Impact of the "Virtual Environmental Challenge" Project in Foreign Language Learning in Burkina Faso

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Abstract: The objective of this study is to evaluate the impact of the "Virtual Environmental Challenge" (a project aimed at investigating distance learning and internationalization policies at home) on language teaching/learning in Joseph KI-Zerbo University (Burkina Faso).

The experiment included 52 students from 5 different countries. We focused on the Burkina Faso group, namely the 12 students from Masters of Applied Linguistics, British Literature and African Literature program at the University Joseph KI-Zerbo. The course was based on a MOOC ("The Stories We Live By"), and offered regular online meetings as well as an online international competition (8 teams from the 5 participating countries). The present research is based on quantitative data (pre- and post-tests) and qualitative data (online-class observation, interviews and surveys). The study concluded that the integration of digital devices and the new teaching/learning methods as proposed in the VEC challenge can be regarded as a valuable addition to the efficiency of the University Joseph KI-Zerbo.

Key words: virtual classroom, collaboration, distance learning, language teaching

1. Introduction

The 21st century is opening up to the possibility of integrating new information and communication technologies (ICT) in the field of education. The Covid-19 pandemic demonstrates the importance and need of these tools through the massive shift from classroom to distance education and the introduction of new teaching methods due to many restrictions. The introduction of the new information and communication technologies (ICT) in teaching brings added value to teaching/learning, improves the educational efficiency of teachers, offers the learner autonomy in personal learning environments and constitutes a real potential for educational innovations in the education system. Rich (2010) defines 21st-century skills as "certain core competencies, such as collaboration, digital literacy, critical thinking, and problem-solving [that he] believe[s] schools need to teach to help students thrive in today's world". These competencies are ICT-driven and taught through a hands-on approach giving students the opportunity to use ICT tools.

In the first semester of 2020–21, four (4) of the EMERGE partners[1] had the opportunity of working together on a project headed by a University Professor, responsible for the Didactiques des Langues program at Rennes 2

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[1] The EMERGE partners are 6 European partners which form an alliance.

University. The project, entitled the "Virtual Environmental Challenge" or VEC (Evain, 2021), aims at cross-campus exploration of environmentally-friendly projects and the exchange of best practices through peer presentations in an international virtual class format.

In today's context of universities striving to offer an increasing number of online learning experiences, the project stakeholders were inspired by principles contained in the Universal Design for Learning (UDL) framework[2] and by the content of the free open online ecolinguistics course: The Stories We Live By. The VEC initiative and other similar projects encourage students to question the way in which we have traditionally studied, consumed and lived and how that is reflected in our projects, interactions and the language we use (in the media, for example). Similar initiatives to the VEC conducted on other campuses ("How to Run University Challenge Projects")[3] have, for example, managed to reduce plastic, food and other wastes, created more green spaces and helped to promote healthy and sustainable learning environments overall.

While the University Joseph KI-Zerbo, located in Burkina Faso (a West African country) has not yet benefitted from recent technical advances and has not yet integrated the use of ICT in its education system, students are very motivated to be part of international collaborations. It is, therefore, to this end that the University Joseph KI-Zerbo, became a partner in the VEC project. And we now wish to evaluate the impact of this project on teaching/learning practices as well as on language teaching/learning. The following questions will be raised:

1) How does the VEC fit into the curriculum of the University Joseph KI-Zerbo?

2) How does student appropriation of the proposed tools impact language learning, and how does this experience offer non-native English speakers the opportunity to progress in English?

3) How is the VEC monitored and how is second language progress measured?

4) Finally how does Burkina Faso compare to other partner universities and what has this first edition of the challenge taught us for the next edition?

2. Research Objectives

The overall objectives of this study is firstly, to develop peer education in an international context, mainly in three areas: language teaching, challenge-based projects, green environments. Secondly, to promote peer tutoring in an international virtual class format, using a virtual classroom platform. Thirdly, to contribute to the development of students' digital literacy and inter-disciplinary project management skills; the approach is a "learning by doing" approach and finally, the experiment aims at strengthening the VEC partnership itself — a network of teachers and researchers wanting to carry out projects together, and to research learning outcomes.

3. Theoretical Framework

Our study is in the field of action research, based on online and distance learning, project-based pedagogy, collaborative learning and peer learning.

3.1 Online and Distance Learning

Distance Education originated in the mid-18th century and is defined by Marija (2012, p. 2) as a field of

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[2] Available online at: https://udlguidelines.cast.org.
[3] Available online at: https://mailchi.mp/a4c538feec70/how-to-run-university-challenge-projects-comment-conduire-des-dfis-universitaires-7509537?e=0d0f37415a.

education that focuses on teaching methods and technology with the aim of delivering teaching, often on an individual basis, to students who are not physically present in a traditional setting such as a classroom. It has also been defined by Roblyer and Edwards as "the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance" (Roblyer & Edwards, 2000, p. 192). In today's context where the world is affected by the Covid-19 pandemic, distance learning has become the ultimate solution for educational institutions mainly in developed countries. Distance learning implies simply that the teacher and the students are separate in the spatial dimension and that this distance is filled by using technological resources (Casarotti et al., 2002, p. 37). Thanks to Distance Learning Systems (DLS), both the learners and the institutions are able to continue their academic program.

The methods of learning used in distance learning are divided into synchronous and asynchronous learning. According to Ferone and Lavenka, the virtual classroom is defined as "a technical-pedagogical distance learning modality that allows people to establish synchronous exchanges including the use of image, sound and text" (Ferone & Lavenka, 2015). Thus, Synchronous learning is online and distance education that takes place in real time, often with a set class schedule and required login times, it is characterized by the presence of all the learners at the same time and the same place. Whereas asynchronous learning does not require real-time interaction; instead, content is available online for students to access when it best suits their schedules, and assignments are completed to deadlines.

Distance learning offers enormous advantages which can be evaluated by technical, social and economic criteria. First of all, with distance learning, learners can get all the knowledge and training they need regardless of where they reside on the planet (Nagrale, 2013). Another advantage of distance learning is its convenience because many of the technologies are easily accessible from home (Marija, 2012, p. 3). Distance learning also allows the learner to be more autonomous. According to (Zimmerman, 2002) the autonomy of learner or learner independence is a major contribution to the success of e-learning environments: learners are responsible for their own learning (Lynuch & Dembo, 2004).

However, despite these advantages, distance learning also has its downsides which should be taken into account. For example, it does not facilitate social interaction and as stated by Bijeesh (2017); the chances of getting distracted and losing track of deadlines are high because there is no faculty around for face-to-face interaction and no classmates who can help with constant reminders about pending assignments.

3.2 Project-Based Pedagogy, Collaborative Learning and Peer Learning

Project-based pedagogy is a teaching model that engages students in the acquisition of knowledge, the construction of knowledge and the development of skills. It allows the learner to be involved in the development of knowledge by carrying out a concrete pedagogical project and by collaborating with other members of the group. According to Blasco-Arcas "Collaborative learning encompasses any learning activity that is performed by a group of learners with a common goal who create meaning or explore a topic, or even want to improve skills. Each learner is a source of information, motivation, interaction and mutual support. In collaborative learning, there is a sharing of knowledge, experience and authority. Through this process, learners learn from each other and develop a positive interdependence" (Blasco-Arcas et al., 2013, p. 105). In both face-to-face and online courses, learners work collaboratively with their peers and the instructor(s) to explore questions, critically analyze issues, synthesize their understandings, actively construct meaning, and apply their learning to a practical context (Garrison & Anderson, 2003). This is clearly in line with the virtual environmental challenge project, where participants had to work collaboratively as well as virtually using online resources to find new innovative ways to promote, connect and find

ways to improve their skills and their campus environments.

3.3 Research Methodology

Let us now desribe how the VEC is organised, in keeping with the research theories previously presented. We will place special emphasis on the mechanics of the challenge, the course material and the tools used. We will then map out the VEC evaluation procedures which, together with our observation of the classes, led to an analysis of the experiment.

The VEC brought together 52 students from 8 international teams and from 5 different countries[4]. The University Joseph KI-Zerbo team was composed of 12 students (11 males and 1 female). All students were doing a Masters in "Applied Linguistics, British Literature and African Literature" at the University Joseph KI-Zerbo. The project ran from October to December 2020, in the first semester of the 2020-2021 academic year. Since the study aimed at developing peer education in an international context, each of the 8 teams had a coach who was a Master student in the "Didactique des langues" program at Rennes 2 University.

The course content was given to the students both in a synchronous and asynchronous mode. Each week, participants were invited to join weekly online sessions using Rennes 2's virtual teaching platform, the VIA system, and they were given various assignments to complete. Students could find the manual for the program on the online collaborative wall "padlet", while recordings of the sessions were published on the YouTube channel so that it was possible to follow the latest exchanges when they had missed the live meeting. All teams participated in the MOOC "The stories we live by" and each team had the opportunity to make a presentation on one chapter of the course.

Concerning the competition at the end of the semester, each team had to develop ideas relevant to their campuses and then present those ideas to the opposing teams. The competition was organized in three stages. The first round, which took place at the beginning of November, consisted of a 20-minute presentation of the teams' eco campus ideas. The presentations were done in the virtual class platform "zoom" and the team's presentations were followed by a 5–10 min question and answer session. The second round took place at the end of November: each team was asked to create a trailer in which they presented their eco campus ideas; the videos were posted on the YouTube channel for the vote. The voting system was moderated by the "super coach" who sent the links of the trailers to all VEC members.

In mid-December, the two finalists each did an 18-minute live presentation in a Ted-Talk format on zoom. These two final presentations led to a last vote, in open session, and the winner was then designated.

3.4 Language Learning

In order to monitor their progress in English, pre- and post-tests were administered to the participants upstream and downstream of the study. The tests were based on a quiz of 100 questions each with a score of 1 point. Extensive questionnaires were also administered to the participants for them to self-evaluate their level and knowledge in ecolinguistics and their progression during the project in areas beyond ecolinguistics.

4. Digital Tools

In this experiment, the following digital tools were used:
- The first one is Rennes 2's e-learning virtual class VIA, that offers many functionalities such as: online

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[4] The partners were: the University of Limerick, Ireland; INN, Norway; the University of Joseph KI-ZERBO, Burkina Faso; the University Matej Bel, Slovakia; as well as from France: the Université Bretagne-Sud, the École Centrale Nantes and SCELVA (Service commun d'études des langues vivantes appliquées).

sessions with up to 300 participants, the possibility to invite people from outside Rennes 2, management of participants' rights (microphone, webcam...), chat system, screen sharing, document sharing, whiteboard, poll, sharing and remote control, creation of sub-groups (workshops), session recording, articulation with a Moodle course space. Key moments of the VEC (such as the Launch session) took place on VIA.

- The second virtual online tool we used in this study is Zoom, which is a cloud-based video conferencing service that is used to virtually meet with others, be it by video or audio-only or both, all the while conducting live chats; the MOOC discussion sessions were recorded for later viewing.

- P-MOOC – "The stories we live by" which is a free online course in ecolinguistics, produced by Arran Stibbe, Professor of Ecological Linguistics at the University of Gloucestershire. The course is based on the Routledge book Ecolinguistics: language, ecology and the stories we live by (Stibbe, 2020). It describes eight ways that language encodes the stories that society is based on: ideologies, framings, metaphors, evaluations, identities, convictions, erasure and salience. This course encourages students "to question the way in which we have traditionally studied, consumed and lived" (Stibbe, 2020).

- YouTube Channel: we created a YouTube channel for the Virtual Environmental Challenge (VEC) on which the participants had to post their productions (presentation and trailer), we posted all the videos of the team competitions as well as the videos of our different meetings.

- Padlet: this collaborative wall was used to display all VEC-related information: course material, documents concerning the teams, coaches and meeting rooms, as well as the VEC guidelines and authorization forms, the VEC logo competition, links and youtube channel, and a column dedicated to each team.

5. Research Results

Our evaluation of the project focuses on three elements: First, we are interested in monitoring the drop-out rate at each stage of the tournament. Our second success indicator is based on the vocabulary tests conducted at the start and at the end of the experiment. These tests allow us to map out the students' progression in vocabulary learning. The video recordings of the weekly regulation sessions with the coaches also provide us with information on the students' progress and their commitment to the project. Finally, questionnaires issued out to participants, coaches and coordinators provide both useful information concerning motivation and a range of suggestions for future editions of the challenge.

The Burkina Faso results for the above three elements — drop-out rates, tests and questionnaires — have been compared to the results obtained in other countries participating in the challenge. This comparison allows us to draw conclusions which will be taken into account in the next editions of the challenge.

5.1 Drop-out Rate Analysis

Let us start with the analysis of the drop-out rate in order to identify the critical moments when participants are at risk of losing interest. For 7 of the partnering countries, we found that the critical moment was at the time of the first round of the tournament. Indeed, the course presented several difficulties for the participants: while the first stage (presentation of a chapter of the MOOC) was easily overcome (because the coach came to the rescue of the teams in difficulty), stage 1 of the tournament required a significant involvement on the part of the teams in order to prepare for the first round of the tournament. At that stage, in two partnering countries, the number of team

members was reduced by half. The reason for the withdrawal was a disagreement on the public dissemination of the deliverables, with a refusal to sign the image rights authorization. The information given at the start of the project was considered to be insufficient. Moreover, the distance learning context reinforces the difficulty of verifying the assimilation of instructions. Finally, a few students in the general feedback questionnaire complained about technical difficulties or expressed a certain end-of-the-semester weariness with distance learning sessions. Concerning the Burkina Faso team, they recorded two drop-outs: students who started but were no longer available to continue for practical reasons. According to the coach's feedback, "the Burkinabe team members were curious, engaged, motivated, eager to make up for any technical hitches by being one step ahead, offering pre-recorded presentations in case the connection broke down". This feedback highlights the motivation of the Burkinabe team, in spite of the difficult technical context.

5.2 Vocabulary Test Results and Questionnaire Results

Moving on to the analysis of the vocabulary test results, our objective was to measure the students' progress. The study used quantitative data (pre- and post-tests) and qualitative data (observation and surveys).

The pre- and post-test evaluation results were analyzed using a non-parametric test of Wilcoxon to find out the significance of the experiment. We used Wilcoxon's signed rank test because the pre- and post-tests were done on the same subjects and with the same question form for both tests, the pre-test was administered to all 52 students who participated in the VEC and we sorted the responses of the students from Burkina team for the purpose of this study and ranked them.

In this result section, our analysis will mainly be based on three main sets of data concerning the Burkinabe students: the pre and post-test that we carried out with the students and the surveys conducted with students.

As indicated in the methodology, we administered a pre- and post-test to the students participating in the study in order to follow their progression in the specific language we worked on (ecolinguistics). For reliable results, we transferred the questions from the pre-test to the post-test questionnaire. The results of the tests are as follows:

Concerning the pre-test, all the 12 students completed it. It was scored at 1point/question. As we can see in table 1, the scores range from 37 to 63. Since the questions were scored out of 100 points, we considered 50 points to be the average. However, on the pre-test, 7 students scored below 50 and the other 5 scored between 56 and 63. The average here is 48,17 with a standard deviation of 9,543.

Table 1   Result Pre-test

Descriptive statistics					
	N	Minimum	Maximum	Mean	Standard deviation
Score	12	37	63	48.17	9.543
N valid (list)	12				

Regarding the post-test, 10 students took part and we noticed that the marks obtained varied between 42 and 83. Only 3 students obtained 42, 46 and 47 points and the other 7 students obtained a mark between 66 and 83. The average is 63 with a standard deviation of 13,669.

Table 2   Result Post-Test

Descriptives statistics					
	N	Minimum	Maximum	Mean	Standard deviation	Variance
Score	10	42	83	63,20	13,669	186,844
N valide (liste)	10					

Table 3   Result Pre- and Post-test

Descriptives statistics					
	N	Minimum	Maximum	Mean	SD
Pre-test	12	37	63	48,17	9,543
Post-test	10	42	83	63,20	13,669
N valid (list)	10				

When we compare the results of the pre- and post-test, the scores clearly show that learning is visible. While the progression is significant (from 48 to 63), the standard deviation is also greater in the post-test, which means that some students benefitted more from this teaching experience than others. However, the minimum score has also risen from 37 to 42, which shows that the weaker students improved their vocabulary skills by 5 points. The stronger students' score rose by 20 points which shows that they were the ones who benefitted the most from the experience, as far as vocabulary skills are concerned.

5.3 Questionnaire Results

Finally, in order to examine how the students felt about their progression and the VEC experience as a whole, let us examine the results of the questionnaire of Joseph KI-Zerbo University. As previously mentioned, they were all Master students of the Applied Linguistics, British Literature and African Literature program. Out of 12 students, 9 answered the survey. All 9 students were new to "distance learning at the University Joseph KI-Zerbo. However, one student had already participated in a MOOC online.

In general, all the students responded enthusiastically to the project. They described it as "fantastic", "inspiring", "interesting" and "exciting". They also enjoyed collaborative learning: "We learn a lot from collaborative learning because every single one of us has something to share". Great emphasis was placed on "sharing and learning at the same time", as well as on "gaining experience" and "being more active".

As for reacting to distance learning, although reticence was to be expected because of poor internet coverage, the response was infused with enthusiasm because the students projected themselves easily beyond the connection difficulties they had experienced. They saw the potential of distance learning both in terms of having access to a larger range of possibilities in terms of education, but also in terms of being connected with the world: "Distance learning permits to learn anything from anywhere in the world".

When asked directly about "integrating distance, online and collaborative learning in the curriculum of the University?" the students immediately saw what advantages this could bring to students living "outside Ouagadougou" and who would be able "to continue their studies" even when "working in places far from the university".

The responses to questions concerning collaboration and motivation for the VEC project revealed both positive aspects ("high commitment", "great collaboration between team members", etc.) and technical difficulties, mainly because of the internet ("weak network coverage areas"), but sometimes also because of the ICT which were perceived to be both "modern", "useful-interesting-good" and "sometimes difficult to use". The VEC tools (pMOOC padlet, zoom, VIA, YouTube) were well identified; the students said these tools had clearly contributed to the acquisition of new skills in culture, linguistics, oral, project management, debate, use of digital technology. As for language acquisition, all the students affirmed that the VEC experience had offered them the opportunity to progress in English, and this claim was indeed consistent with the test results. The VEC's coordinators observations concur in underlining the motivation of the Burkinabe team: the students showed up on time for the weekly session

and their level of participation during the sessions was high.

6. Discussion

The VEC project allows us to compare how different communities of students from different countries respond to online and distance learning, project-based pedagogy, collaborative learning and peer learning. In this present article, we focus mainly on Burkinabe students. Their main goal, during this first edition of the VEC, was to enhance a set of skills including their English skills, especially in ecolinguistics and the common VEC strategy was for all partners to use digital technology. The data we collected, both in the tests and questionnaires, demonstrates a positive impact on students' motivation and results. The data also highlights their enthusiasm for the use of educational technologies in teaching/learning language.

When compared to the VEC partner universities, Joseph KI-Zerbo University is at a great technical disadvantage: since the university is not in the habit of using educational technologies and the country has very bad internet coverage, the 12 students who took part in the VEC were experiencing, for the first time, teaching methods such as peer tutoring, collaborative learning, teaching through virtual classes. The results of the questionnaire as well as the Burkinabe's team level of participation during the weekly sessions show that all the students of the University Joseph KI-Zerbo were highly motivated; despite the difficulties due to the unsteady internet connection, and to the fact that the tools used were new to them, they managed to complete the tasks and assignments given to them.

According to the country coordinator, his study was a great opportunity for the University Joseph KI-Zerbo to take part in the first edition of the Virtual Environmental Challenge. The objectives setoff the Burkinabe team have been achieved: the experience allowed us to investigate peer education in an international context, it allowed us to promote peer tutoring in an international virtual class format, and also contributed to the improvement of student's English skills in terms of ecolinguistics and to the development of their digital literacy and project management skills.

The conclusions of this study pave the way for recommendations for future editions of the VEC. While back up solutions need to be put into place to ensure a smooth running of the VEC (mainly in the form of pre-recorded presentations), VEC partner universities welcomed the contribution of Joseph KI-Zerbo University and all partners are now considering a wider scope for institutional collaboration.

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Available online at:: https://www.youtube.com/channel/UCmRDoUt8CMs72vdX4NKLbNg?view_as=subscriber

Appendix

10 samples questions from the survey.

You participated in the Virtual Environmental Challenge (VEC) project. Now we are interested in your opinion in order to complete an article we are writing on the "VEC in Burkina Faso". Thank you for taking 5 minutes to answer this questionnaire.

Name and first name

1) How did you find the project?
2) Have you already participated in a distance learning given by the university Joseph KI-Zerbo?
3) Have you already participated in a collaborative educational project?
4) Have you already participated in a MOOC?
5) Have you enjoyed working on this project?
6) Have you enjoyed working collaboratively with your team members?
7) What do you think about collaborative learning?
8) What do you think about distance learning?
9) What do you think about integrating distance, online and collaborative learning in the curriculum of your university?
10) How do you find the collaboration between your team members?

10 samples questions from the quiz on ecology

Test your knowledge in ecolinguistics

Choose the correct(s) answer(s)

1. What is ecology?
- The study of Earth's Mantle
- The study of relationships between living things and their environment
- The study of humans and their impact on Earth
- The study of plants

2. The way that three-dimensional forms are combined to make up the total building bulk.
- Building footprint
- Pattern language
- Building mass
- Building massing

3. The employment of land for the primary purpose of obtaining a profit in money by raising, harvesting, and selling crops, of feeding, breeding, managing, selling, or producing livestock, poultry, fur-bearing animals, or honey bees, or by dairying and the sale of dairy products, by any other horticultural, forlicultural, or viticultural use, by animal husbandry, or by any combination thereof.
- Environmental corridor
- Agricultural use
- Light-rails transit
- Rails-to-trails

4. Special physical characteristics of a structure or area (e.g. architecture, landscaping, natural features, open space, types and styles of housing,number and size of roads and sidewalks) that set it apart from its surroundings and contribute to its individuality.

Infrastructure
- Diversity
- Human scale
- Character

5. In a community, producers are _____ which convert light energy to chemical energy in a process called _____
- heterotrophs, photosynthesis
- autotrophs, photosynthesis
- heterotrophs, respiration
- autotrophs, respiration

6. The employment of land for the primary purpose of obtaining a profit in money by raising, harvesting, and selling crops, of feeding, breeding, managing, selling, or producing livestock, poultry, fur-bearing animals, or honey bees, or by dairying and the sale of dairy products, by any other horticultural, forlicultural, or viticultural use, by animal husbandry, or by any combination thereof.
- Neighborood character

- Mixed-use development
- Agricultural use
- Social network

7. The way that three-dimensionalforms are combined to make up the total building bulk.
- Building footprint
- Pattern language
- Building mass
- Building massing

8. A dwelling unit used for both dwelling purposes and any non residential use permitted in the zoning district in which the unit is located, provided that not more than two person swho do not reside in the unit are employed on the premises.
- Contextual zoning
- Live/work dwelling
- Previous (permeable)
- Workforce development

9. The minimum distance by which any building or structure must be separated from a streetright-of-way or lot line
- Setback
- street wall
- Densit Bonus
- Bike lane

10. In addition to producers and consumers, healthy communities must have _____, bacteria and fungi which recycle detritus
- Utotrophs
- Decomposers
- spontaneous combustion
- viruses