

Implementing Education 4.0 Trends in Language Learning

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Abstract—The fourth industrial revolution is changing the role of education substantially and, therefore, the role of instructors and learners at all levels. Education 4.0 is an imminent response to the needs of a globalized world where humans and technology are being aligned to enable endless possibilities, among them the need for students, as digital natives, to communicate effectively in at least one language besides their mother tongue, and also the requirement of developing theirs. This is an exploratory study in which a control group (N = 21), all of the students of Spanish as a foreign language at the university level, after taking a Spanish class, responded to an online questionnaire about the engagement, atmosphere, and environment in which their course was delivered. These aspects considered in the survey were relative to the instructor's teaching style, including: (a) active, hands-on learning; (b) flexibility for in-class activities, easily switching between small group work, individual work, and whole-class discussion; and (c) integrating technology into the classroom. Strongly believing in these principles, the instructor deliberately taught the course in a SCALE-UP room, as it could facilitate such a positive and encouraging learning environment. These aspects are trends related to Education 4.0 and have become integral to the instructor's pedagogical stance that calls for a constructive-affective role, instead of a transmissive one. As expected, with a learning environment that (a) fosters student engagement and (b) improves student outcomes, the subjects were highly engaged, which was partially due to the learning environment. An overwhelming majority (all but one) of students agreed or strongly agreed that the atmosphere and the environment were ideal. Outcomes of this study are relevant and indicate that it is about time for teachers to build up a meaningful correlation between humans and technology. We should see the trends of Education 4.0 not as a threat but as practices that should be in the hands of critical and creative instructors whose pedagogical stance responds to the needs of the learners in the 21st century.

Keywords—Active learning, education 4.0, higher education, pedagogical stance.

I. INTRODUCTION

THE fourth industrial revolution is undoubtedly changing and impacting our reality as the previous ones did, but the speed of current breakthroughs has no historical precedent. In other words, this transformation is unlike anything humankind has experienced before. It is characterized by an amalgamation of technologies that constantly affect all spheres of our lives as human beings. Consequently, the so-called digital revolution, which started in the middle of the last century, influences how we live, learn, and work, as well as how we interact to one another. Hence this revolution cannot be ignored by educators and learners.

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This paper discusses the results of research conducted at the University of Lethbridge in Alberta. 21 students who were enrolled in an intermediate Spanish course answered a survey at the end of the semester. The questionnaire inquired about student perceptions concerning the implementation of some Education 4.0 trends. For example, the course was delivered in a SCALE-UP classroom, as the instructor intended to have a flipped class. SCALE-UP stands for student-centered active learning environment with an upside-down pedagogy. Considering that the physical atmosphere was the mentioned classroom, the students answered questions about engagement, atmosphere, and environment. The results obtained in this study clearly indicated that the majority of the students considered that the atmosphere and environment designed for their learning process were very effective, and they expressed their level of satisfaction. Thus, it is important to emphasize that instructors need to conceive the matching between human and technology in the classroom as a crucial pedagogical decision without diminishing the importance of the instructor's role in the relationship with the 21st century students.

II. REVIEW OF LITERATURE

A. Education 4.0

As indicated previously, the fourth industrial revolution is provoking an imminent change in the world around us. Artificial intelligence (AI), robotics, big data, and the internet of things continue leading these changes to impact notoriously the labor market and the industry. These disruptive technologies have been influencing how we think and live; in other words, they affect not only the business world, politics, and economics but also education; therefore, the name Education 4.0 was born. In this sense, universities must understand their role in rapidly adjusting on-campus and off-campus curriculum to expand their capacity to accommodate the acquisition of new knowledge by students, faculty, and alumni. They must implement new modalities of instruction that correspond to the digital advances from the third industrial revolution and that conduct us into the world of the fourth industrial revolution.

In the spectrum of higher education, language education becomes relevant, since students, more than ever, must communicate effectively across cultural differences and thus learning second/foreign languages becomes crucial and can determine a distinctive asset in the labor market. Thus, when talking about language learning/teaching it is important to admit that "the societal changes from the fourth industrial revolution will require higher education to enable students to

develop greater capacity for ethical and intercultural communication, placing a premium on liberal arts-type education with modifications to adapt to the particular issues raised by four industrial revolution technologies and their disruptions to society” [1]. Technology, in fact, does not dehumanize us; we must assume control of technology in our pedagogical practices.

To take full advantage of the opportunity created by advanced technology, we must implement Education 4.0 trends in the language classroom and beyond it, not just to meet the needs of the emerging society but mainly to ensure the best possible student experience. The role of the instructor is not secondary: we are not being replaced by machines, we are necessary and important actors, and our pedagogical stance will be extremely important and determinant of the quality of our students’ experiences.

By the term “pedagogical stance”, we refer to the kind of role that a teacher generally takes in interacting with pupils to fulfill their goals as a teacher, that is, the goals they have as determined by their professional role of teacher [2]. Respective to the aim of this study, the pedagogical stance of the instructor is a very important factor in student engagement, since an authoritarian presence in language learning is considered to be an obstacle for students, by opposing a constructive-affective presence. The role of the language teacher is no longer to transmit knowledge, but to create and organize situations to promote meaningful learning experiences, according to the epoch and needs of the students. In fact, as [3] states, “instructors need to relearn and equip themselves with the digital tools to meet the learning preference of the Gen Z students.” Technology has revolutionized these kinds of students: they are more hands-on and involved in their learning process. We, as instructors, should take advantage of their characteristics as active learners.

B. Trends Related to Education 4.0

According to Hussin [3], “There are nine trends related to Education 4.0; they shift the major learning responsibilities from the instructors to the learners. Instructors should play their roles to support the transition and should never consider it a threat to the conventional teaching profession”. We will briefly discuss the trends that could be considered essential for language learning and that were integrated into the Spanish course.

- Learning can occur anytime, anywhere. Virtual tools offer great opportunities for remote, self-paced learning. The flipped classroom approach also plays an enormous role, as it allows interactive learning to be done in class, while theoretical parts are learned outside of class. This approach is fruitful for languages, since talking the language in class is more important than talking about the language. This is why the class targeted for this study was conducted in a SCALE-UP room, to deliver the course using the flipped approach, giving students time to discuss, to do group projects, and to use the language actively.
- Learning will be personalized. Students will be introduced to harder tasks only after mastering a certain level. Students must be treated as individuals, and they learn at different rhythms. Concerning language learning, we must remember that skills can be acquired in very different modes at very different moments.
- Students need to be encouraged to have the opportunity of deciding how they want to learn; what kind of tools or techniques they want to use. If they were invited to participate more actively, the outcomes could improve progressively and accordingly to the students’ needs and expectations. Being said, the students would become more competent in a foreign language and develop their intercultural competence in different scenarios. If the instructors consider these factors, they could more wisely choose among the different approaches to deliver the class content, opting for an adequate approach among them: blended learning, flipped classroom or BYOD: Bring Your Own Device. The BYOD approach has been particularly used in the Spanish class as an important tool for students to access their material and to complete online assignments.
- Students will be exposed to more project-based learning. They must apply their knowledge and skills in completing projects. Being involved in the projects helps them practice their organizational, collaborative, and time management skills, which are useful in future academic careers. The experience in the course indicated how enthusiastic students were to prepare their projects. Assessment is crucial in language teaching and creativity; as well, critical thinking should be an integral part of language assessment. Students realize that in the real world, speaking a language does not mean perfect domain of the language but rather collaboration and cooperation with the interlocutor to achieve goals, such as asking for an address, expressing gratitude, or buying something.
- Students will be exposed to more hands-on learning through field experience, such as internships, mentoring projects, and collaborative projects. Advancing technology enables the effective learning of certain domains, making more room for acquiring skills that involve human knowledge and face-to-face interaction. This trend was implemented during the course delivery. Students were encouraged to be in contact with the Spanish-speaking community and to challenge themselves to communicate in Spanish.
- Learners will be assessed differently, and the conventional methods to assess students may become irrelevant or insufficient. Traditional assessment in language learning could become irrelevant and stressing for students whose skills should be tested more dynamically. Students’ communicative competence in the foreign language can be assessed during the learning process and can be tested when they work on their projects. As for the course, aim of this study, the students did a movie as a final project. They included a list of speech acts and integrated them into a plot, with cultural

components that reflect their own culture and the Hispanic culture in general.

- Student opinion will be considered in designing and updating the curriculum. Student perspectives are always important, and they guide the instructor towards a better curriculum design. Students should have the opportunity to reflect on their own learning progress and to discuss successes and mistakes.
- Finally, we as instructors, witness how students are becoming more autonomous in their own learning process, thus compelling teachers to assume a new role, not as transmitters of knowledge, but as facilitators whose main tasks will be to guide the students through their learning process. Indeed, it was the instructor's role in the course delivered for the purpose of this study: being able to create and propose learning activities that could enhance the students' motivation and engagement.

It is very important to emphasize that the role of the instructor is always meaningful and even if we think beyond today, "in 20 years, students will incorporate so much independence in their learning process, that mentoring will become fundamental to student success. Teachers will form a central point in the jungle of information that our students will be paving their way through. Though the future of education seems remote, the teacher and educational institution are vital to academic performance [4]".

C. SCALE-UP Rooms

The new vision of learning promotes learners not only to learn needed skills and knowledge but also to identify the source to learn these skills and knowledge [3]. Particularly in language teaching, we could affirm that active learning promotes students' independence while using their linguistic knowledge in meaningful communicative situations. To achieve optimal conditions for active learning, instructors should consider that being an engaging teacher is not always sufficient. Rather, the learning environment must allow for active learning [5].

SCALE-UP originated as an initiative at North Carolina State University (NCSU) in 2000 is brought forth by Dr. Robert Beichner [6]. The SCALE-UP approach was originally instigated to make science education more effective and successful in large classroom settings. Similar approaches had been used for smaller, upper-level courses in the natural sciences, particularly physics and engineering. It was possible to adapt the SCALE-UP changing from a small-scale approach of interaction and collaboration in science class to a larger-scale environment. SCALE-UP has since been adopted by other universities in the United States and Canada, not only in the hard sciences but also in the social sciences and humanities [7]. It has been reported [7] that physics education specifically has been more effective when students can interact with faculty, benefit from collaboration with peers, and actively engage with the class material. The model of the SCALE-UP room brings these benefits to a large-scale classroom. In this kind of classrooms, students perform better on conceptual understanding as well as critical thinking skills

[7], [8]. Students perform better than their peers in traditional classrooms 88% of the time. Beichner et al reported that there is an improvement in student attitudes towards learning in the SCALE-UP classroom. In the SCALE-UP room instructors can forget about the back-of-the-room phenomenon because students do not have the option to hide in the back of the class. Having good students sited in the front and poor students in the back of the class is not anymore a concern [9]. The SCALE-UP classroom goes hand in hand with an active learning pedagogy; if classroom setting and pedagogy used are mismatched, the success of SCALE-UP is not significant [10]. Considering that, as instructors, we should be aware of our students' needs and the changes they face, teaching in SCALE-UP rooms is a good way to suit a teaching style of promoting active learning and designing activities in which students can easily switch from working in a small group to work individually or to participate actively in a whole-class discussion; all this integrating technology in the classroom in order to enhance students' motivation and to achieve better results in their learning process. This is precisely what reflects a contextualized pedagogical posture according to all the challenges and changes brought to education by the fourth industrial revolution.

Paradoxically, some instructors could argue that in their institutions, they do not have access to these kinds of classrooms. Indeed, we all know that most classrooms in well-known universities, including The University of Lethbridge, do not reflect the appropriate configuration to enable 21st century learning and teaching active strategies centered in the student and are instead predominantly suited to only one style of pedagogy, where the instructor continues being the central actor of the pedagogical act, that is to say, perpetuating the lecture model [5].

III. THE STUDY

This study was conducted at the University of Lethbridge in Alberta. The Department of Modern Languages and Linguistics offers a minor in Spanish. Interest in learning Spanish has been growing lately. Regular courses are offered, and the students are also encouraged to participate in a summer immersion program in a Hispanic country. The program is small compared to other universities, which explains the number of participants (N = 21).

In this study, students, after taking an intermediate Spanish course (that was offered in the SCALE-UP room, see Fig. 1), were asked to participate voluntarily and anonymously in a survey about their engagement and the atmosphere and environment related to the course.

Three quarters of the students in this class participated in the online survey, comprised of seven items with a total of 16 questions. 21 students attempted the survey. One student did not answer the questions (4.8% missing for all questions), and one additional student did not answer one of the questions (9.5% missing for Q5). The overall completion rate was 95.2% of those who attempted the survey. As expected from designing a learning environment that (a) fosters student engagement and (b) improves student outcomes, we are

confident to report that students who took the mentioned course were highly engaged, which was partially due to the learning environment.



Fig. 1 SCALE-UP classroom built at the University of Lethbridge, Alberta

IV. RESULTS

The study measured the following aspects of student engagement and the learning environment:

1. Engagement: 7 questions pertained to student engagement based on active learning strategies. These items were taken from the CLASSE version of the NSSE (National Survey of Student Engagement).
2. Comfortable talking to instructor outside of class
3. Level of enjoyment of group work in class
4. Difficulty of material

5. Ease of following content
6. General feeling about the classroom
7. Space: 4 questions pertained to the overall effects of the classroom.

We discuss questions 1, 4, 5, and 7 below.

- Question 1: Please indicate how often you did the following activities over the course of the semester.

Students were asked to rate their frequency of engagement in the following 7 activities from one of five options: “Never,” “1-2 times,” “3-5 times,” “6-10 times,” or “More than 10 times.” Here, the first two response items are considered low engagement, the middle option medium engagement, and the last two response items high engagement.

- 1.a. Asked questions during class
- 1.b. Contributed to a class discussion that occurred during class
- 1.c. Came to class without having completed readings or assignments
- 1.d. Worked with other students on projects during class
- 1.e. Worked with classmates outside of class to prepare class assignments/projects
- 1.f. Discussed ideas from class with others outside of class (students, family members, coworkers, etc.)
- 1.g. Discussed ideas from readings or class with your instructor outside of class.

The results mentioned above can be seen in Fig. 2.

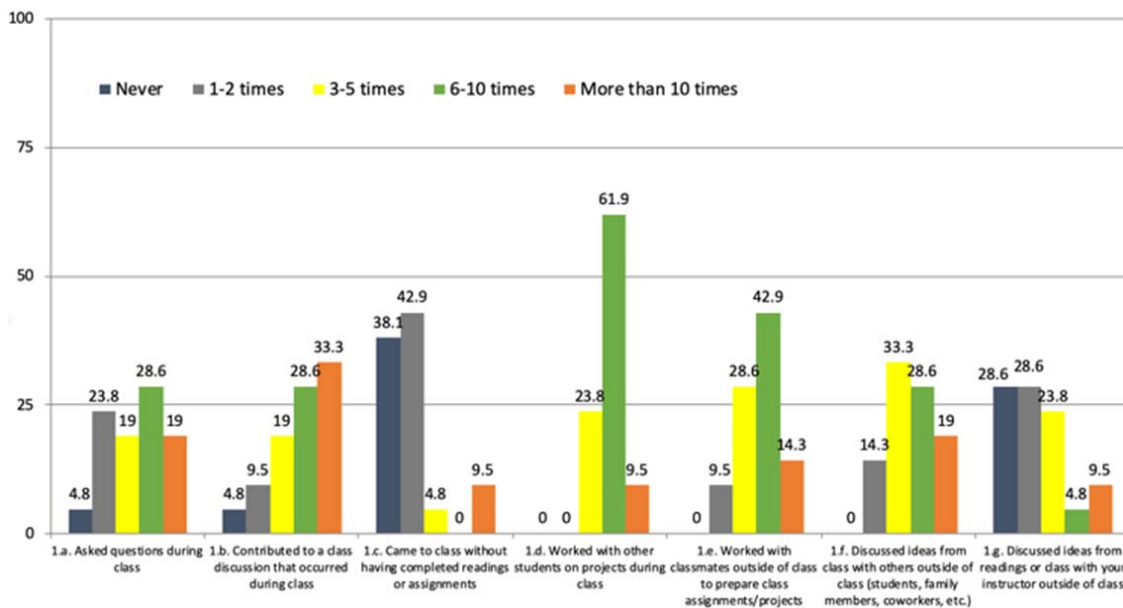


Fig. 2 Engagement indices; Y-axis indicates % of students

Highlights of these results are:

- 61.9% of students contributed to class discussion more than 5 times during the term.
- 81% of students came to class unprepared fewer than 3 times during the term.
- 95.2% of students worked with other students on projects during class 3 times or more and 71.4% of students 6 times or more
- 85.5% of students worked with other students on projects outside of class 3 times or more and 57.2% 6 times or more

more.

- 95.2% of students discussed ideas from class with external parties (e.g., other students, family, coworkers)

Overall, these results indicate that students who were enrolled in this Spanish class were highly engaged with the class, the material, and the instructor.

- Question 4: How difficult is the course material in your class?
- Question 5: How easy is it to follow the content of the lesson in your class?

Students were asked to rate their perception of difficulty/ease with the overall course material, as well as following lesson content, on a scale of 1 = very difficult to 7 = very easy. Please note that each scale started at the valence of the question word (difficult or easy), and the scale in question 5 was recoded to reflect the same ratings as question 4 for ease of comparison, see Fig. 3.

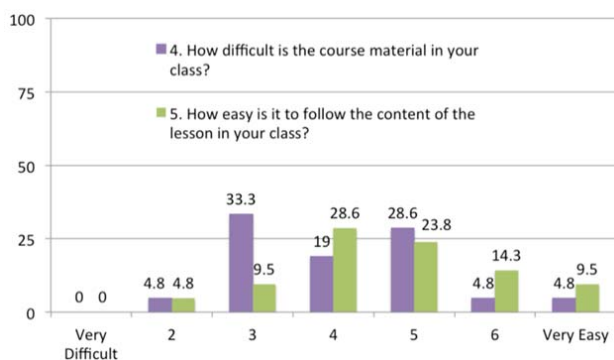


Fig. 3 Level of difficulty of course material and following lesson content. Y-axis indicates % of students

When recoding these variables into three categories (1 through 3 = difficult, 4 = neutral, 5 through 7 = easy), a Chi-square test indicated that the observed outcomes for each category did not significantly differ from the expected outcomes, Q4: $\chi^2(2, 20) = 1.6, p = .45$; Q5: $\chi^2(2, 19) = 3.9, p = .14$. In fact, when conducting a bivariate correlation on these two questions, there was a trend (although not significant) for a negative correlation ($r = -.069$; see Fig. 3). This means that students who found the course material more difficult rated it less easy to follow the lessons, while students who found the course material less difficult rated it easier to follow the lessons. This is exactly as would be expected. With a larger sample, this trend might be significant. Based on these student perceptions, there is no indication that the course material was too easy or too difficult.

- Question 7: The SCALE-UP classroom

Lastly, students were asked to rate the SCALE-UP classroom by expressing their level of agreement with the following four items:

This classroom...

- 7.a. is an effective space in which to hold this course
- 7.b. facilitates different types of learning activities (e.g., lecture, discussion, group work)
- 7.c. offers a physically comfortable learning environment

7.d. facilitates my engagement in the learning process

An overwhelming majority (all but one) of students agreed or strongly agreed with all four statements, indicating that the SCALE-UP room was an ideal learning environment for this course, see Fig. 5.

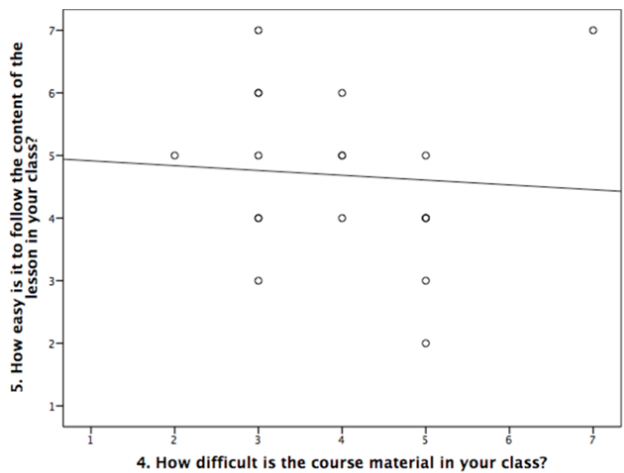


Fig. 4 Trend for negative correlation of Q4 and Q5, explained in text

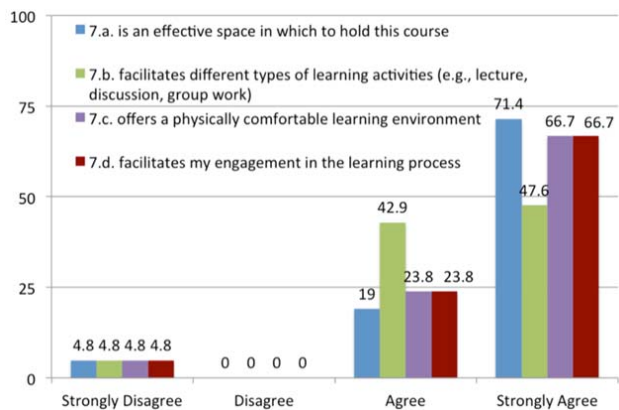


Fig. 5 The SCALE-UP classroom. Students overwhelmingly agreed that the classroom was an effective space for this course on four measures. Y-axis indicates % of students

According to the results presented, it is possible to assert that the students seemed committed and motivated in their course, which was partially due to the learning environment purposely chosen by the instructor and the opportunity offered by the University of Lethbridge building this SCALE-UP room. Student answers also indicated how useful and practical the course was; they took advantage of the flexibility to do their activities, switching between small group work, individual work, and whole-class discussion. Finally, the integration of technology into the classroom also was an asset, since the SCALE-UP room provides itself access to technology (high quality video and audio, one screen per table, internet connection).

V.CONCLUSION

This small study clearly indicates that students were engaged with the learning process, with the class, and with the instructor. They also liked the materials they were using, as well as the virtual tools. That being said, implementing Education 4.0 trends improves student experience while learning Spanish as a foreign language. They liked to work in projects inside and outside class, and they enjoyed discussing class ideas with external parties. Their sense of cooperation and collaboration was evident in their answers and in their behavior in class. As there was no back in the classroom (last row of seats), all students were active protagonists in their learning process. In fact, students considered the learning space to be very effective for the course.

Even as a small study, the results could be considered relevant enough to consider implementing the Education 4.0 trends in combination with a constructive pedagogical posture. The role the instructor assumes in the interaction with students is crucial and can determine the success of the teaching act. Indeed, a better understanding of how teacher stances affect teacher–student interaction and student learning is of the utmost interest for both teacher training and constructing future virtual pedagogical actors. The act of teaching is *per se* an act of constant interaction, which is the ultimate goal of learning a language: being able to communicate effectively across cultural differences.

More than ever, even facing the fourth industrial revolution, the teacher is and will be a source of inspiration for students; our responsibility is not taken by any disruptive machine. In the classroom, we should have the control to help students use their devices for learning purposes without distractions. A pedagogical intervention within a constructive interaction between teacher and learner is always crucial for life-long learning.

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