

# An Immersive Experience in the Virtual 3D VirBELA Environment for Leadership Development in Undergraduate Students during the COVID-19 Quarantine

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## Abstract

Leadership is an essential soft skill in any professional today. However, its development can be a significant challenge in traditional classes focused on disciplinary competencies. In this sense, the use of an immersive 3D virtual environment can be an advantage for leadership development, since it can facilitate communication and interaction between the participants; thanks to overcoming fear associated with face-to-face interaction. In this regard, this work exposes a leadership activity developed in VirBELA, explaining their designing, developing, and evaluating processes. The results obtained show that this activity under the participants' perception was facilitating the interaction of the participants among themselves and with the professor and improve the learning process in different ways. This process was carried out during quarantine due to Covid19.

## Keywords

Leadership, 3D Immersive Virtual Environment, Soft Skills, Virtual Reality, VirBELA

## 1. Introduction

By 2007, immersive virtual environments were defined as "a three-dimensional space, real or imaginary, generated by a computer, which a person can interact with" [1]. These kinds of environments produce the sensation of being inside a place since virtual reality is made up of objects and situations that recreate a complete sensory experience in an artificial setting [2, 3]. Initially, its use was focused on video games due to the way they visualize, manipulate and interact on the computer, and this was rapidly spread to other fields such as education, medicine, industry, among many others [4].

The communication process in this type of environment is constituted by one or several users connected in three-dimensional virtual space - immersive- [5], which they access to give life to an Avatar, through which they interact with a virtual community [2]. For this reason,

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education through virtual environments is more focused on the needs and rhythm of student learning [6, 7].

In this sense, Banerjee, Perera, & Choudhury [8] argue that virtual tools promote collaborative work and learning independently; content plans are more aligned with the current trends in the disciplines. Both allow students to develop their knowledge and skills in a more significant way. These technologies will enable the release of anxiety derived from face-to-face interaction, which represents an advantage to promote collaborative learning, which serves as the basis for the development of soft skills [9, 10, 11].

Collaborative learning, according to Triberti, Villani, & Riva [12], is a teaching method in which a group of several people builds knowledge from collective discussions and reflections. Furthermore, for it to be collaborative, it must promote social and inclusive contact, generating "an interdependence among group members," allowing the development of interpersonal techniques, competencies, and skills [13, 14].

Different studies have verified that the use of Virtual Immersive and Collaborative environments generate a 50% retention rate in the student and a significant percentage of improvement in learning [2]. Educational institutions worldwide have implemented this type of virtual technology in their classes, intending to improve student performance and stimulate meaningful learning [15].

According to the study promoted by the Institute of Technological Perspective of the European Union [16], the involvement of new technologies in training processes is essential for the development of 21st-century skills, including leadership. In this regard, it is evident that among the weaknesses that new professionals present are the difficulties related to the development of emotional intelligence, among these the lack of ability to join workgroups and company policies, the lack of proactivity and guidance to action, little commitment and little sense of processes [17].

Now, organizations are forced to rethink processes related to production, business structure, and job functions to be more competitive in an increasing world globalized [18]. The above implies adequate training through the identification, standardization, and certification of labor competencies. This last understood as "the ability to effectively carry out an activity of specific work fully identified, to achieve the objectives that such activity implies [19].

Among all competencies demanded by professionals one that tops the list is leadership; which is not linked to the imposition of ideas or authoritarianism, but is associated with the ability to convince or persuade, not only subordinates but also directives. And it is necessary to relate it to skills as to-build-relationships and teamwork that often go hand in hand. It is identified then that leadership allows us to assume challenges, achieve objectives, and achieve changes, a transformative leadership [17].

Thus, incorporating immersive virtual environments in learning processes becomes pertinent and imperative for the application of methodologies for the development of soft skills. In this sense, it is necessary to renew education to create spaces where students without going to their institutions interact with multidisciplinary groups, simulating different realities and contexts, where they can develop skills and abilities to integrate and lead work teams. Due to those above, this work presents an immersive experience in the 3D virtual environment Vir-BELA for leadership development in students of technological programs in business administration. First, the methodological process carried out to determine the virtual environment to



**Figure 1:** Navigating the SecondLife virtual world

be used is exposed, the definition of the pedagogical activity and the evaluation instruments of the process carried out, the results and the discussion of the findings are presented below, to finish with the conclusions.

## 2. Methodology

The process carried out was structured within the framework of leadership mediated by experience in the immersive virtual 3D environment. It was defined into three phases for the development of the whole pedagogical action. The first one consisted of the evaluation of three virtual worlds through the exploration and, after that, the selection of one, from specific criteria. The second phase structured the activity pedagogically to achieve the learning objectives, considering the advantages and restrictions of the virtual world. And the last stage is about the evaluation of the participants' perception of the process was carried out.

### 2.1. First phase

The first phase began with the exploration of three virtual worlds SecondLife (see Figure 1), Sansar (see Figure 2), and VirBELA (see Figure 3), which are described below.

#### 2.1.1. SecondLife SL

SL is a virtual world inspired by Neal Stephenson's science fiction novel Snow Crash. In Neal's book, a concept called Metaverse appeared that described a virtual world in which people could interact, play, do business, and all kinds of communications. In this virtual universe, the important thing was status. The status was valued with two elements that SL has perpetuated, the possibility of accessing exclusive sites and technical training, often focused on the spectacular nature of the virtual appearance. [20]



**Figure 2:** Navigating the Sansar virtual world

Access to SL is free. Just create an account with a first and last name from a predetermined list (this first and last name will be the one used in SL), and an email. In SL the movement is performed with a virtual appearance, commonly called an avatar. This can be completely faithful to the real person or a completely different image, like a red duck. The basic avatar changes (complexion, body shape, colors ...) are quite easy to do, for the rest, some 3D design knowledge is needed.

Linden Lab, the creator company of Second Life. launched in the market in 2017 what could be considered an evolution of the famous virtual reality video game. On this occasion, Sansar perfectly integrates the immersive experience that Oculus Rift glasses (or other similar ones) provide, offering the user the possibility of acquiring the subjective vision of their avatar. Of course, that is not the only notable feature of the video game, as Sansar allows you to design scenarios, share them, and even make money from them. As with Second Life, the virtual universe to which anyone who signs up with Sansar has access is very extensive and the possibilities of interaction with other users can be used for educational purposes. As Ebbe Altberg, CEO of Linden Lab, explained in an interview, searching on Google, I want to learn French, you can find experiences in which Sansar users visit virtual spaces in France or meet other French users with whom to dialogue [21].

### 2.1.2. VirBELA

It is the first virtual 3D university campus in the world. This amazing world will help you take a complete tour of the software and its Virtual 3D technology. VirBELA generally brings students and companies together in a whole new 3D world and connects them all for expert collaboration. Whether it is a small group of globally distributed digital nomads or side by side, the VirBELA open campus is the perfect place to host online events or create a cloud-based business and rejoice forever. VirBELA is completely free and is home to a community of independent innovators, on a global scale. You will also learn how to create a 3D character



**Figure 3:** Navigating the VirBELA virtual world

within VirBELA to use before starting the educational adventure, learn about team suites, and go through other functions and features in VirBELA, including public chat, private bubbles, resolution, or window display settings, among other things [22].

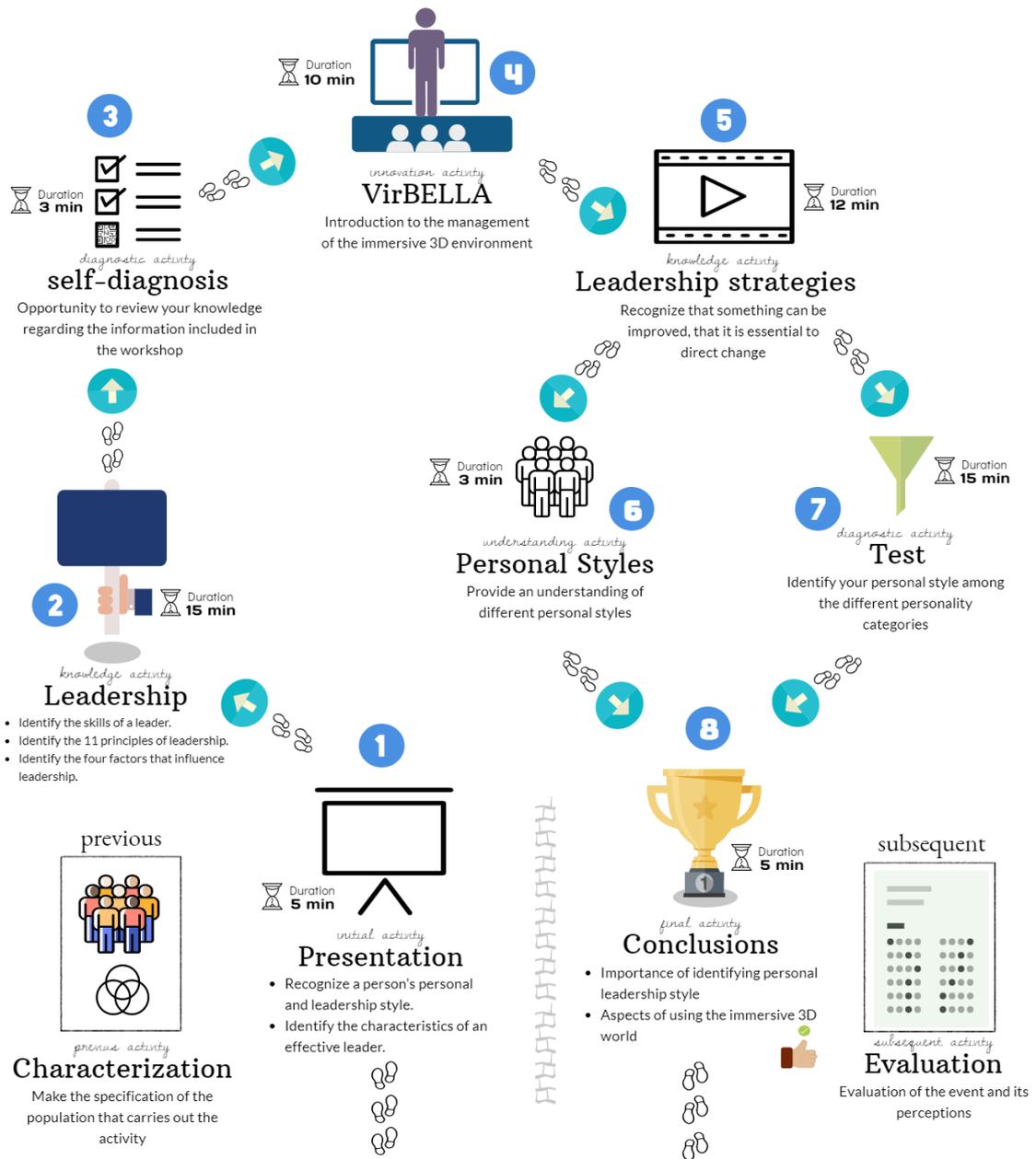
## 2.2. Second phase

The second phase defines and executes a three-stage learning activity focused on the development of leadership in the virtual world. The first stage focused on identifying the characteristics of an effective leader. The second introduced the different theoretical approaches to leadership and the five main leadership strategies, ending with the third stage in which the participants identified their leadership style and personality. Each step had its learning objectives, which are described below:

- First stage: 1) Identify the characteristics of an effective leader and 2) Recognize the personal and leadership style of a person.
- Second stage: 1) Identify the skills of a leader, 2) Identify 5 leadership strategies, 3) Identify the 11 leadership principles, and 4) Identify the four factors that influence leadership.
- Third stage: 1) Identify your style among the different categories.

The process described in Figure 4 begins with the characterization of the students, identifying the students' limitations in activity development. Then, were explained: the activity objectives, game rules, and educational strategies to be implemented.

Next, leadership activity starts in which were presented the leadership skills and eleven principles, and the four factors that influence it. Finally, a self-diagnosis is made, which allows us to review your knowledge about the information explained.



**Figure 4:** Process schema of leadership learning activity

Then the induction into the 3D immersive virtual world of VirBELLA is carried out, the configuration of the avatar, the map of the island, we moved to various scenarios within the virtual world highlighting the auditoriums, offices, and meeting rooms. Next, we move to one of them and audiovisual material on the five Leadership strategies.

Simultaneously, while presenting the personality styles proposed by Jung and using the

Myers-Briggs indicator, the participants identified their personality style and they interacted among them [23]. We end with an additional exploration of virtual world scenarios and highlight the importance of identifying your leadership style and how the mediation of these immersive 3D virtual worlds allows you to work interactively.

### **2.3. Third phase**

The third phase focused on the evaluation of the developed process, for which two questionnaires were developed that were closely related to the objectives set and focused on the selected population.

The first survey conformed by 23 questions that were structured in 8 thematic blocks, 1-General characterization, 2-Technological Equipment, 3-Uses of technological equipment, 4-Use of the internet, 5-Video games, 6-Use of social networks, 7-Grading level, 8-Immersive 3D Activity.

The first block includes five questions about the age range, socioeconomic stratum, locality or neighboring municipality, file, and training program. The second block includes four questions about the technological devices available at home, Internet access via smartphone, Fixed broadband Internet access, Type of internet connection. Block three asks questions about the uses you make of these devices at home and the time that has passed since you purchased the devices. The fourth block includes questions about internet use at home, about who frequently uses the devices at home. The fifth block asks if the students play and what kinds of video games. The sixth block investigates the use of social networks, the time you use them, whether you use them while in class, and an evaluation. On the ratings, in block seven, we investigate the level of ratings that it currently has and the impact of social networks and video games on them. To finish, we asked the student if he would be interested in participating in a soft activity development activity using an immersive 3D tool.

The second questionnaire was made up of 31 questions divided into 8 sections, as follows: 1-Information of the Assistant, 2-Situations that were presented for those who did not carry out the workshop, 3-Use of the VirBELA Virtual World, 4-Aspects on the activity design, 5-Aspects on the development of the workshop, 6-Attitudes and skills developed in the workshop, 7-Assessment of the training received, 8-Positive and negative aspects, 9-Information on the asynchronous workshop.

This study included a sample of students in training selected for convenience -due to the accessibility and availability of the participants to carry out an exploratory study- who are taking technological training programs in the administrative area. The research had the informed consent of the participants. The final sample size is marked by 84 valid questionnaires completed for the first survey and 51 valid questionnaires for the final evaluation of the workshop. Of the total questionnaires (135), 82.4% were women and 17.6% men.

## **3. Results**

The execution of the activity began with a characterization of the technological resources of the participants to identify technical limitations that could affect the subsequent steps. In this sense, the participants have 79.8% access to smartphones, 58.3% to laptops, 29.8% to desktop,

and 7.1% to tablets. However, only 63.1% have the internet on their cell phones, and 86.9% have the internet at home.

Regarding use, smartphones are the most used medium with 52%, followed by laptops with 43.9% and tablets with 4%. The use of smartphones stands out in 75.2% for entertainment and 40.2% as academic support, while the use of laptops or desktops is 57.4% as academic support. Regarding leisure, 33.3% play video games, and 91.7% make use of social networks.

Of the people summoned to the activity, 56.9% could not participate, mainly because 48.3% of the event hours were crossed with other businesses and 31% of these, because they had difficulties with access to the virtual environment due to your internet connection or the characteristics of your technological devices.

When considering the virtual environment as an educational tool to promote the learning process, the participants stated that the activity allowed them greater access to information (86.4%), in addition to facilitating group work (81.8%), allowing for new relationships between the teacher and the participant (81.8%), motivates the participant to learn (77.3%), and facilitates the transfer of knowledge (77.3%). It is noteworthy that 100% of the participants expressed their willingness to carry out similar activities in the future.

Regarding the impact of leadership activity on their training, the perception of the participants was: it increases their level of knowledge (95.5%); it gives them professional value (90.9%); it presents exciting content (90.9 %); it allows them to develop in a virtual environment (90.9%); it facilitates relationships with peers (90.9%); it improves the relationship with the teacher (90.9%). It should be noted that in global assessment, there was significant interest and positive perception of the activities; So, it exists the potential of engaging people through this technology.

## 4. Discussion

As it was evident, the participants have greater access to smartphones, laptops, and desktops, with internet access, however, the quality and continuity of the service represent a limitation for the massive implementation of this type of activity. It is essential to highlight that the majority of the use that participants give to their technological devices is for entertainment, and to a lesser extent, like academic support. Besides, laptops and desktops are mainly used for work and academic support at the same percentage. And as expected, these teams are available for frequent use of social networks.

Regarding the difficulties that the students presented, the technological tools (PC / Laptop, Internet) were not available or did not have the appropriate characteristics to carry out this type of activity in an immersive 3D virtual environment. In a minimum percentage, the students stated that they were not interested in the event.

It was interesting to see that the participants met their expectations thanks to the characteristics of the VirBELA 3D immersive virtual world, which allowed them to:

- Gain access to more information,
- It made group work easier for them,
- Promote new relationships between teacher and student,

- Motivate learning,
- Facilitate the recall of information and reinforce the contents,
- Facilitate the transfer of knowledge,
- Offer a better presentation of the contents,
- Create or modify new attitudes,
- Facilitate self-learning and individualize teaching,
- Demonstrate and simulate experiences,
- Clarify abstract concepts.

Regarding the impact of the activity carried out on the 3D immersive virtual world of VirBELA and especially on leadership, the participants stated that:

- Increase your knowledge,
- Provide professional value,
- Features interesting content,
- allowed them to develop in a virtual environment,
- It made it easier for them to relate to their peers,
- It helped improve the relationship with the teacher.

And as a global assessment of the workshop, a high interest in the activity, its quality, the high level of acquired attitudes, the great possibilities of applying what was learned and the high level of knowledge acquired was evident.

## 5. Conclusions

This document exposes the design, development, and evaluation of a leadership training activity mediated by a 3D virtual immersive environment (VirBELA) for students of technological programs in business administration.

The virtual platforms comparison carried out between SecondLife, Sansar and Vir-BELA, showed that the characteristics of the latter are more convenient for the development of training processes, which contributed to the successful development of the activity. However, bad Internet connection and poor technological capacities of devices still represent a barrier to the massification and use of virtual environments in education in Colombia.

It is essential to highlight that these results occur during the quarantine due to the Covid19 virus, which has led educational institutions to the extensive use of technology to continue with

their training processes. This situation favored the development of this activity and demonstrates the potential of 3D virtual immersive environments to be integrated as tools of everyday use in the education of the future under the new normality mediated by social distancing.

In the perception of the students, the activity carried out has significant advantages thanks to the fact that it motivates the students to learn, it facilitates group work, reinforcement of contents, transfer, and recall of information. It also offers a better way of presenting the materials, thanks to the fact that it allows demonstrating and simulates experiences, helping to clarify abstract concepts. Even the activity fostered new relationships between the teacher and the students, and between them since it allows free interaction between them without the pressure of face-to-face interactions.

Finally, thanks to the extensive use of information and communication technologies in education because of the global crisis caused by the pandemic due to the Covid19 virus, a window of opportunity opens for the massive implementation of virtual 3D immersive virtual environments. Also, this technology will allow social interactions that at this juncture are not possible, but that are indispensable in the training processes.

## References

- [1] M. Ramos, J. Larios, D. Cervantes, R. Leriche, Creación de ambientes virtuales inmersivos con software libre, *Revista Digital Universitaria* 8 (2007).
- [2] Z. V. Comas Gonzalez, I. C. Echeverri Ocampo, R. Zamora Musa, J. Vélez, R. Sarmiento, M. L. Orellana, Tendencias recientes de la educación virtual y su fuerte conexión con los entornos inmersivos, *Espacios* (2017).
- [3] A. Becker, D. Görlich, What is game balancing?-an examination of concepts, *Paradigm-Plus* 1 (2020) 22–41.
- [4] C. Pollock, J. Biles, Discovering the lived experience of students learning in immersive simulation, *Clinical Simulation in Nursing* 12 (2016) 313–319.
- [5] M. W. Bazzaza, B. Al Delail, M. J. Zemerly, J. W. Ng, iarbook: An immersive augmented reality system for education, in: 2014 IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE), IEEE, 2014, pp. 495–498.
- [6] R. F. Murcia, L. C. Álvarez, C. M. Corredor, El estilo de aprendizaje en educación virtual: breve revisión de la literatura, *Virtu@ lmente* 4 (2016) 70–95.
- [7] O. Mendez, H. Florez, Applying the flipped classroom model using a vle for foreign languages learning, in: *International Conference on Applied Informatics*, Springer, 2018, pp. 215–227.
- [8] I. Banerjee, I. Perera, J. Choudhury, Introducing immersive technologies for learning: A study evaluating the readiness for using virtual worlds for learning and teaching in an indian university, in: 2013 Sixth International Conference on Contemporary Computing (IC3), IEEE, 2013, pp. 268–273.
- [9] B. Pinzón-Cristancho, H. A. Calderón-Torres, C. Mejía-Moncayo, A. E. Rojas, An educational strategy based on virtual reality and qfd to develop soft skills in engineering students, in: *Workshop on Engineering Applications*, Springer, 2019, pp. 89–100.
- [10] A. E. Rojas, C. Mejia-Moncayo, Students' perception of a postgraduate course in agile

- project management aimed at developing soft skills, *CEUR Workshop Proceedings*.pp. 194–204 (2019).
- [11] A. E. Rojas, C. Mejía-Moncayo, Design of a course oriented to the comprehension of agile methods based on teamwork, role-play, and class project with a real client, in: 2019 International Conference on Virtual Reality and Visualization (ICVRV), IEEE, 2019, pp. 212–216.
  - [12] D. Villani, E. Gatti, S. Triberti, E. Confalonieri, G. Riva, Exploration of virtual body-representation in adolescence: the role of age and sex in avatar customization, *Springer-Plus* 5 (2016) 740.
  - [13] R. Zamora Musa, Estudio de los aportes de las herramientas de entornos colaborativos e inmersivos en el desarrollo de laboratorios con acceso remoto en la educación en ingeniería electrónica desde el punto de vista de su efectividad y diferenciación en el aprendizaje, Universidad Tecnológica de Bolívar (2014).
  - [14] A. Rojas, A. García, C. Mejía-Moncayo, Scrum para especialistas en gestión de proyectos, in *Memorias LII Asamblea Anual CLADEA 2017*, “Rompiendo paradigmas: Anticipando el futuro de la educación global,” (2018).
  - [15] O. Martínez-Palmera, H. Combita-Niño, E. De-La-Hoz-Franco, Mediation of virtual learning objects in the development of mathematical competences in engineering students. *univ. educ.* 11 (6), 63–74, 2018.
  - [16] F. Caena, C. Redecker, Aligning teacher competence frameworks to 21st century challenges: The case for the european digital competence framework for educators (dig-compedu), *European Journal of Education* 54 (2019) 356–369.
  - [17] A. Becerra, K. La Serna, Las competencias que demanda el mercado laboral de los profesionales del campo económico-empresarial en la actualidad, *Cent. Investig. la Univ. del Pacífico* (2010).
  - [18] S. A. Hurrell, Rethinking the soft skills deficit blame game: Employers, skills withdrawal and the reporting of soft skills gaps, *Human Relations* 69 (2016) 605–628.
  - [19] F. V. Zúñiga, 40 preguntas sobre competencia laboral, volume 13, Cinterfor, 2004.
  - [20] P. Flink, Second life and virtual learning: an educational alternative for neurodiverse students in college, *College Student Journal* 53 (2019) 33–41.
  - [21] M. Gawlik-Kobylińska, P. Maciejewski, Experiential learning with sansar platform—a concept of military training, in: part of the MULTI CONFERENCE ON COMPUTER SCIENCE AND INFORMATION SYSTEMS, 2019, p. 325.
  - [22] S. W. Volkow, A. C. Howland, The case for mixed reality to improve performance, *Performance Improvement* 57 (2018) 29–37.
  - [23] S. Myers, The five functions of psychological type, *Journal of Analytical Psychology* 61 (2016) 183–202.