Introducing Virtual Reality in English Teacher Education

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Introduction

Research in neuroscience has come to support language teachers' intuitions: the interactions produced during playful and immersive activities within educational environments have a positive effect on the cognitive development of learners (Immordino-Yang, 2016; Aden, 2017). In the 1990s, neuroscientist Varela (1993; 1996) developed the enaction paradigm falling within the embodied cognition theory to define how meaning and knowledge are created in the mind through bodies and emotions. This paradigm has enabled to scientifically study the positive effects of sensory-motor devices such as 3D virtual worlds in educational contexts (Deutschmann & Panichi, 2013; Berti, 2019): using virtual reality applications is likely to create new relations between perception, cognition and action which support language learning/ teaching (Molle et al., 2020; Peterson, 2017). These are the reasons why language teachers should be trained to this new educational device before they integrate them in their practices.

This short article focuses on the perceptions of pre- and in-service English teachers (master's degree students in English learning/teaching) on the creation of new learning environments in virtual reality facilitating language acquisition/ learning considering the enaction paradigm and embodiment theories.

Pedagogical experimentations with 20 participants were led in 2022 in the context of second language teacher education. The data collected are made up of the students' responses to pre- and post-questionnaires as well as photos and videos taken during the trials of VR headsets. Analysed along the appraisal theory (Martin & White, 2005), they shed light on the need to accompany teachers in the use of VR for language learning/teaching to be effective.

1. Theoretical framework

1.1. Embodied cognition and the enaction paradigm - neuroscience

In the 1980s, linguists explored how abstract concepts could be based on metaphors of bodily and physical concepts. At about the same time, researchers in neuroscience studied how the mind could be understood in the context of its relationship with a physical body that interacts with the world and its environment. Hypotheses on the existence of embodied cognition started to arise (Lakoff & Johnson, 1999).

After scientific research in cognitive neuroscience using RMI and EEG, Varela (1996) proposed the enaction paradigm. For Varela, languages serve to bring people together ("to couple them", as he puts it) to make meaning emerge, and this construction of meaning takes shape in an individual way depending on the environment in which the individual evolves. The place of language in this process is crucial and the environment and the context of language use are the conditions for the emergence of meaning. The researcher asserts that thought is not separated from the body, thought and speech are embodied, cognition is incarnated and emerges in contextualised situations.

Damasio supports and confirms this paradigm when he writes that emotions are an integral part of the learning process since "the sites of emotion induction trigger a number of signals to other sites in the brain (...) and to the body[1]". (Damasio, 2002: 76). Emotions precisely impact consciousness and make it possible to access cognition, including that of language (Immordino-Yang & Damasio, 2007). Immordino-Yang has led much scientific research on the role of emotions in education and points out that emotions and cognition are supported by interdependent neural processes. Her research has led her to discover the existence of "emotional thought" which she defines as an "important overlap between cognition and emotion" (Immordino-Yang, 2016: 37). Emotional thoughts can change the state of the body in characteristic ways, for example by contracting or relaxing muscles or changing the heart rate. In turn, the bodily sensations of these changes, real or simulated, contribute, consciously or not, to feelings, which can influence thinking. The experience of these bodily sensations, whether conscious or not, can then affect cognitive processes in learning, such as attention and memory.

In this article, the focus is on the perceptions of pre- and in-service English teachers when it comes to reflecting on the bodily and emotional dimensions of using VR in second language learning. My experiments fall within the above-mentioned theories and are

[1] My translation for « les sites d'induction de l'émotion déclenchent un certain nombre de signaux vers d'autres sites du cerveau (…) et vers le corps. »

underpinned by the idea that engagement, attention, and motivation are sustained using VR in SLA (Lan, 2020; Meyran-Martinez & Spanghero-Gaillard, 2021; Roy, 2017; Chen & Kent, 2019). It is in this context that VR has been considered as a learning environment worth introducing in second language teacher education (SLTE) (Privas-Bréauté, 2021; Castaño-Calle et al., 2022; Ciekanski et al., 2020).

1.2. Second Language Teacher Education

SLTE in France aims at three objectives: teaching future language teachers how to teach, preparing them for the CAPES contest, a competitive exam that enables them to get tenure track positions in mainly secondary schools, and transforming them into reflective practitioners. In Nancy University, it follows a constructivist and socio-constructivist approach in which students get knowledge and competencies in language teaching and learning through theoretical courses on SLA (Second Language Acquisition), FLA (Foreign Language Acquisition) and ELT (English Language Teaching) combined with experiential pedagogy. This "socio-constructivist experiential SLTE pedagogy" includes incorporating activities in SLTE programmes which focus on practice teaching for student teachers and has naturally led me to introduce several educational devices (including learning and teaching materials and environments) such as drama, drawing, board games, and virtual reality, mainly because I am sensitive to enactive and immersive training tools that differ from what students traditionally know and use.

In today's digital age, trying to impart academic skills or methodological strategies is not enough to meet current needs. It is thus crucial to support language teacher education by helping future language teachers to promote research-based practice in teacher education and become more aware of their emotional skills, attitudes, beliefs, and behaviours (Brudermann et al., 2018). Therefore, pre- and in-service teachers are required to explore their "teaching actions" (Cicurel, 2011) so as to better understand both their inner selves and their learning/teaching practices and to further make concrete proposals for the effective implementation of initial training schemes based on experiential learning. Along those lines, it is more than ever important to develop pedagogies supporting and promoting language teachers' professional training through reflective practice and help transfer their knowledge to classroom situations (Abendroth-Timmer, 2017).

My SLTE programme focusing on experiments with VR inscribed in a participatory research protocol requires the participants to precisely determine the extent to which VR,

considered to be enactive and immersive, can become a pedagogical device for language learning/teaching.

2. Research protocol

2.1. Context of the experimentation

The experiments were conducted from September 2022 to December 2022 with 20 master's degree students in English teaching/ learning, some of whom were already in-service teachers. They were organised within a series of courses whose goals were to have students learn more about course-building, learning/teaching materials and learning/teaching methods. In this context, many educational devices were presented and tried: role-play, board games, drawing, drama, and virtual reality. The students actively participated in this research-action/ creation project and were involved in the research protocol by a) signing informed consents for the right to disseminate the photos, videos and questionnaires that will constitute the data for this research, b) answering pre- and post-questionnaires, which sometimes take the form of reflective writings, since they are intended to help them reflect on the pedagogical application of the devices, c) testing the proposed devices, d) becoming aware of the implementation of a research protocol, (they experience for themselves what is then expected of them in the context of their research thesis) and e) reflecting on the inclusion of these devices in didactic theoretical frameworks.

In this article, the focus is exclusively on the experimentation involving virtual reality with VR headsets, which represents an average of 3 two-hour lessons (Table 1).

	Workshop	Research
Lesson 1	Presentation of the learning material Experimentation 1: Google 360, Travel VR, Google earth, The Smithsonian's, roller coaster	Pre-questionnaire Photos and videos Post-questionnaire 1
Lesson 2	Experimentation 2: The People's House, Disney, ImmerseMe, Amaze, Mission ISS …	Photos and videos Post-questionnaire 2
Lesson 3	Experimentation 3: Sansar, Altspace, Immersive Virtual	Photos and videos Post-questionnaire 3

	Environments (IVEs requiring the creation and use of avatars)	

Table 1. Research protocol

These lessons, divided into two distinct parts (workshop and research) were designed to allow students to 1) try out the applications and thus immerse themselves in the applications and situations proposed and 2) fill in questionnaires to bring out pedagogical uses of virtual reality. Other more theoretical courses on SLA and ELT are delivered over the years. Students are then required to draw on the approaches and theories they need for VR.

2.2. Data

The data that are collected are mixed: quantitative data is supplied by questionnaires (appendixes 1 and 2) and qualitative data is given thanks to the videos and photos taken during the experimentations (photos 1, 2, 3 et 4). In this article, only the most significant responses (mainly extracted from the post-questionnaires) are treated, and only a few photos help illustrate the responses.

2.2.1. Pre-questionnaire (appendix 1)

The purpose of this pre-questionnaire was threefold: 1) to establish an inventory of students' knowledge of digital training devices, 2) to find out about their personal use of digital technology and 3) to understand their professional use (i.e. in the language classroom) of digital tools.

2.2.2. Post-questionnaire (appendix 2)

The post-questionnaires were distributed immediately after the trials, so the respondents did not have much time to think about what they had experienced. The responses to the post-questionnaires reveal the impressions and emotions that they felt after trying out several VR applications. They also highlight their opinions regarding the development of language and other skills.

2.2.3. Photos

Many of the photos show the same excitement and enthusiasm in using VR for the first time for many of the students and their will to explore it to its numerous dimensions including movement as we can see in photos 1, 2, 3 and 4.

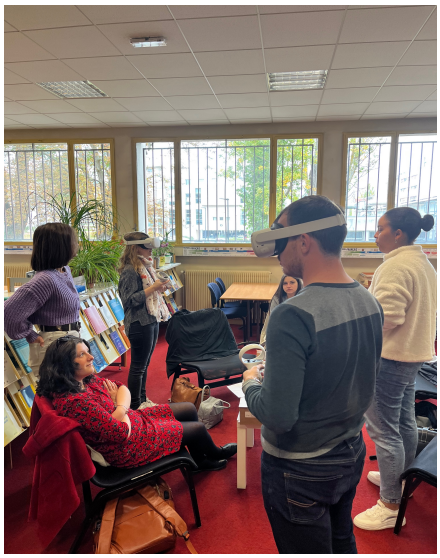

Photo 1

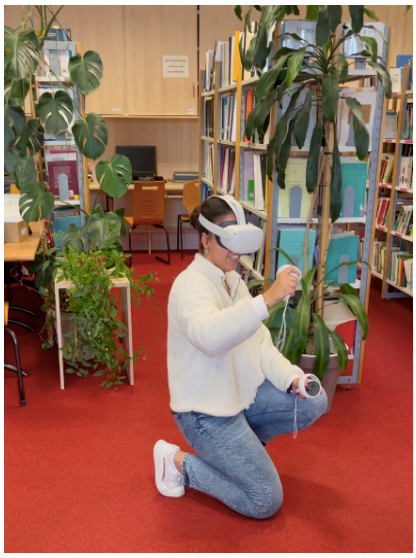

Photo 2

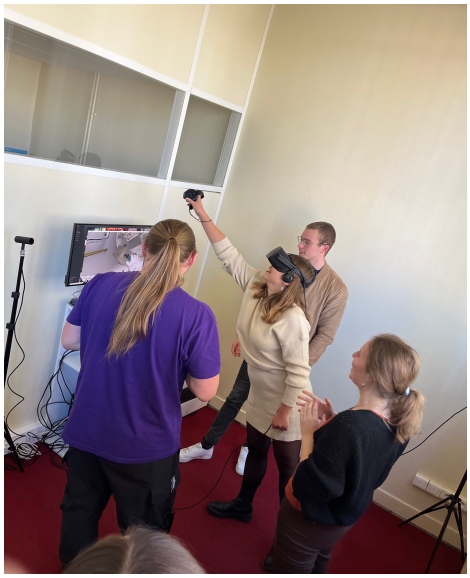

Photo 3

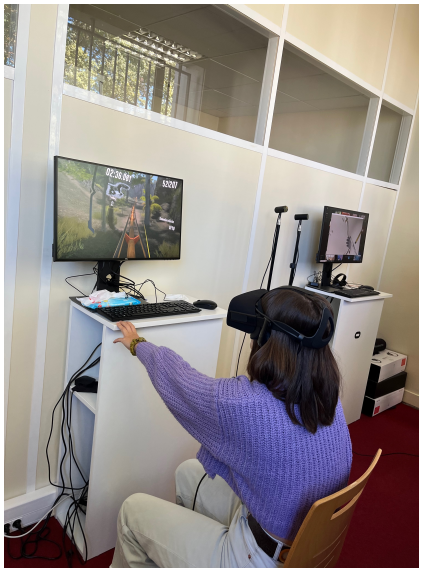

Photo 4

3. Results

The responses of the participants are analysed along the appraisal theory (AT), a framework for discourse analysis that brings light to "those meanings by which texts convey positive or negative assessments, by which the intensity or directness of such attitudinal

utterances is strengthened or weakened and by which speakers / writers engage dialogistically with prior speakers or with potential respondents to the current proposition" (White, 2015, p.54). I will here focus on attitude and, as advised by AT, I will classify the responses along the three sub-categories of "affect", "appreciation" and "judgement" by frequency of occurrence.

3.1. Affect

Affect is defined as the "positive/negative assessments presented as emotional reactions" (Martin & White, 2005: 56). The responses of the students along this criterion can be seen in Table 2.

	Positive assessment	**Negative assessment**
VR headsets (hardware)	Astonishing (1/20) Surprising (1/20)	Unsettling (1/20)
VR applications (software)	Impressive (2/20) Joyful (2/20) Amazing (1/20) Entertaining (1/20) Exciting/ excited (1/20) Attractive (1/20)	Disappointing (3/20) when applications no longer exist Frustrating (3/20) when applications don't work

Table 2. Assessment as an emotional reaction

3.2. Appreciation

Appreciation refers to "assessments of objects, artefacts, texts, states of affairs, and processes in terms of how they are assigned value socially" (Martin & White, 2005: 56). The responses of the students along this criterion can be seen in Table 3.

	Positive assessment	**Negative assessment**
VR headsets	Ease of use (2/20)	Proper placement of the headset so that the image is not blurred (2/20) Difficulty in control (2/20) Slight dizziness (1/20), loss of balance Headache (1/20)

VR application	Immersive (4/20): "You are immersed, you feel like you can touch, communicate, move". Interactive (2/20), all the more so as it is "possible to interact with the setting and grab objects" Curiosity, "desire to discover new environments" (2/20)	Lack of interaction with the environment (2/20) Feels inactive and passive, in a 360 video (2/20)

Table 3. Assessment of artefacts, entities, happenings, and states of affairs by reference to aesthetics and other systems of social valuation

3.3. Judgement

Martin and White define judgement as the "positive/negative assessments of human behaviour and character by reference to ethics/morality and other systems of conventionalized or institutionalised norms." (Martin & White, 2005: 56). The responses of the students along this criterion can be seen in Table 4.

	Positive assessment	**Negative assessment**
VR headsets		Complicated to use/difficult to hold (especially for mobile headsets) (5/20)
VR applications	Immersion: this allows a "disconnection from the real world" (1/20) "Visiting in a fun way" (1/20) "Quiet application that allows for more accessible tourist trips" (1/20)	

Table 4. Assessment of human behaviour and/or character by reference to ethics and other social norms.

The pre- and in-service teachers' responses suggest that the experience they lived was embodied, aroused emotions, and triggered many positive and negative assessments. These VR resources provoked experiences with a high degree of sensory-motor and emotional impacts (Privas-Bréauté & Ciekanski, 2021).

Through these experiments, the students became aware of the role of their bodies and emotions both in virtual worlds and in the real world (much laughter broke out during VR sessions and the need to move their bodies was constant as the photos show) and of the non-verbal dimension in communication situations. This awareness of the preverbal echoes Immordino-Yang's "emotional thought" matrix and alerts us to the importance of studying the conditions in which language learners are placed in communicative situations.

The results of these experimentations corroborate the fact that VR can be used in education and can support language learning, since it is a playful, innovative device that would increase students' motivation and require a greater cognitive commitment, through the emergence of positive emotions and bodily involvement. They also permitted pre- and in-service teachers to be fully implicated in the research project.

4. Discussion

One of the objectives of this participatory action research project was to enable students to explore the full didactic potential of VR in language education, and to provide educational scenarios involving VR (question 12 in the post-questionnaire). Among those that were collected, many used real-world tour applications such as Google Earth. The cultural dimension takes precedence over the language dimension, with students opting from the outset for environments where the cultural input is privileged, where the context is immediate, which corroborates Varela's words: language, verbal or non-verbal, emerges in situations where the context is clearly identified (Ciekanski & Privas-Bréauté, 2019).

The experimentations and the data highlight the fact that pre-service and in-service language teachers need to be trained and accompanied when it comes to using VR in task-based and design-based approaches (Chen & Kent, 2019; Capron-Puozzo, 2021).

Conclusion

The data collected invite us to understand that the students did not remain insensitive to this experimentation and were allowed to experience the world phenomenologically, as in Vial's terms:

> The phenomenon of the world is everything that appears and, as a result, offers itself to be lived, experienced and invested. This includes physical, psychological and social phenomena. Therefore, experience is the fact of experiencing a phenomenon of

the world. Each time I perceive, I therefore make-an-experience of the world.[2] (Vial, 2013: 108)

The introduction of virtual reality in SLTE allows us to raise phenomenological questions related to the embodied cognition theories in articulating perception and action through an experience of the world whose contours are redefined by this new technology. Further research and field experiments are yet still needed to explore the full potential of VR in supervised language teaching/learning contexts that are safe and controlled by all users since many technical obstacles remain (Chateau et al., 2019; Roy, 2017).

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[2] My translation for : « Le phénomène du monde, c'est tout ce qui apparaît et, par suite, s'offre à vivre, éprouver, investir. Il s'agit aussi bien des phénomènes physiques et psychiques que sociaux. Dès lors, l'expérience, c'est le fait d'éprouver un phénomène du monde. A chaque fois que je perçois, je fais donc une-expérience-du-monde. »

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Appendix 1 – Pre-questionnaire

Frequency and use of CTBT and ICT

Who are you?

1 You are: a man / a woman / I do not wish to answer

2 What is your age?

3 You teach in: lower secondary / upper secondary / both

4 Which classes do you have this year?

Your classroom practices

5 What teaching aids do you use? Rank these suggestions in order of preference (1 most often, 6 least often)

- textbooks/books
- authentic paper documents
- digital authentic materials
- workbooks
- worksheets
- internet exercises
- other. Specify:

6 Do you use the internet to prepare your lessons?

Yes/ no/ don't know

7 If you do, rank these reasons from most relevant 1, to least relevant 6

- easy to access
- free of charge
- numerous/ unlimited resources
- authentic resources
- quality resources
- fast
- facilitates student engagement
- facilitates student agency
- facilitates student autonomy
- other

8 Which new technologies do you use most in the classroom? Rank from 1, most often, to 9, least often.

- video
- podcasting
- interactive white board
- virtual reality
- Smartphones
- tablets
- computers
- video projector
- no technology
- other :

9 Which teaching devices do you use? Rank in order of preference: 1 most often, 9 least often.

- role-playing
- theatre
- board game
- debate
- drawing
- singing
- virtual worlds
- video games
- other online games (hot potatoes, kahoot)
- other:

10 Explain your choice.

11 Which devices do you think are the most suitable for student collaboration? Why or why not?

12 Which devices do you think are most conducive to students' listening skills? Why?

13 What do you think are the most suitable devices for students' speaking skills? Why?

14 What do you think are the most suitable devices for developing pupils' language autonomy? Why?

Your mastery of NICTs

15 What digital tools do you personally use on a daily basis? Rank from 1 most often to 4 least often.

- computers
- smartphones
- tablets
- virtual reality (headset)
- none
- other:

16 Before this course, did you know about virtual reality?
Yes/ no/ I don't know

17 Have you experienced it before?
Yes/ no/ I don't know

18 Before this course, did you know about virtual reality headsets?
Yes/ no/ I don't know

19 Have you experienced them before?
Yes/ no/ I don't know

20 Can this device (answer yes, no, or don't know)

- be introduced into the language classroom?
- promote telecollaboration between students?

- facilitate/encourage speaking? - develop students' language Interaction? autonomy?

- facilitate/encourage listening? - develop other, more general skills?

- develop communication skills? - If so, which ones?

21 In your opinion, what are the obstacles to introducing virtual reality into the language classroom?

Appendix 2 – Post-questionnaire

Who are you?

1 You are: male / female / do not wish to answer

2 What is your age?

3 You teach in: secondary school / high school / both

4 Which classes do you have this year?

Virtual Reality

5. Was this the first time you used virtual reality?
Yes/ no/ I don't know

6. Was it the first time you used virtual reality headsets?
Yes/ no/ I don't know

7. Which application/ resource have you used/ discovered/ explored today?

8. What was/were your first impression.s ?
Explain in a few words

9. What emotion.s have you felt?

Explain in a few words.

10. Does this resource develop/encourage students' language autonomy? Justify your answer in a few lines.

11. Does this resource develop/encourage a different kind of autonomy for students? Justify your answer in a few lines.

12. Think about an educational application of this resource in the language classroom and the language or other skills it develops. Justify.