant # 17)

THEME 2: BALANCING ROBOT'S POSITIVE FEATURES WITH NEGATIVE ASPECTS

This theme emerged from the participants' ambivalence when they were talking about the robot as a teacher. First, they exclaimed their appreciation of robots as a teacher, or their good effects, then, later on, would think otherwise and realized its negative aspects.

The codes extracted under this theme are:

Code 1: Knowledge versus character

There is a perception by most students that since robots are programmed with a vast amount of knowledge, the students think that they will gain more knowledge from the robots teachers than from the human teachers who have limitations when it comes to level or amount of knowledge. The participants realized that they might have gained a lot of information from the robot, but it cannot show them a good example of being a good person. For them, "knowledge is useless, the character is the best" is an adage that will always hold true. Two students expound on this further in the following statements:

"Robots can deliver and express very well the lessons systematically. . . there would be no problem with the correct and proper pronunciations and grammar. . . and I think we can ask them to repeat again and again until we understand the lesson and then they will never get tired of teaching and disseminating information.... but I think if we have a robot teacher, it's too exciting and maybe a little bit boring because the robot compared to a human being it has big differences." (Participant 20)

"Nowadays, many of us have gone with the wrong path may be because of some personal reason, like family, financial and many more… and all they need is a parent or guardian to guide, comfort, and to make them feel the love and only human can do, so I really don't think so if our second parent or teacher will become a robot., if it can give all those things." (Participant #12)

"I think it's very wonderful idea… educational system will improve... why? Because as I've said the robots are never stressed, not like a human being they have a family to take care of... lots of responsibilities that sometimes affect their teaching... not like a robot they are not busy. . they will not be absent from class." (Participant #18)

"Even though they (robot) can teach every student and provide good learning, still robot teachers don't have feelings . . . not able to understand their students' feelings. Unlike human teacher, they can advise their students of what is good or bad." (Participant #27).

Code 2: Unreceptive versus receptive

This code came out based on some of the students' answers who get sad with the idea of having an unreceptive robot for a teacher because they cannot be motivated. They cannot have a funny conversation or jokes with "it" (the robot). But then, some students do not like to be reprimanded or scolded by the teachers, so they prefer a robot teacher who won't nag and that they don't have to suffer from the temper of an angry and displeased teacher (especially if they commit mistakes). Let's look at the following statements from the students:

"As we all know robot doesn't have any feeling… it has no emotion, you can't have a funny conversation and interaction with it ... you can't have a joke... but then, it would be good also because you don't have to handle its temper and the strict attitude because they have no emotions… (Participant #15)

"Yes, a robot can help educate human beings even though there is no life, but they can't interact with human beings like us. The robot can never entertain the student in the proper way. . . robots cannot captivate the interest of the students than the real teacher. . . Human being is much better than a robot. We don't need to have a robot to become a teacher for us. We are more comfortable with the human teacher"." (Participant #16)

"As I've said, a robot doesn't have the emotion, feelings, and heart, so how can the robot connect and interact with us human beings if the robot doesn't know what is inside our minds? Also, the robot doesn't have the capability and quality of being an effective teacher because he just is being controlled by humans."(Participant 21)

"Robot cannot motivate us… without motivation there is no drive to learn." (Participant #22)

"…and also the teacher has power or ability to use the hand gestures, the facial expressions. . . and change the tone of their voice when talking and teaching in the front of the class which could catch the attention of the students especially they are sleepy." (Participant #27)

Code 3: Excellent facilities versus quality education

Student participants have conceptualized that if we have robots for teachers, the school facilities could be much improved. Because the government will not spend much on teachers' monthly salaries, the funds can provide the students with better facilities that would make them

comfortable. However, they are also unsure about the quality of education we will have if the robots will teach the students. They have doubts if the robots really can do the job well like a real human teacher. They fear that the quality of education will be jeopardized. As gleaned from the statements of some student participants:

"I will be surprised to have a robot as a teacher, especially when it is walking around the classroom. Maybe I would not be able to absorb the lessons because of shock and astonishment." (Participant # 16)

"I think with robots replacing the teachers the educational system will improve in terms of facilities and buildings because the government doesn't have to pay the monthly salaries so they can save lots for budgets for facilities and there will be no complaints about lack of classrooms, chairs, etc. But with regards to the quality of students, I don't think we can be well-rounded individuals if the robots are the mentors."(Participant #25)

"With robot as the teacher, the quality of education might decline. Robot teachers lack the essential principles of being a human… the ability to feel, they don't have that moral judgment and ability to distinguish what is right or wrong… When we talk about education, we should consider human behaviors, morality…. I believe that nothing can replace the good & quality education imparted through the experience and actual accounts of my instructors."(Participant 22)

THEME 3: HUMAN-ROBOT INTERACTION IMPACTS

This theme, "human-robot interaction impacts," emerged from the student participants' statements regarding the effects of having a robot as a teacher with whom they have to come in contact while they are at school. In this theme, how students may come to be influenced by a classroom robot teacher's presence in the long term will be discussed. This includes both potential changes to student's own behavior and also their outlook on others. Theme 3 was extracted from the following codes:

Code 1: De-humanizing/ robot mimicry

Most student participants fear having a robot for a teacher will make them less human and more like robots. A related study [7] supports this claim, which showed that it could have a psychological impact where people, for instance, begin to imitate robotic behaviors. In the said study, participants expressed concerns that children would be "de-humanized" through their constant interactions with the robots. There were several assumptions as to how and why this could happen. Firstly, a commonly held view was that robots could not interact on the same emotional plane as humans. As a result of their interactions with robots, it was argued that children would start to struggle understanding human facial expressions leading to impaired emotional intelligence. Robot mimicry has been observed previously in [19], [20], so it would not be surprising if children adopt the robots' mannerisms. The statements below demonstrate how students fear being de-humanized:

"If we let robots teach us, I might say, we the learners will become a robot too." (Participant #14)

"I guess there are lots of adjustments, especially on the side of the students, and I guess the students also will soon become a robot, without feelings! OMG! I wonder how a robot will teach lessons about drama and acting." (Participant #11)

"… then the ethics and manners in every individual student will be gone slowly, and students will also become detached and no feeling like the robot." (Participant #19)

"Having robots to educate us it would affect our ability to think like humans." (Participant 22)

"I think if we rely on robot teacher too much, our educational system is like a robot too, lifeless and boring. Because the robot cannot fulfill the wide range of tasks, unlike the human teacher." (Participant #29)

Code 2: Credibility and trust affordance

This code credibility and trust affordance surfaced from the students who showed approbation in having robots as teachers. This is not surprising because it runs parallel with the findings of a similar study, which revealed that since children receive answers to their questions instantly from their robot teachers and benefit from constant assistance when solving tasks, the robots might be perceived to be too credible. The students will think that they are superior to human teachers and trust them so much that they could become over-reliant on robots and lose their capacity to be critical [10]. This could be evident from the statements of two students:

"Well, for me it is absolutely amazing with having a robot teacher and so high tech. . . And I'm sure I will listen carefully, because the robots are amazing and convincing. And also the first time for us to meet a teacher like that, which is a robot, and it is a new one... thanks to modern technology." (Participant #17)

"Although we can say that robot is man-made or human creations... but we are talking about what's the best for teaching. Teachers easily get tired and have a lot of reasons to consider this, and like that, especially when they already have a family, there is a lot of responsibility to deal with. Unlike robots, they are quite amazing... they don't have anything else to do... like family and anything to consider... they never get tired of talking and explaining the lessons to the students. They don't have many reasons to be distracted by something else, and they only focus on their responsibility of teaching." (Participant 20)

Code 3: Personality impediment

The student participants perceived that having robots as teachers, specifically long-term interaction with robots inside the classroom, will cause a decline or worsen the students' total personality. Since the robot is just a machine, the students will not respect it and will not be able to show respect to others. We are aware that values training starts at home, and the teachers at school

will reinforce that training. If the robots are the teachers, there will likely be no reinforcement of these values. With this, the students will become ill-mannered and, worse, develop misbehavior, such as disrespecting authority. Reference [11] pointed out that association with robots could hinder the pupil's progress in the many ways such as human interaction, linguistic ability and understanding mutual human relationship whereby they might not fully develop empathy and understanding of the ambivalence of human nature. According to some of the student participants:

"I think all students will become rude... become ill-mannered because the robot can't teach students how to obey the elders since robots don't need to be respected because it's just a machine... students won't have a good attitude."(Participant #28)

"They (robots) will not know the feelings of the learner; they will not understand and also they don't know how to discipline or teach good values to the learners…" (Participant #13)

"I think it will just ruin the life of a student like me, as we all know the learnings inside the classroom must not be enough for a student to just be a literate person… the robots will only teach every data that is being installed to them.. the teachers are the ones who help us students to realize that the knowledge was not just in the four corners of the classroom. . . that aside from cognitive domain, we should also improve the affective domains." (Participant 23)

Part II. Robots as Teachers from the Lens of College Teachers

From the lens of teachers, the following themes were extracted: (1) "prognosis of negative implications on education"; (2) "robot's limitations/shortcomings inappropriate for a noble profession"; and (3) "teachers' concern over student's welfare."

THEME 1: PROGNOSIS OF NEGATIVE IMPLICATIONS ON EDUCATION

As the primary stakeholders of education, it is not surprising that teachers would be the first to foresee an imminent risk to the educational system if robots become teachers. It was revealed in a study that teachers were more critical of robots in schools than parents and students were [8]". This could explain why they have forecasted negative implications of using robots in formal education. Under this theme, there are several codes:

Code 1: Challenges

Most of the teacher participants perceived that using robots in our educational system will not be easy and will entail many challenges. These difficulties are analogous to the findings of a survey [21] that states "while experts are optimistic concerning the development of technology-enhanced learning opportunities, skepticism prevails concerning the ability of formal education systems and institutions to keep pace with change and become more flexible and dynamic." One teacher participant best expresses this code in a statement:

"Probably, there can be robots in a classroom… but there's still need for a teacher or facilitators to control or manage the class because robots are still robots with no sense of emotion." (Teacher Participant # 6)

"Robots do not have the capability of rising to a situation and decide what solution best fits the circumstance. They could not suggest or propose or recommend something unless they are programmed to do so... the robot must be perfect... but we know that the robots will not function without human intervention. . . the robots need manipulation from the humans. . . so we will not lose our job, but we need to undergo training." (Teacher Participant #3)

"There will be problems with regards to assessment and evaluation of students' performances inside the classroom. If the robots are the teachers, they cannot encourage students' critical thinking. They cannot give essay or discussion type examinations because robots cannot internalize or relate to the students' answers because as a robot it wasn't exposed to life experiences that we humans go through." (Teacher Participant #10)

Code 2: Incapacitated critical thinking

An educational system can be considered effective if it will produce learners who have developed critical thinking skills or evaluate information objectively and make a rational judgment. Students need to be taught critical thinking because it is an essential life skill. However, if we have robots as teachers who do not possess a "reasoned judgment," developing our learners to be critical thinkers would pose a problem.

It is, then, not surprising if most of the teachers in this study believed that having robot teachers would incapacitate students' critical thinking. Again, this perception runs parallel with a related study's results claiming that children could become over-reliant on robots and lose their critical capability [10]. Furthermore, a research survey reported that about 60 percent of teachers in American public high schools said that "educational technology hindered students' ability to write and communicate face to face, and almost half said it hurt critical thinking and their ability to do homework.It further revealed that 76 percent of teachers believed students are being conditioned by the internet to find quick answers, leading to a loss of concentration [22].

The teacher participants expressed this insight in the following statements:

"Most probably, if the robots will be the teachers, they cannot encourage students' critical thinking. They cannot give essay or discussion type examinations because robots cannot internalize or relate to the students' answers because as a robot it wasn't exposed to life experiences that we humans go through."(Teacher Participant #10)

"Human teachers develop thinking skills… human teachers relate the lessons to their day-to-day life ... they ask questions that will enable the students to apply their knowledge in a real-life scenario." (Teacher Participant #4)

Code 3: EQ deficient students

Most of the teacher participants perceived that in having robots as teachers, the students would be deficient in emotional intelligence or EQ (emotional quotient), a notional measure of a person's adequacy in self-awareness, empathy, and dealing sensitively with other people. With robots as teachers, "this could be a reason for children not understanding the consequences of their

actions on other people, or by a deficit in emotional intelligence wherein appropriate emotional understanding or emotional display would not be learned" [19].

Reference [23] asserted that "as individuals, our success and the success of the profession today depend on our ability to read other people's signals and react appropriately to them." We cannot expect this from a robot teacher. To function as a classroom teacher, a robot needs to have the ability to control and make decisions about children's behavior in the classroom. Reference [11] argued that robots lack the indispensable moral and situational understanding to adequately, or acceptably, fulfill a teacher's role. These points in agreement with the candid statement of one teacher below:

"I still believe that to have a higher IQ, one must have high EQ first, which can only be provided by a human teacher. Teaching is more than teaching the concept only. It's teaching students to become human that matters. Lessons of life are far better than a lesson taught conceptually. There is a philosophy in counseling that states, " the sooner the teacher stop teaching pure subject matter and begin teaching students about life the better for any educative process" meaning   the emotional role of the teacher plays a greater impact on students life and learning because we   are their role model., which is only possible if their teacher is human and not robots."(Teacher Participant # 9)

THEME 2: ROBOT'S LIMITATIONS/SHORTCOMINGS INAPPROPRIATE FOR A NOBLE PROFESSION

Theme 2 emerged from the teachers' perceptions of the limitations, shortcomings, and inadequacies of robots, making it inappropriate for a noble profession such as teaching. This perception agrees with a recent empirical work [24] which has indicated that current robots do not measure up to human tutors in terms of students' learning outcomes. The codes under Theme 2 include:

Code 1: Lack of special qualities

A good and effective teacher must have knowledge and skills, but most especially, a good teacher must have some special qualities such as empathy, sense of humor, and passion. Reference [25] supports that teacher dispositions are strongly related to student learning and development. If we have robots as teachers, the above-mentioned qualities are absent, leading to uninspired and unhappy learners. According to one teacher:

"Yes, robots may perform a various complex act as talking, instructing, or even teaching, but it is controlled by a computer and lack of capacity for emotion. While the teacher has many traits and qualities which can't be   found in robots are as follows: caring, inspirational, generous, encouraging, patience most importantly passionate and God-fearing… teachers help children thrive in an uncertain future."(Teacher Participant # 5)

Code 2: Devoid of human experiences

Although a typical robot has a movable physical structure, a sensor system, a power supply, and a computer "brain" and have features that imitate human and animal behavior, they are still devoid of human experiences. This is the very reason why the teacher participants see robots as an inappropriate replacement for them. This could be seen to draw on the moral conviction that human contact is preferable, which resonates with the conclusions drawn by [10] that "first and foremost, children need to be taught by fellow human beings who understand them, care for them, and who form appropriate role models and attachment figures." This is validated in the following statements:

"Learners are human beings. We all know that each human being is unique… that no two individuals are the same… even identical twins may be genetically identical. Still, their perceptions, moods, and other characteristics are not the same. What I'm trying to drive at is that, with a robot as a teacher, "it" would not be able to deal with these diverse individuals no matter how intelligent "it" is. Only human teachers can do that. Only human teachers can understand the complexities of humans…"(Teacher Participant #4)

"We don't want to see and have robot students too in the future, right? It's too impractical. For this reason, the boundaries of things and humanity must be set, clarified, and strictly monitored in the future. After all, Education's end is to make us better persons, not better (as) robots!" (Teacher Participant #1)

Code 3: No sense of responsibility

The school is the second home of the students. They spend most of their lives at school. While they are at school, they are under the care and protection of their teachers, whom they considered second parents. The robot teachers cannot ensure the students' safety because they cannot be held liable for the students as they have no conscience and would not care whatever happens to the students. In this case, the teacher participants perceived that robots are unsuitable to replace human teachers. According to some of the teacher participants:

"A human teacher is considered as the authority in the classroom that should be respected and obeyed." (Teacher Participant #4)

"We teachers are considered as the second parents of our students. Robots can never replace the sense of responsibility and emotional connections we have with our students." (Teacher Participant #10)

"A traditional way of teaching may be boring, but it is full of compassion and sacrifices with the teacher doing and preparing all the teaching materials and other instructional materials full of commitment and responsibility coming from the heart." (Teacher Participant # 8)

THEME 3: TEACHER'S CONCERN OVER STUDENT'S WELFARE

Theme 3 was established based from the description given by reference [26] that analyzing qualitative data is an extension of the kind of analysis we do in everyday life; therefore, our

interpretation is highlighted by our past and present personal, social, and cultural experiences as teachers. It was discerned that despite the teacher participants' varied stance and perceptions on robots as teachers, there is one thing that is common with their responses: they all showed concern for the students' welfare. In fact, although the issue implies robots taking away their jobs, it was so distinctive that they opposed the idea because they are more concerned for the students' welfare than them losing their jobs.

This runs parallel with the findings in a related study [7] that the teachers' disapproval of robots in the classroom seems to be engrained in their intrinsic care for their pupils' future. How they have argued on this issue denoted that the teachers feel that they have an emotional and moral responsibility to support children's rights to a healthy upbringing within the educational setting. Moreover, the teachers' concern for the pupils is articulated in a similar study [24] conducted in 2016 where it was revealed that the attitude of teachers towards social robots in schools is" cautious". The said study concluded that teachers' concern about appropriate social skills of the pupils   dominate over practical and ethical concerns, suggesting more focus for child-robot interaction research.

The codes that lead to the development of this theme 'teacher's concern over student's welfare' are the same codes that were used in formulating theme 1 and theme 2, namely: challenges, incapacitated critical thinking, EQ deficient students, lack of special qualities, devoid of human experiences, no sense of responsibility. These codes will collectively cause a decline in the quality of education and debilitate the students' personalities. Hence, the teacher participants showed concern because they don't want this to happen to the students if the robots are their classroom teachers. Furthermore, the majority of the teacher participants showed concern for the students' welfare, which could be gleaned in the following statements:

"We don't want to see and have robot students too in the future, right? It's too impractical. After all, education's end is to make us better persons, not better robots!" (Teacher Participant 1)

"I can't imagine the scenario; teaching needs the heart to be enthusiastic to mold slow learners as what can be observed in traditional teaching… a standard robot might only cater those above-average students." (Teacher Participant 2)

"In the long run, the students might get bored listening to a robot every day for the entire school year. Sometimes inside the classroom, dull moments happen, especially when the students are hungry and sleepy; when that happens, a teacher can share jokes with the students, laugh with the class, talk with them, and not teach. A robot does not have the ability to recognize and respond to the learners' emotions, behavior, and moods. So all a robot teacher will be able to do is to transmit information… Remember, education comes from the Latin word 'educare' which means to bring up, to rear, to nurture… and a robot cannot do that… only human teachers can." (Teacher participant # 4)

"Teachers help children thrive in an uncertain future." (Teacher Participant #5)

"We have to take into consideration that aside from teaching, we serve many other roles in the classroom. We set the classroom tone, build a warm environment, nurture students, listen to their problems and encourage and inspire them. And I don't think robots could be programmed to do that." (Teacher Participant #6)

"I think most of the children would have a hard time dealing emotionally with a robot. A robot lacks the heart and warmth of a human being. A learner should be holistically developed so emotionally robots cannot deal properly with human emotions' complexity. Robots don't understand the growing brain; they would not know how to deal with students." (Teacher Participant # 7)

"Robots do not know about human affairs. They do not know what is morally right and wrong. They do not have a conscience. They cannot instill good values and ethical views in the students. They do not know how to be affectionate and considerate on the feelings of the learners…"(Participant # 8)

"In terms of mastery, robots are more knowledgeable since they are created for that alone, information can be downloaded to them in no limits, not like a human, there are times we forgot certain concepts. But, in terms of emotional bond with students and teacher, a traditional classroom is better. As a teacher, I believe that teaching becomes more effective when the teacher can touch their students' lives, and that's what makes the traditional classroom more effective." (Teacher Participant # 9)

"In the traditional classroom, teaching and learning activities may be slow and the learners will be more dependent on the teacher while a modern classroom may be fast and challenging and stimulating. However, a traditional classroom with human beings as teachers is more effective, especially when developing a wholesome personality. A human teacher can empathize with and encourage the learners, especially those who need special attention, and understand the learners' ups and downs. Teachers should be compassionate, loving, and caring. While modern classrooms with robots as teacher is more advanced in terms of gathering data, research, and information but they do not have feelings and don't understand if students are happy to learn or not. In this sense, it is important that humans   will be the ones to teach our students and not robots." (Teacher Participant #10)

CONCLUSION AND RECOMMENDATION

From the lens of the student participants, the use of robots as teachers is viewed as inapplicable and unacceptable. As inferred from the themes "students' veneration for teachers versus disparagement for robots"; "balancing robot's positive features with negative aspects"; and 'human-robot interaction impacts", the student participants expressed high regard for their human teachers which made them hesitant to accept the idea of robot teachers. Although some showed approbation for robot teachers as having advantages in teaching given that robots are programmed with a vast amount of knowledge, it would be overshadowed by the perception that having robot teachers will cause a decline or worsen the students' total personality.

In addition, the student participants perceived thatrobots are unfit to be teachers considering that the robots will only "communicate" data that is being installed in them while the human teachers are the ones who help the students to realize that knowledge is not just acquired in the four corners of the classroom – that aside from the cognitive domains, the affective domains should also be considered.

Similarly, from the perspectives of the teacher participants, having robots as teachers is viewed skepticallyas inferred from the extracted themes "prognosis of negative implications on education"; "robot's limitations/shortcomings inappropriate for a noble profession"; and "teachers' concern over student's welfare". They perceived thathaving robot teachers entails challenges and are unsuitable in an educational setting owing to the fact that robotslack special qualities, devoid of human experiences, has no sense of responsibility.The students spend most of their lives at school and while they are at school, they are under the care and protection of their teachers, whom they considered as second parents. The robot teachers cannot ensure the students' safety because they cannot be held liable for the students as they have no conscience and would not care whatever happens to the students. In light of this, the teacher participants perceived that robots are unsuitable for the role of a teacher.

In conclusion, the student and the teacher participants have a negative perception of robots' applicability in education. It is viewed that robots in the classrooms could negatively affect students, whereby the risks outweigh the possible benefits.

To substantiate this study's results, similar studies may be conducted in other institutions in the Philippines where students and teachers from other courses or disciplines will be included and consulted. Moreover, since the study only focused on students' and teachers' perceptions, it is recommended that the parents' perceptions may also be included because they are also important stakeholders of education and have only the welfare of their children in mind. In addition, the use of robots as assistant to teachers – filling up forms, routinary tasks – may also be explored.

REFERENCES:

[1]   Tiempo, A. (2015). Man Undefined: Appropriations in the Philosophical Study of Man. Rokgel   Publishing.

[2]   Palk, S. (2010, October 22). Robot teachers invade South Korean classrooms. CNN.com Global Connections.http://edition.cnn.com/2010/TECH/innovation/10/22/south.korea.robot.teachers/index.html

[3]   Houser, K. (2017). The Solution to Our Education Crisis Might be AI: Are educators next in line for a robot takeover? Futurism. https://futurism.com/ai-teachers-education-crisis

[4]   Reuters. (2018, March 27). Finland schools are testing out robot teachers. New York Post.https://nypost.com/2018/03/27/finland-schools-are-testing-out-robot-teachers/

[5]   Robot teachers invade Chinese kindergartens. (2018, August 29). Phys.Org. https://phys.org/news/2018-08-robot-teachers-invade-chinese-kindergartens.html

[6]   Ullas, S.S. (2019, August 28). At this Bengaluru school, robots teach and teachers mentor. The India Times. https://timesofindia.indiatimes.com/city/bengaluru/at-this-bengaluru-school-robots-teach-and-teachers-mentor/articleshow/70867664.cms

[7]   Mubin, O., Stevens, C., Shahid, S., Mahmud, A., & Dong, J. (2013). A review of the applicability of robots in education. Technology for Education and Learning, 1, 1-7. https://doi.org/10.2316/Journal.209.2013.1.209-0015

[8]   Lee, E., Lee, Y., Kye, B. &Ko, B. (2008). Elementary and Middle School Teachers', Students' and Parents' Perception of Robot-Aided Education in Korea. In J. Luca & E. Weippl (Eds.), Proceedings of ED-MEDIA 2008--World Conference on Educational Multimedia, Hypermedia & Telecommunications (pp. 175-183). Vienna, Austria: Association for the Advancement of Computing in Education (AACE).https://www.learntechlib.org/primary/p/28391/.

[9]   Chang, C.W., Lee, J.H., Chao, P.Y., Wang, C.Y. & Chen, G.D. (2010). Exploring the Possibility of Using Humanoid Robots as Instructional Tools for Teaching a Second Language in Primary School. Journal of Educational Technology & Society, 13(2), 13-24. https://www.learntechlib.org/p/75345/.

[10]   Serholt, S., Barendregt, W., Vasalou, A., Alves-Oliveira, P., Jones, A., Petisca, S., &Paiva, A. (2016). The case of classroom robots: teachers' deliberations on the ethical tensions. AI & Society, 32, 613-631. https://doi.org/10.1007/s00146-016-0667-2

[11]   Sharkey, A. J. (2016). Should we welcome robot teachers?.Ethics and Information Technology, 18(4), 283-297. https://doi.org/10.1007/s10676-016-9387-z

[12]   Sparks, S. (2016, August 3). Seymour Papert, Ed-Tech Pioneer Who Shaped Views of Digital Learning, Dies at 88. EDWeek Market Brief. https://marketbrief.edweek.org/marketplace-k-12/seymour-papert-ed-tech-pioneer-who-shaped-views-of-digital-learning-dies-at-88/

[13]   Papert S., &Harel, I. (1990). Situating constructionism. In: Harel (Ed.), Constructionist learning. Cambridge, MA: MIT Media Laboratory. http://www.papert.org/articles/SituatingConstructionism.html

[14]   Merriam, S. &Tisdell, E. (2016). Qualitative Research : A Guide to Design and Implementation (4th ed.). San Francisco, California: Jossey-Bass. https://download.e-bookshelf.de/download/0003/7195/84/L-G-0003719584-0007575839.pdf

[15}   Creswell, J. W. (2013). Qualitative inquiry and research design: Choosing among five approaches(3rd ed.). Thousand Oaks, CA: Sage. http://www.ceil-conicet.gov.ar/wp-content/uploads/2018/04/CRESWELLQualitative-Inquary-and-Research-Design-Creswell.pdf

[16]   Braun, V. & Clarke, V. (2013). Successful Qualitative Research: A Practical Guide for Beginners. Sage.https://www.researchgate.net/publication/256089360_Successful_Qualitative_Research_A_Practical_Guide_for_Beginners

[17]   Opper, I. M. (2019). Teachers Matter: Understanding Teachers' Impact on Student Achievement. RAND Education and Labor. Santa Monica, CA: RAND Corporation, 2019. https://www.rand.org/pubs/research_reports/RR4312.html.

[18]   Porayska-Pomsta K, Mavrikis M, D'Mello S, Conati C, & Baker R. (2013). Knowledge Elicitation   Methods for Affect Modelling in Education. International Journal of Artificial Intelligence in   Education, 22:107-140 .doi:10.3233/JAI-130032

[19]   Kahn, P., Ishiguro, H., Friedman, B., Kanda, T., Freier, N., Severson, R., &Wolk, J. (2007). What is a human? Toward psychological benchmarks in the field of human–robot interaction. Interaction Studies 8 (3), 363–390. DOI:10.1075/is.8.3.04kah

[20]   Ros, R., Coninx, A., Demiris, Y., Patsis, G., &Sahli, H. (2014). Behavioral Accommodation towards a Dance Robot Tutor. ACM/IEEE International Conference   on Human-Robot Interaction. DOI:10.1145/2559636.2559821

[21]   Alimisis. D. (2013). Educational robotics: Open questions and new challenges. Themes in Science   &   Technology   Education,   6(1),   63-71. https://www.researchgate.net/publication/284043695_Educational_robotics_Open_questio ns_and_new_challenges

[22]   Porter, A. (2013, January 28). The Problem with Technology in Schools. The Washington Post.https://www.washingtonpost.com/blogs/therootdc/post/the-problem-with-technology-in-schools/2013/01/28/cf13dc6c6963-11e2-eda3-d86a4806d5ee_blog.html

[23]   Akers,   M.   &   Porter,   G.   (2018).What   is   Emotional   Intelligence   (EQ)? https://psychcentral.com/lib/what-is-emotional-intelligence-eq/

[24]   Kennedy, J.; Lemaignan, S. &Belpaeme, T. (2016). The Cautious Attitude of Teachers Towards   Social   Robots   in   Schools. https://www.researchgate.net/publication/307205374_

[25]   Peterson-DeLuca, A. (2016). Top five qualities of effective teachers, according to teachers. SAVVAS Fresh Ideas for Teaching. https://blog.savvas.com/top-5-qualities-of-effective-teachers-according-to-teachers/

[26]   Bazeley, P. (2013). Qualitative Data Analysis: Practical Strategies. SAGE Publications Ltd. https://uk.sagepub.com/engb/eur/qualitative-data-analysis/book234222

[27]   Sai Pandraju, T. K., Samal, S., Saravanakumar, R., Yaseen, S. M., Nandal, R., & Dhabliya, D. (2022). Advanced metering infrastructure for low voltage distribution system in smart grid based monitoring applications. Sustainable Computing: Informatics and Systems, 35 doi:10.1016/j.suscom.2022.100691

[28]   Sharma, R., & Dhabliya, D. (2019). A review of automatic irrigation system through IoT. International Journal of Control and Automation, 12(6 Special Issue), 24-29. Retrieved from www.scopus.com