

Learn different, learn somewhere else. Does changing the environment impact students' learning?

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INTRODUCTION

The question of learning spaces and physical environments is full of paradoxes. Although considered as playing an important role in the well being and, consequently, the success of learners, the way in which these spaces impact learning is to a large extent misunderstood. Although this is not a recent question [1], very little research on it has been carried out: research and reflections focus mainly on primary and secondary education, and very rarely on higher education where the architecture and design of spaces remain relatively conventional. Finally, with the growth of digital work areas this question is particularly relevant since the integration of new technology entails developing new learning practices as well as new ways of designing the spaces to accommodate them.

In this paper, we present an original experiment carried out in a French engineering school. Within the framework of a self-directed language learning programme, we designed a course where each pedagogical sequence was presented in a different space chosen specifically because it symbolised the fundamental notions of the subject we wanted to teach. A questionnaire was given to students to validate whether the notions we presented had been understood and especially whether the change of space for each pedagogical sequence had had an impact on their learning. We present and discuss the results of this questionnaire.

1 THE LEARNING SPACES IN QUESTION

Our teaching practices and their corresponding learning practices are associated with and influenced by both time and space. When a teacher reflects on how to implement strategies to help students acquire and develop knowledge and know-how, the main focus is on support materials, tools and teaching methods whereas space is often neglected. Undoubtedly this is due to the fact that the physical environment the teacher and students have to work in is given, prescribed, constrained.

And yet numerous studies (although relatively rare when compared to the wealth of scientific literature on pedagogy) have shown the impact that the environment can have on learning and pedagogical practices [2][3]. The architecture of buildings conveys an image of what education and its objectives

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are meant to represent. In France, for example, the primary schools built from 1881 onwards, just after the introduction of free and compulsory education for all, are built on the same model symbolising the order and discipline required to achieve republican ideals: imposing austere buildings, high quality materials, impressive pediments, identical classrooms accessed by long corridors [4][5][6]. The architecture of schools also symbolises a vision of knowledge and pedagogical practices. 19th and 20th century classrooms, with a raised dais at the front and desks in a line facing the teacher, represent knowledge that was to be transmitted to or imposed on passive students. This is in stark contrast to the open spaces required for collaborative learning and developing the ability to analyse the mass of information accessible via communication technologies rather than memorise monolithic blocks of knowledge [7][8][9]. The explosion of virtual technology consequently leads to a re-examination of how physical spaces are used [10].

Indeed, this integration not only poses questions concerning the functional ergonomic of technology, it also determines new pedagogical practices which in turn can lead to looking at how the environment is organised and how modular it is [11][12]. Integrating virtual technology into both schools and everyday life is not the only factor influencing change. Pedagogical innovations over the last 40 years² (active learning, autonomous learning, etc.) also influence the learning environment; in the same way that rethinking space can lead to new practices. The development of project-based learning has led to the need for smaller spaces with movable partitions where groups of students can meet, as well as for areas facilitating informal exchanges between students, with other groups or with teachers. These evolutions in pedagogical practices are taking place within a context where the desired learning outcomes go beyond the transmission of knowledge and know-how and seek to include transversal skills such as autonomy, learning to learn, creativity, innovation and life skills [13]. It is because our practices, objectives and representations of learning have evolved that we can observe semantic changes where the term “school architecture” is used much less than the term “learning space”. Indeed, learning is no longer viewed as something that is limited to the classroom but as a diffuse and continuous process taking place at various times and places both at school (in the playground or documentation centre) and outside school (home, museums, community centres, etc.) [14]. These are the central issues that led us to develop the experiment which we will subsequently describe: how, within a self-directed language learning system, can we lead students to change their representation of the act of learning by using the symbolic nature of different physical spaces.

2 TEACHING SELF-DIRECTED LEARNING?

2.1 Self-directed language learning

Our experiment took place at the ENSGSI, a French Engineering School, or Grande Ecole, which trains students in Innovation Project Management and whose curriculum is based on 3 core elements: scientific and technical training, management skills development and industrial project based learning.

As with all French Engineering Schools, students are required to validate a minimum level in English in order to graduate (level B2 according to the Common European framework of reference for languages). In 2001 the decision was taken to organise language learning around a self-directed learning system. The term self-directed learning means that students are responsible for determining their own objectives as well as the means and activities required to achieve these goals, taking into account personal preferences, learning strategies and available resources [15][16].

This system is one form of “self-study”, which denotes a range of practices and research based on the question of autonomy in learning [17]. Our choice was influenced by a doctoral thesis that revealed that innovators commonly use “self-study” to acquire the knowledge they need to implement their innovation project [18]. Deciding to apply this pedagogy to language learning was also helped as it is a field where the question of autonomy in learning has been widely researched and there are a multitude of resources, methods and tools for both students and teachers alike.

Throughout their 3 years of study, all the engineering students work within the self-directed language learning system. From the outset, the objective was to help develop students’ foreign language skills as well as their ability to take charge of their own learning. It is built around a general framework within

² The link between pedagogical evolution and reflection on the environment is even older since precursors such as Dewey, Montessori, Claparède and Coussinet looked for ways to adapt school environments to their pedagogy [1].

which each year focuses on the development of specific knowledge and know-how:

- In the 1st year, students work in pairs to develop their general skills in both English and another foreign language. This first experience of autonomous learning, which we will come back to later, is divided into two parts: the first four months are given over to exploring this method of learning through active experimentation, the discovery of resources and new strategies, etc. Over the following four months we encourage and help students to articulate action and reflection more precisely in order to foster critical, reflective and informed practice. At the end of the year students are expected to be able to describe themselves as learners with their own learning preferences and motivations, define learning goals along with the means of reaching them and find or create the necessary resources.
- In the 2nd year, learning specifically focuses on English in a professional context and takes place within the framework of year-long industrial projects which groups of 4 or 5 students have to manage. Here, the collective dimension of learning is emphasised as the students are asked to create a structure where each and every student, whatever their level, can develop their professional language skills. They are expected to have reinforced the skills they acquired during the first year and be able to apply them to a collective context by developing their understanding of what learning team is and does.
- In the 3rd and final year, before leaving for a 6-month end of studies internship, students are asked to devise, alone or in small groups, a sustainable learning project. They are completely free to choose the language, the subject and how they will lead their project over the entire semester. Typical projects include acquiring the language and/or intercultural skills needed for a particular profession or business sector, developing deeper understanding of how teams learn, or exploring a subject of particular personal interest. Through these projects we aim to evaluate each student's ability to formalise and implement a learning project taking into account its human, organisational and technical dimensions.

From an organisational point of view, one half day per week is allocated to languages for each year group. During this time the pairs or groups, depending on the year, meet with the language-learning advisor every two weeks to present their learning reports and to discuss the evolution of their work, in terms of both the language and transversal skills developed. This provides the students with the opportunity to ask questions and get feedback on their progress as well as advice on various learning issues.

In addition to these meetings, we organise 2 sessions of classes/lectures where all the students are present. The first one at the beginning of the year is used to present the self-directed learning system and explain to students what they will be doing over the year. The second one, at the beginning of the 2nd semester, involves exchanging best practices, and examining theoretical knowledge about learning (motivation, learning styles, organisation, etc.) and about languages (learning and acquisition, the 4 skills, self evaluation, etc.) [19]. Our experiment on learning spaces took place during the second session with the 1st year engineering students.

2.2 Teach differently, and elsewhere

The 8-hour module we used as a basis for our experiment is an important moment for the students who are beginning to take an active approach to how they are building their self-directed learning skills. It is also a key phase in that after having tested self-directed learning with their partners for 4 months, students are asked to reflect on what they have been doing. The classes therefore aim at helping them understand the need to adopt a reflective posture as well as bringing them knowledge to nourish this reflection[19]. The module is designed to help with the transition from a traditional learning system to a self-directed system since our experience has often shown us that students have difficulties in changing their perceptions and habits and in deconstructing and reconstructing their skills as students in order to (re)create their skills as learners[20].

Consequently, the aim of this module is to modify students' representations of the act of learning and to understand key issues such as self-directed learning and its challenges, the link between self-directed learning and the training of engineers and innovators, the need for self-awareness in developing the ability to learn autonomously, the importance of experimenting new practices in new places at different times, exchanges with other students, and how all of these aspects impact language learning.

In other words, the question we face is how to get students to break their habits of a lifetime of

scholastic classroom based learning and to rethink their own learning. Until 2 years ago, the module had a classical format consisting of alternating lectures and tutorial classwork. The regular 2 weekly meetings that followed the module enabled us to evaluate its impact on students' learning behaviour and to bring any further information on methodology as and when required.

Confronted with the difficulty involved in such deconstruction/reconstruction, and aware of the importance of the role of space and architecture in learning, we redesigned the module. We started by listing the course objectives and associated notions. We then defined the successive stages of our teaching programme and the related pedagogical formats, tools, documents, etc. Finally, we tried to determine which space could be symbolically associated with which aspect of the programme. As a result, our module takes place in 6 different areas within the school:

- In the amphitheatre on the ground floor where we give a formal lecture on the theoretical elements of self-directed learning, the links with their engineering training and how innovators learn.
- In the school's underground car park, which forms part of the building's foundations, among the automobiles, we explain the notion of auto...nomy and the importance of self-awareness which is one of the fundamental aspects underpinning learning to learn. The students are also given an exercise to evaluate their self-directed learning readiness [21].
- On the 1st floor, in the rooms where the practical classes normally take place, the students present to each other what they have done during the 1st semester. Working in sub groups they all exchange their best practices and ideas.
- On the 2nd floor, where the innovation project groups hold their meetings, the students lead creativity sessions with the aim of proposing new self-directed learning ideas, activities, tools and spaces.
- On the wide open staircase between the 3rd and 4th floors, where the school's directors and managers have their offices, we look more closely at the notion of direction in self-directed learning and how this is linked with motivation.
- Finally, on the school's roof terrace which affords panoramic views of the city, we ask the students to take a longer-term position and think about their professional future and how they will learn tomorrow in businesses where the human and technological environment is constantly changing.

The first year we tested this format allowed us to validate that its originality had a positive impact on the students. It seemed their representations of self-directed learning had indeed evolved, but we lacked any quantitative objective evidence so we sought to remedy this by administering a questionnaire.

3 MOVING FOR LEARNING – IT WORKS!

3.1 Evaluating the module

Pedagogical experimentation without any form of evaluation of its relevance is ultimately sterile. To help us reflect on our practice, we wanted to multiply the types of feedback we could use to evaluate the impact of our module [22].

The first and most subjective feedback is the impressions we had during the classes and how the students appeared to react to what we proposed. For example the students were visibly surprised when, after 2 hours of a traditional lecture, we asked them to put down their pens and follow us down to the car park. This provoked a break with the class format, analogous to the break we want to provoke in their vision of learning. We also noticed students' renewed interest, the change of place having aroused a certain degree of curiosity. This "impression" was confirmed during the exchanges we had with students just after the class when they expressed their enthusiasm. Going beyond the feelings of the moment, another type of feedback emerges during the two-weekly discussions with the language-learning advisor. For the advisor it is the opportunity to see whether the students' representations of learning have evolved or have at least been put into question. This indicator is less subjective as it is based on what the students say in the discussions and write in their learning reports.

These constitute a rich and qualitative corpus, which is difficult to exploit because of the complexity involved in analysing the content³.

A more classical means of evaluating impact is through the final summative assessment at the end of the module. By changing the teaching approach, do the students achieve better results or not? In our case this is not really applicable as two elements are evaluated in the self-directed language learning system: the level of English, as certified by a score on the end of year TOEIC test, and the development of the ability to learn how to learn which is integrated into the general managerial skills appraisal. In both cases the results stem from more global systems – the self-directed language learning system and the management skills training programme. Neither allows us to show that students' progress can be directly imputed to the module in question. Moreover, our question was not only about the module's impact on students' representations of self-directed learning and their understanding of the notions presented, we also wanted to validate our hypotheses that changing spaces is of interest for students and that they clearly perceived the symbolic link between the areas where issues were investigated and the objectives of each session. For this reason, we chose to submit an on-line questionnaire to the students one month after the module. We have done this each year since we started the new module format two years ago.

3.2 How do students perceive this new pedagogical approach?

The questionnaire consists of 34 questions divided into 3 categories¹: the characterisation of the population, the understanding of the notions presented during the module and questions on the pedagogical aspects (changing spaces, the rhythm of the sessions and the teaching materials)⁴. We present the results of this last category in the next part of this paper. Most of the questions were answered using a four-point scale ranging from "No, not at all" to "yes, completely". Sometimes extra boxes were provided for students to add comments to explain their choices. In all, 68% of the 129 students answered the questionnaire. For half of them (44 respondents), it was the first time they had studied in a self-directed language learning system and for the other half it was their second year⁵. We can also note that the clear majority of students say they like foreign languages (yes, completely: 31.8%, yes, mostly 55.5%) and that a slight majority say they find language learning easy (yes, completely: 5.7%, yes, mostly 51.1%).

Question	Yes completely	Mostly yes	Mostly no	No not at all
I understood the link made between the area we were in and what it represents symbolically	26.14 ⁶	54.41	17.05	3.41
I find that changing spaces for each session is positive	50.00	40.91	7.95	1.14
Associating a place and an activity improved understanding of what was being presented	28.24	51.76	15.29	4.71
Alternating theory and activity helped me understand what was being presented	9.41	60.00	10.59	1.18
The various tools seem useful	19.32	54.55	22.73	3.41

If we consider the questions on the pedagogical aspects of our experiment, the results are positive. Regarding changing spaces, it appears that the students particularly appreciated the pedagogical roaming we proposed. For 80% of them the symbolic link between the areas chosen and the session's

³ Such a discourse analysis was carried out for a Master's degree research project studying the impact of self-directed learning on three pairs of students who were new to this form of learning and showing the benefits they derived as well as the difficulties they faced [23].

⁴ the questionnaire (in French) can be found at the following address:

https://docs.google.com/forms/d/1uvO0Cd2-d-YsNY8nUozcnqx_K87v5s1SRN92tCGrU1Y/viewform

⁵ As our school runs an integrated preparatory class programme, the students who enter the engineering programme from this section have already had one year of self-directed language learning.

⁶ Expressed as a percentage of the total of the respondents.

objectives was very or mostly clear. It should be said that at the beginning of each session we took care to explain why we chose the area and how it was linked to the issues we wanted to explore. In particular, the students found changing areas for each session very positive (more than 90%). In their comments they explain this by referring mainly to two aspects:

First of all, changing areas is seen as breaking the routine of a traditional class and maintaining concentration:

"It makes me more motivated to listen. I found the afternoons long and dense so moving around meant I could recharge my batteries"; "it's easier to pay attention, we don't expect to get bored like when we go into a classroom for example"; "yes, in the sense that it gets us out of our usual context of the lecture theatre. For me it was very beneficial because it intrigued me, made me want to discover more, to know what was behind all this changing spaces. I was more interested in what was being taught because of this. It's also a good way to show us that we can learn differently instead of sitting on a chair in a traditional and ordinary classroom".

One student also remarked *"even you teachers were different when we changed areas"*, which we recognise as true since the originality of the situations made us more alert and we felt more involved in our teaching.

Secondly, the students commented on how changing areas helps them with memorising the information given:

"In terms of memory, it helps too because we can remember that such and such an explanation was given at such and such a time of the day and in such and such a place"; "Given the volume of information, it helps to remember the main points of each session by associating them with the place in question".

This confirms the answers to the question on whether associating a place with information given aids understanding, which is the case for 8 students out of 10. *"It enables me to pay more attention and I find the change of environment changes my way of thinking and perceiving".*

In fact, putting students in different conditions, from a spatial point of view, provokes increased attention and more attentive listening which facilitates understanding of the content and consequently memorisation – which conforms to what cognitive psychology currently has to say about how memory functions [24]. In their comments the students are also critical of changing spaces when this impacts their level of comfort.

"You should be careful about the practical aspects of these places because if we aren't in the right conditions it can have the opposite effect and make us lose interest more quickly"; "I think the places we went to were too unsettling and I couldn't concentrate on what was being said. Change places, yes, but improve the conditions."

These conditions include the cold (in the car park or on the roof), having something to lean on to write, and the acoustics of certain spaces which meant that some students had to strain to hear what was being said.

Although changing spaces is seen by the students as facilitating learning, we cannot affirm that it is the only factor involved. Indeed, other dimensions of our pedagogy, such as alternating between theory and practice or the tools used, are also evaluated positively. For us, our main objective was to validate our hypothesis that experimenting with the use of space had a meaning. From this point of view, the results we obtained lead us to think that our approach is pertinent. 95% of the students said they completely or mostly understand what self-directed learning is at the end of the module, compared to 62% before they followed the course. We do not have any information that would allow us to compare this score with the results of the previous, more traditional, form of our module. Nevertheless, we feel it worthwhile continuing to develop our reflection on learning spaces in engineering training, especially when this forms part of a global approach to course design where the notion of space is linked with content, activities, and materials to provide an extra layer of meaning.

CONCLUSION

Our objective with this experiment is to show how it can be interesting for teachers to integrate the spatial dimension in their reflections on their teaching. As we have seen, the space where teaching takes place is a "container" which not only conveys a vision of what knowledge is thought to be and

what education is meant to represent but also influences our pedagogical practices. In our case, including the notion of space right from the start of designing our module was interesting from two aspects. First of all, it made us pay more attention to the space, time and rhythm of our module with a view to breaking the monotony that may characterise some more traditional lectures. Secondly, taking this new dimension into account provided us with the opportunity and motivation to develop new activities and new materials to give the students, thereby helping us to think about our course in a new light and re-examine our teaching methods. Finally, we got to teach where no man has taught before (not in our school anyway) and leading students throughout the building brought us into contact with our curious teaching colleagues as well as the surprised administrative staff and gave us all the opportunity to talk about the module we were teaching, thereby, hopefully, facilitating internal communication through higher visibility.

Although the evaluations of our experiment are globally satisfactory and encourage us to continue developing our reflection on the subject, we are not looking to present the question of learning spaces as a fundamental element of pedagogy. Rather, it is one dimension among many others which teachers can choose to incorporate into their practice where this is possible, depending on the spaces available and the possibilities offered by the building itself.

Our main desire is to invite all teachers to experiment with new forms, new practices, new ways of developing their methods and tools to make teaching more efficient and also, especially, to have fun training the engineers of tomorrow.

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