TEACHING AND LEARNING IN A DESIGN COURSE: A CASE STUDY

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Abstract

The aim of this article is to describe a teaching methodology to address the topic ‘Methods of design’ aiming to improve the students’ skills and competences necessary for their professional formation. The case study is a class of design students from a generalist undergraduate design course that takes place in an institution in Brazil. As the first author of this article is a faculty member for the above mentioned design course, this is a narrative about the teaching-learning process in class, more specifically, how the activities are performed and what are the students’ expectations and interests.

The curriculum for this course aims to stimulate students’ creativity during the development of a design process and it helps first year’s students to organize the project, because this is the moment when students learn about methods of design. Additionally, students learn about the several ways available to follow in the process of design and how to mix them to use as a sequence during a development of a project. The proposed activities motivate students to learn about and to use as many tools as possible during a curricular semester. In the end of the semester students should be able to decide by themselves which methodology they want to use to create their projects. Amongst others, the following skills are addressed in the class: oral presentation, visual organization, and personal development. All of those are extremely important in the formation of a future designer. An interesting fact in this class is the thought techniques that are responsible for arising students’ skills and competencies. The faculty member uses a different approach for every meeting in order to expose students to a mix of teaching-learning process such as, flipped classroom, seminars, discussions, problem-based learning, surprise presentations, etc. To motive the personal skills of each student, the strategies used in class are the following: working groups for projects development, interaction between working groups, discussions, oral presentations to explain the process of the design project during the class, justifications about their choices in the project, minimum time to deliver the activities and constant pressure to work as occurs in the real world that they will act as a designers. The students’ perceptions were very positive since they spoke that the opportunity to start doing tasks that they have never thought about before it is the most stimulating thing happened in class. The author’s inference is that teaching methodologies used in class were able to motive students to get together as a united group. Also, it was possible to notice the students’ insights on the performed work, their absorption and application of knowledge in a short period of time. In sum, although the teaching methodologies reported in this case study are not unprecedented, the active approach that those methodologies are used (i.e. a mix of dynamic methodologies) and the students’ positive perceptions regarding the discipline, result in a great work atmosphere; which reach the objective of improving students’ skills and competencies, that are necessary for their professional formation.

Keywords: Education, Teach, Learn, Design, Methodology.

1 INTRODUCTION

Higher education institutions are known as those responsible for disseminating content related to the areas of their course offerings. However, it is known that students have access to content without the need for faculties, i.e. the reality is different, with online platforms available, they are able to consume and retain knowledge at the speed, quantity, place and time that is most favorable and convenient for them within their routines. The reality in the face of the needs of academics and scenarios of the contemporary labor market has changed and therefore institutions are rethinking their teaching formats, aiming at the market demand, which seeks committed people and with differentiated training.

Considering the above, the focus of educational institutions has been directed to the development of knowledge and learning by relating theory and practice in order to work the competences and skills to prepare the still academic, adjusting situations that simulate the daily future of work to deal with the probable circumstances and solve problems predicted as real in each area.
Thus, the aim of this article is to describe a teaching methodology used in a design subject of a degree course in design, which aims to improve the skills and competences of students necessary for their professional formation related to the human intellect itself, in addition to the specific contents provided for the discipline itself. Thus, the study reports on the strategies adopted by the subject's teacher, mixing the required pedagogical objectives of subject content with the development of intellectual skills necessary for the exercise of the profession in the context of current demand.

The report takes into consideration the activities proposed to the class in all its stages of development, based on the ethics and responsibility of students as participating agents and knowledge builders, and striving for the development of relationships in the social, cultural and economic fields in design projects to be carried out as a request of the discipline.

As a result of the observation made in the application of the method in the discipline in question over at least six semesters, it is perceived that the strategy enables the construction of skills and knowledge that enable the understanding of the essential content of the discipline, also seeking to solve problems in the face of new realities and conducting activities in a format of simulation of real situations. Always relying on the various areas of knowledge and techniques put into practice, with the construction of classroom organizations that leaves aside the conventional space, enabling academics to work dynamically and relying on the support of the teacher as mediator in the active methodology used.

2 METHODOLOGY

The case reported in this article is considered a case study because it is a specific case investigation that occurs within a real context and that seeks to clarify 'how' some issue occurs [10]. It is also a way of analyzing reality, not necessarily making use of specific techniques, but organizing data and preserving the social character of the object studied [7].

Thus, it has a descriptive approach that generally seeks to describe characteristics, identify possible variables and discover the existence of associations between these factors [6]. Aiming to detail the information about the analyzed situation, this narrative deals with the teaching-learning process that occurs in the classroom, more specifically, how the activities are performed and what are the competencies and skills developed through them by students.

The case is a class of an undergraduate course in generalist design, working the design in an interdisciplinary way and without specific focus on any sub-area, thus being with comprehensive and innovative design projects. It is located in a private institution in the southern region of Brazil and currently has around 300 academics, with a maximum of 25 students in design disciplines such as the one that will be reported in the study.

2.1 The report

The discipline called Project Laboratory aims to provide students with a space for project and intellectual production related to the stages of design project methodologies. In addition to guiding on the elaboration of their work, both in relation to the use of research tools and design tools, as well as scientific elaboration of the work and organization of information. This subject is indicated to be studied before the others of project offered in the course, is an introduction to the project in design. That is why it is considered one of the most important in the curriculum matrix, since it is the moment when the academic understands what design work is in fact.

The curriculum of this course aims to stimulate the creativity of students during the development of a design process and this discipline helps students of the first year to organize the project, because this is the time when they learn about design methods. In addition, students understand about the various ways available to follow in the process and how to mix tools and methods to use as a sequence during the development of a project.

In design courses the design disciplines have primordial role in forming the profile of the graduate due to their integrative character of the knowledge relative to the areas that make up the context of design and natural interdisciplinary role of design problems. Most of the time they are supported by the contents from the other disciplines of the curricular matrix, which give input for the application of knowledge in the themes proposed in each project, and also contextualize issues not addressed in these disciplines of specific approach, because they force the academic to relate the themes that are seen in different disciplines.
Already in the first class the challenge of forming work teams by means of a random drawing made by
the teacher makes the first existing barrier be crossed, the proposal is to use a stipulated time to know
each other, while the concept of team instead of groups is explained so that the academics show
empathy with colleagues and create relationships. In addition, each team is asked to create a
presentation with information on the components, positive and negative points, in common, skills and
a name that reflects the way they perceive they will work throughout the semester.

At the beginning of the next class, time is allocated for the activity to be finished or redone, if they
have noticed during the week that they have left important characteristics out or have talked and got to
know each other better. Without prior notice and without the need to go to the front of the room,
informally and at the moment they feel comfortable, the groups are asked to briefly present, with a few
sentences, a conclusion about themselves, a summary of the exercise performed, and it is not
necessary that only one speaks, can be relaxed with the speech of the group. Without noticing it, they
made the first interaction with the group, a first presentation or speech to the large group. The
interesting thing is that the tense atmosphere at the beginning of the semester is left aside and they
only notice this when they are warned that the first presentation to the class has already happened.

The reason for this initial strategy is that they lose the fear of speaking in public, which helps a lot
throughout the semester since the subject offers an action-oriented principle-reflection-action due to
the approach proposed by the teacher, which bases most of the classes on seminars, which makes
the academics responsible for generating knowledge that reaches the classroom to the group through
presentations. Each class a group is responsible for explaining a stage of the design process. All
current proposals that explain educational trends emphasize the importance of letting the academic be
a protagonist in the classroom, i.e., an active agent in the teaching-learning process. Numerous
publications also point out that the best way to learn is trying to pass on knowledge to other people, so
this strategy is put into practice in about 90% of the meetings of the discipline.

The seminars stimulate numerous aspects in the human and social development of academics, such
as: responsibility for research, reading, analysis and interpretation of texts and data; group
organization - technique of socializing teaching, and preparation for oral presentation; construction of
visual presentation of support with content and ethics when selecting and giving credits to what is
being exposed; creation of differentiated strategies to explain a topic; preparation to indicate the
sources consulted and discuss the subject in the debate always proposed after the presentation to the
class; promotion of active participation and need for empathy on the part of all academics since all
must perform presentation throughout the semester; critical and reflective analysis on the subject
treated; and the need to make the academic a thinking subject in the context of learning responsible
for both their knowledge and the learning of the rest of the class through this practice of intentional
teaching proposed by the teacher [9; 3; 8].

In parallel to the seminar strategy, each class, in addition to the group responsible for the
presentation, another group should write a formal text in the model minutes, a report of the meeting,
and this should be read to the class before the end of the class. Both the seminar material and the
minutes of the meeting are made available to the class in the virtual environment used by the
institution. The stimulus to writing, the need to select what is relevant to the context and events in
three hours of class, the ability to synthesize the content and the requirement to follow the formal rule
of writing the text within a model provided, makes the exercise of building minutes to assist academics
in issues such as criticism, positioning and writing. The interesting thing about this writing request is
that in addition to the formal text written by a group at each class, all students must build an individual
sketchbook with personal notes about the points they consider important in each class, is not a report
of the meeting, but a summary of content, so that at the end of the semester they have a notebook of
all the content of the semester. The request is to be made in class, during presentations, discussions
and practical activities, and to try to express characteristics of the academic himself as an apprentice.
The format is free and can be made of notes, collages, drawings, sentences, topics, as long as the
academic has a compilation of everything that caught his attention or considered relevant during the
classes.

In the second meeting the academics have the first contact with the visual and theoretical structures
proposed as design processes by several authors. The lecture-dialogue is initiated by the already
mentioned activity where the groups present themselves. After that, two scientific articles are read,
which end up being the first contact with some students’ scientific texts. After the reading is held a
debate, to verify the analysis and seriousness with which the reading was made, some questions are
put on the agenda and again there is encouragement for the participation of academics with
comments to the class. The important thing is to make it clear that there is no right or wrong, but rather
the interpretation and understanding of the reading of each, which promotes the participation of almost
the entire class at this time of debate. In all these moments the teacher is not transmitting knowledge,
but being a promoter of open dialogue and mediating the direction of the comments made from the
reading.

Still in the meeting that addresses the design processes, a second and more relaxed moment is
proposed, about 70 visual schemes of methods are delivered to the printed class and randomly
academics must analyze the similarities and differences between them. Since the methods generally
have the same stages, but receive different nomenclatures according to their authors, a debate on the
part of the academics themselves starts involuntarily when they notice this when analyzing various
methods. A second moment of discussion and analysis occurs and the participation is even greater,
which makes the integration of the class better and more dynamic for the next meetings that will be in
the format of a seminar.

In the third lesson, the first seminar takes place, in a different format from the others to be held in the
semester, the theme was passed on to the whole class and all the groups must prepare material for
the presentation, because three groups are drawn to present at the meeting. The empathy that occurs
in the class for the fact that everyone is at risk of having to present is important before the official
presentations where each group has its responsibility already established. During the presentation,
since all the groups researched the topic, in addition to the three groups that lead the meeting, there is
the participation of several students in order to complement or opine on the subject. The organization
of these classes can be seen in the table below:

<table>
<thead>
<tr>
<th>LESSON - OBJECTIVE</th>
<th>TEACHING STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1 - OBJECTIVE OF CLASS - Introduction to the discipline and the theme. Teaching plan, schedule, bibliography, organization of classes and groups.</td>
<td>Expositive-dialogue class. Interactive activities - in groups drawn for the semester.</td>
</tr>
<tr>
<td>Class 2 - OBJECTIVE OF CLASS - What is the design method in design.</td>
<td>Expositive-dialogue class. Brief presentation of the groups. Reading of scientific text and debate. Content analysis and discussion through questions by the teacher to the group of students. Interaction of students, need for analysis, positioning and opinion on the theme.</td>
</tr>
<tr>
<td>Class 3 - SEMINAR 1 - SORT OF 3 GROUPS TO SUPPORT AIM OF CLASS - DESIGN METHODS</td>
<td>Oral presentation Research based on previous direction oriented by the teacher. Practical activity on the content. Class registration - ATA model. Record of the individual lesson - report of a page with topics considered important.</td>
</tr>
</tbody>
</table>

Already in the fourth class, but in the first official seminar of a total of ten, the first group to present has
the responsibility to introduce the initial stage of a design project to the class: the construction of the
project briefing. In this seminar the dynamics of division of time of the meeting begins to be applied,
where the seminar has the time of half of the class, between organization, presentation and debate,
the other half of the time of class is devoted to carrying out practical activities related to the content
presented. That is, this class begins the design project that the groups will develop in parallel to the
content that is being seen and the strategies for intellectual development that are being worked. Each
group has the period of practical activity to build a briefing and instead of solving in a project way the
briefing they formulate, the same are exchanged between the groups, which generates the need for
dialogue between the groups in the search for the definition, understanding and detailing of the
information contained in the exchanged document.

The other seminars follow a more defined and repetitive logic, each seminar are presented between 4
and 10 design tools that can be used throughout a project, so that students know a large number of
application possibilities when developing a design project, always in the second moment of the lesson, in the practical stage, the proposal is that the groups apply in their projects at least 4 tools presented per lesson. The projects are based on the briefings built and the search for a result through a design project is the attempt to not only work human development also teach students to understand and solve the problems around them, thus training professionals better prepared to face and deal with challenges of life and daily work market.

Basically, the following ten classes take place in the same format, the classroom is inverted through the presentation of seminars, the teacher is the mediator and not the holder of absolute knowledge, academics are the protagonists and responsible for the joint construction of knowledge, learning through action-reflection-action, debates, stimulating the synthesis of relevant notes and the development of a formal text in minutes models. Furthermore, the fact that there is the development of a project makes the discipline work with the proposal of Problem-Based Learning, so widespread today as an active methodology in higher education. The schedule of these classes can be seen in the table below, together with the teaching strategy:

<table>
<thead>
<tr>
<th>LESSON - OBJECTIVE</th>
<th>TEACHING STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 4 - SEMINAR 2 - GROUP 1</td>
<td>OBJECTIVE OF CLASS- DESIGN OPPORTUNITIES - BRIEFING</td>
</tr>
<tr>
<td>Class 5 - SEMINAR 3 - GROUP 2</td>
<td>OBJECTIVE OF CLASS- ANALYSIS TOOLS</td>
</tr>
<tr>
<td>Class 6 - SEMINAR 4 - GROUP 3</td>
<td>OBJECTIVE OF CLASS- TOOLS FOR ANALYSIS/DEFINISHING REQUIREMENTS</td>
</tr>
<tr>
<td>Class 7 - SEMINAR 5 - GROUP 4</td>
<td>OBJECTIVE OF THE CLASS- SEMINAR 4 - CREATIVITY TOOLS (CREATIVE AND CONCEPT RESEARCH)</td>
</tr>
<tr>
<td>Class 8 - SEMINAR 6 - GROUP 5</td>
<td>OBJECTIVE OF CLASS- SEMINAR 5 - CREATIVITY TOOLS</td>
</tr>
<tr>
<td>Class 9 - SEMINAR 7 - GROUP 6</td>
<td>OBJECTIVE OF CLASS- SEMINAR 6 - SOLUTION ASSESSMENT TOOLS</td>
</tr>
<tr>
<td>Class 10 - SEMINAR 8 - GROUP 7</td>
<td>OBJECTIVE OF CLASS- SEMINAR 7 - PROJECT ASSESSMENT TOOLS/VIABILITY ASSESSMENT</td>
</tr>
<tr>
<td>Class 11 - SEMINAR 9 - GROUP 8</td>
<td>OBJECTIVE OF CLASS- SEMINAR 8 - Test Tools</td>
</tr>
<tr>
<td>Class 12 - SEMINAR 10 - GROUP 9</td>
<td>OBJECTIVE OF CLASS- SEMINAR 9 - Test Tools / MOCKUP CONSTRUCTION</td>
</tr>
<tr>
<td>Class 13 - SEMINAR 11 - GROUP 10</td>
<td>OBJECTIVE OF CLASS- SEMINAR 10 - CONSTRUCTION OF MOCKUP/PROTOTYPES</td>
</tr>
</tbody>
</table>

There is a meeting that has no class objective in the schedule of the semester, is the meeting called "qualification" where without knowing what it is about, the academics receive at the beginning of the class the request that they need to make a presentation (surprise) of up to 7 minutes showing the project until that time, explaining what happened until that date and what the intentions for the next steps. The moment is thought to simulate the designer's work environment, where many times immediate requests for monitoring the development of the project are requested, this makes the academics create awareness about the need to build and always have a report of the project process, so that the evolution and logic of what is being done can be explained. In the midst of a discipline that teaches design method and the many misinterpretations about the designer's activity, it is reinforced with this practice that design is not just drawing, it does not happen with a magic spell and that everything is founded through a systematic process, based on research and creative work structured and logical.

After the qualification there is one more class where all the groups have to prepare for the theme, which is related to 'Presentation to the market and project delivery', and again three groups are drawn to deliver the seminar. At this stage of the semester, with the class well connected and the objectives
well defined, in addition to the three groups drawn others also ask to present, as they want to show additional questions they have found or to check if the content they have prepared is correct. In other words, there is no panic about the oral presentation and no fear of showing the content that has been prepared, there is now an intellectual evolution and breaking down barriers that exist at the beginning of the semester for many students.

Finally, at the time of the final presentation of the project, in the last class, is when the groups show the solutions they developed for the briefings they received. In this meeting the argumentation, defense, presentation, visual material, speech and result should be thought and organized in the way that the groups would think to do for a real client, simulating a project delivery to the labor market. All these activities develop in academics the competences and skills needed in today's professional environment, in addition to the fact that these strategies favour learning; stimulate the co-responsibility of the student for efficient and effective learning; promote study, coexistence and group work; develop independent, systematic studies and self-learning; offer differentiated learning environments due to simulations in the classroom; develop the capacity for analysis and research ability; and finally promote the articulation between teaching and research with the educational principle. The table that explains the objectives and strategies of these classes follows:

<table>
<thead>
<tr>
<th>LESSON - OBJECTIVE</th>
<th>TEACHING STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 14 - QUALIFICATION</td>
<td>Surprise presentation of each group with time stipulated</td>
</tr>
<tr>
<td>Lesson 15 - SEMINAR 12 - SORT OF 3 GROUPS TO SUPPORT AIM OF CLASS - MARKET PRESENTATION/ PROJECT PRESENTATION</td>
<td>Oral presentation</td>
</tr>
<tr>
<td></td>
<td>Research based on previous direction oriented by the teacher. Practical activity on the content.</td>
</tr>
<tr>
<td></td>
<td>Class registration - ATA model. Record of the individual lesson - report of a page with topics considered importante.</td>
</tr>
<tr>
<td>Class 16 - ORGANIZATION/FINALIZATION</td>
<td>Class aimed at finalizing the project, organization of project records, presentation, doubts, finalizations...</td>
</tr>
<tr>
<td>Class 17 - FINAL PRESENTATION</td>
<td>Presentations of each group with time stipulated. Simulation of project delivery to the client. Moment of feedback from the group that made the briefing before the result of the project.</td>
</tr>
</tbody>
</table>

Of the 19 meetings proposed by the institution, there are planned academic activities that occupy at least two classes per semester (inaugural class, academic week, design project exams) or even holidays. Therefore, the schedule presented is outlined in 17 meetings, but if necessary the initial classes are reorganized.

3 RESULTS

With so many possibilities for learning and forms of teaching, active learning is considered one of the teaching strategies that best allows developing competences and skills in the contemporary student. Involving an agitated student, who wants to practice before theory and who seeks specific knowledge according to his need and will is not the simplest reality to teach. The use of information technologies and interactive tools are also good possibilities of innovative methods for the classroom.

To ensure that the academic is attracted by the content and committed to the learning process numerous activities should be required such as reading, writing, discussion, questioning, problem solving and project development. It is still essential that high level mental tasks are requested for tasks such as analysis, synthesis and evaluation of situations. Thus, active learning is a form of teaching that commits the student to the tasks in a conscious way, since it occupies the student in the performance of work at the same time that makes him aware of what is being developed and what the objectives are. Active learning is based on the combination of demands that demand mental functions that were the intelligence of the academic [2].
The proposed activities used in the case report motivate students to learn and use as many tools as possible during an academic semester, directly related to the specific design content worked. At the end of the semester, students should be able to decide for themselves what methodology they want to use to create their projects. In addition it develops also in the classes of this discipline numerous thinking techniques that are responsible for the skills and competences of the students. The teacher uses a different approach to each meeting in order to expose students to a mixture of teaching-learning process, which does not allow classes to become boring.

Analyzing the competences required by the National Curriculum Guidelines of the Graduate Design courses established by the Ministry of Education of the Federal Government [4], the activities carried out in the discipline enable assistance in the development of the requirements that are included, since they promote the application of theory and practice in solving problems related to the profession and direct the student to intellectual emancipation. Thus, the activities developed provide improvement of competencies and skills important in the training of a future designer.

Given the progress of the discipline in this format for some semesters, it can be observed that the development of competencies and skills required in other disciplines of design (and consequently in the profile of the designer) was improved in the resourcefulness of academics. The impact of working so directly within the activities of the discipline the personal and intellectual improvement left the students more confident and able to conduct and carry out their next projects. The academics themselves reported perceptions of growth during the course, leaving a record in their end-of-semester feedback.

The ability is when the individual 'knows how to do', it is an acquired capacity of being. Competence, on the other hand, is 'knowing' and can be observed at the moment when knowledge, skills, interests and will are transformed into practical results [5]. It is believed that in the discipline all this is instigated to be developed and applied. It can be said that competences are achieved when a set of skills has been harmoniously developed.

Thus, it is visible that the proposed teaching format consolidates, throughout the academic career, the relationship between theory and practice in addition to stimulating the student to participate in diverse experiences and induce the practice of independent, cross-sectional studies that enable the formation of an ethical, autonomous, critical and responsible subject, capable of effectively contributing to the society in which it is inserted through design projects.

Using the technique of project development and consequently problem-based learning is enriching for the integral improvement of the academic. The way the subject is conducted, the assessment is procedural and gradual, because students are evaluated in a set of relationships and practices that are established in the development of the curriculum component, while the teacher redefines the planning to meet the needs of the student. Throughout the process, the academic has the opportunity to build significant learning. The teacher updated and consistent with the new curriculum guidelines needs to be more a facilitator and advisor than an instructor, is more concerned with the learning process of the student's competence (knowing how), than with the memorization process of what is transmitted to him (knowing what), because it is in a process of human intellect management beyond the issue of content [1].

Thus, the attempt is to move from a culture of teaching to a culture of learning; to replace training for employment with entrepreneurial education; to build significant knowledge, based on real problems, which will enable the construction of creative solutions and innovative responses to social needs. In addition, to qualify ethics, scientifically and technically professionals with awareness of the reality in which they will act, autonomy, theoretical foundation for the competence, technical and productive training in social development.

### 4 CONCLUSIONS

The relationships established in the classroom, in order to create an educational process that enables meaningful learning and that gives autonomy to the life and work of academics is important in university education. It is also noteworthy the ability to move with ease and security in the projects proposed during the academic life, which makes the future professional probably has a good performance in the labor market increasingly complex and with innovative technologies.

The students' perceptions of positive feedback, for having had the opportunity to start doing tasks that they have never thought of before, is stimulating and comes as a response to the proposals of what
happens in the classroom. Thus, the teaching methodologies used in class were able to motivate students to come together as a cohesive working group. In addition, it is possible to perceive the students' insights on the work performed, their absorption and application of knowledge in a short period of time and their perceptions of intellectual and personal evolution in the face of some previously existing barriers.

In sum, although the teaching methodologies reported in this case study are not new, the active approach that these methodologies are used (e.g., a combination of dynamic methodologies) and the positive perceptions of the subject by students result in an excellent working environment; they achieve the objective of improving the skills and competences of students necessary for their professional development.

In this way the active learning as applied in the discipline, which makes the student interact with the subject building the knowledge instead of receiving it passively from teachers and results in satisfaction on the part of the same for realizing that all this made him overcome challenges. In an active learning environment, the teacher acts as a guide, supervisor, facilitator of the process, where the focus is the student and his learning, aiming at the student to become competent in the use of the knowledge treated, developing their skills and achieving results.

Thus, the students' perception of how much improvements in their skills and competencies increased, the teaching strategy made them perceive with a lower degree of difficulty after the completion of the proposals, which initially made them think that they had a lower level of competence than at the end of the project. This all demonstrates an awareness for the self-responsibility of the academic before his learning process aiming at his professional future as a designer, where the teacher instigates, provokes and helps for the improvement and consolidation of academic training.

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