

# DEVELOPMENT OF CLINICAL CASES AS A STRATEGY OF SITUATED KNOWLEDGE TO ACHIEVE DEEP LEARNING IN PHARMACOLOGY

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## Abstract

Teaching procedures based on the accumulation of decontextualized knowledge has proven to be a risk factor in the training process of university students. General Pharmacology and Pharmacology and Pharmacotherapy are compulsory subjects (9 ECTS, annuals) of 3rd and 4th year in the Pharmacy Degree, respectively. Pharmacology constitutes a fundamental area of the Pharmacy Degree, and the need of students to acquire a meaningful learning is essential for their ability to further apply this knowledge in a responsible manner in the real context.

Achieving deep learning in Pharmacology-related subjects makes necessary to “step the knowledge out of the classroom” encouraging the students to discover by themselves the most immediate real application, in their close environment. Carrying out this activity in their real surroundings allows the student to experience first-hand the direct application of the acquired theoretical knowledge, thereby strengthening the understanding, the deep learning process and promoting his/her intrinsic motivation for the subject.

Considering that in Spain, as in other western developed countries, there is a significant overuse of drugs, finding patients under pharmacologic treatment and, even polymedicated ones is not difficult. Furthermore, a report published by the WHO in 2003 suggests that between 30% and 50% of prescribed drugs for chronic diseases are not taken properly. Interestingly, it has been shown that a patient's adherence to treatment improves directly with the level of awareness about him/her disease, as well as with the pharmacist's interventions. Therefore, the current environment of Pharmacology students offers a wide opportunity to encourage the acquisition of knowledge to further contribute to society, raising awareness about drug therapies, in a process leading to personal deep learning.

Therefore, we proposed to implement the development of real clinical cases by the students of Pharmacy Degree as a strategy to achieve deep learning of Pharmacology-related subjects. With this strategy, the students not only become the protagonists and instructors of their own learning but they also pay forward, contributing to the benefit of the patients (family member or friend), as they guide them towards a better understand of their pathology and drug treatments.

Keywords: Pharmacology, deep learning, clinical cases, real application.

## 1 INTRODUCTION

The main purpose of this activity arises from the active search for strategies and tools that allow the student to achieve a deep learning of our subjects. General Pharmacology and Pharmacology and Pharmacotherapy are considered to be one of the most important and fundamental areas of the Pharmacy Degree, and the need of students to acquire a meaningful learning is essential for their ability to further apply this knowledge in a responsible manner in the real context. Teaching based on the accumulation of decontextualized knowledge has proven to result often in demotivation during the training process of university students (Porlán, 2017). This need for transformation in the way of learning drives university teachers to look for tools that promote deep learning.

Deep learning transforms the way a student interprets and solves a problem. Deep learning allows the student to internalize the concepts, to understand them in an integrative manner and to further transfer them into their professional life. By contrast, superficial learning increases the confusion and overlapping of otherwise solid related matters leading the student utterly unable to respond to complex problems.

Guiding the transformation of the learning process of the student from a superficial to a meaningful one involves the ability of the teachers to create a richer learning context in which the acquisition of skills and the development of self-confidence will facilitate the search for self-efficiency, and the improvement of communication skills and collaboration. The development of complex cognitive processes requires not only individual effort, but also shared effort with others pursuing the same learning goals. Thus, peers, teachers, families and communities, with a common desire to connect with others (Fullan, 2019) to achieve a wider array of ways to solve problems, making possible for everyone to benefit from collective intelligence.

Achieving deep learning in Pharmacology-related subjects makes necessary to transfer the knowledge from the classroom to the outside world and to invite the students to discover their most immediate real application, in their close environment. In Spain, as in other western developed countries, there is a significant overuse of drugs and finding patients under pharmacologic treatment and, even polymedicated ones is not difficult for the students which facilitates the implementation of our proposed activity.

Another important aspect in the context of higher education, particularly nowadays under a pandemic crisis, has been the ability to adapt our teaching methods by using either half or full online platforms. In addition to the technological aspect itself, this novel situation requires further major adaptations from different ways of interaction among all members of the educational system to new evaluation procedures. The sudden circumstances have rather diffculted the design of collective activities, due in part to the lack of predisposition of the students to actively participate in this environment sharing their knowledge. Recent evidence supports that there is no progress without learning from within the group (Porlan, 2017; Fullan, 2019). However, this situation can be addressed not as a problem but as a challenge.

## **2 OBJECTIVE**

The general objective is based on the design, implementation and evaluation of a practical activity integrated into the teaching of General Pharmacology (3<sup>rd</sup> course) corresponding to the Pharmacy Degree and, the Double Degree in Pharmacy and Nutrition, as well as Pharmacology and Pharmacotherapy (4<sup>th</sup> course) of the Double Degree in Pharmacy and Nutrition Double Degree, as a strategy to promote deep learning in the student.

The following specific objectives are pursued:

1<sup>st</sup>- Design and implementation of the activity, which consists of the elaboration of a real clinical case related to someone socially closed to the students, in order to increase their interest and motivation for learning about the case, therefore realizing the real application of the teaching program content.

2<sup>nd</sup>- Correction by the student of two clinical cases elaborated by two other students to set in motion a chain on interactive work, collective intelligence and decision-making, always guaranteeing the protection of patient data.

## **3 METHODOLOGY**

The design of this project has been carried out respecting the four learning principles (4CRAS) proposed by Vega (2020). These 4CRAS are constructive, reciprocal, self-regulated and situated learning.

The team that is developing this project is constituted by ten professors from the Department of Pharmacology, Pharmacognosy and Botany of the Faculty of Pharmacy of the University Complutense of Madrid (Spain). In addition, there are three PhD students who stand out for their academic excellence and their essential contribution from the student's perspective.

## 4 RESULTS

### 4.1 Specific objective 1: design of the activity

#### ✦ Presentation of the activity

At the beginning, the activity was explained giving basic, mainly general rules to prioritize the freedom and creativity of the student in the design of the task. Given the current health emergency, the information was offered online.

Several thematic options were presented to be chosen as potential clinical cases, all of them directly related to the pharmacology aspects studied in the current course.

- Thematic 1: Asthma or chronic obstructive pulmonary disease (COPD), or any other pathology that requires the use of bronchodilator drugs.
- Thematic 2: High blood pressure and / or heart disease.
- Thematic 3: Glaucoma.
- Thematic 4: Allergy
- Thematic 5: Endocrine system

#### ✦ Starting point :

The student looks for a potential patient treated with one of the drugs that are included in one of the 5 thematic lines offered (see above) and informs of the choice to his or her corresponding teacher.

Once the patient is identified, the student will design a questionnaire that provides information on: a) the pathology (diagnosis, symptoms); b) treatment (medications, administration, possible adverse reactions); c) other relevant aspects (self-medication, psychological aspects derived from the pathology or treatment). The questionnaire will be carried out in the first quarter of the course.

Once the information has been collected, the student will study the case in depth. In this context, the student is free to choose the format that considers more appropriate to build the case, which guarantees the variety for self-expression and communication. Thus, students are free to create audios, videos, PowerPoint presentations, or Word files. In addition, the organization of the information is left up to the student (i.e., transcribing the interview as it is, developing the case description, or answering the theoretical questions throughout the case). To conclude the activity, it is encouraged to reflect in an integrative manner, either based on theoretical aspects and/or on the personal impression of the patient regarding the way in which the patient handles the disease and treatment.

### 4.2 Specific objective 2: Correction and evaluation of clinical cases

#### ✦ Correction:

If the distribution of the cases allows it, the teacher will distribute students into groups of 10 divided in turn to 5 thematic groups consisting of two students per subject. Shared folders will be created, one per thematic group, by using the Google Drive platform. The students will have access to these folders through their institutional email address. Each student will upload his or her clinical case with the patient's interview, incorporating changes as his or her work agenda progresses. Within each group, each student will be in charge of correcting two clinical cases that, developed by two of his or her peers, will belong to different topics, adding critical constructive comments the corresponding file, indicating doubts and/or suggestions that were to be considered appropriate. In turn, the student will receive similar inputs in his or her Drive file from his or her classmates. Figure 1 shows a diagram representing the groups organization regarding the interactive cascade activities. Thus, one student receives and sends corrections from and to two different classmates.

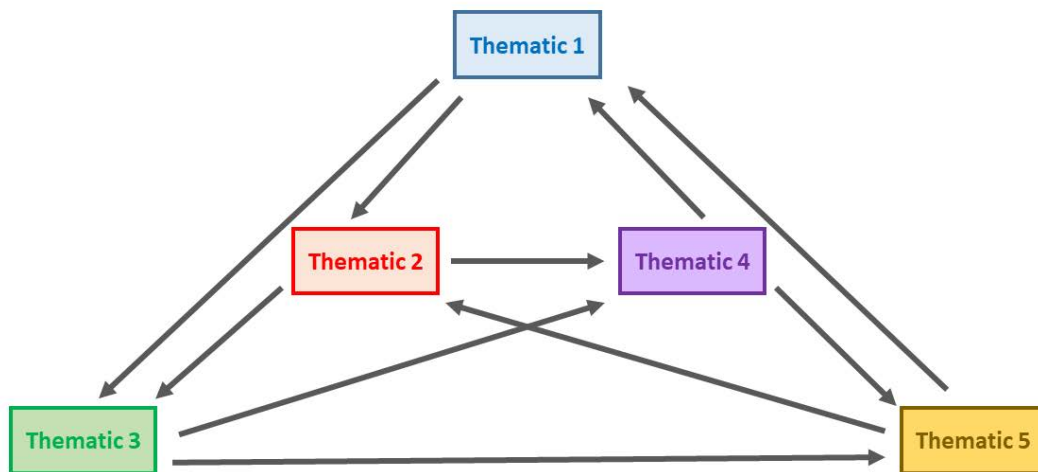


Figure 1. Correction system for clinical cases among students

Thus, each student interacts with four different classmates who, ideally, come from the other four proposed themes.

The role of the teacher is to supervise the progression of the work and to review the cases files to ensure that the activity dynamics is being carried out correctly. Teachers will be always accessible to students in case they have doubts that they have not been able to solve with their classmates.

Each student will incorporate the corrections and suggestions made by their colleagues about their clinical case, to prepare the final version of it.

## 5 DISCUSSION

In the proposed activity the development of a collective intelligence is one of the fundamental pillars. To do this, a new learning environment is proposed, focusing on deep learning and communication among students. In this environment, the student gains more voice and decision-making capacity; logically seeking more communication and collaboration among students and teachers (Figure 2).

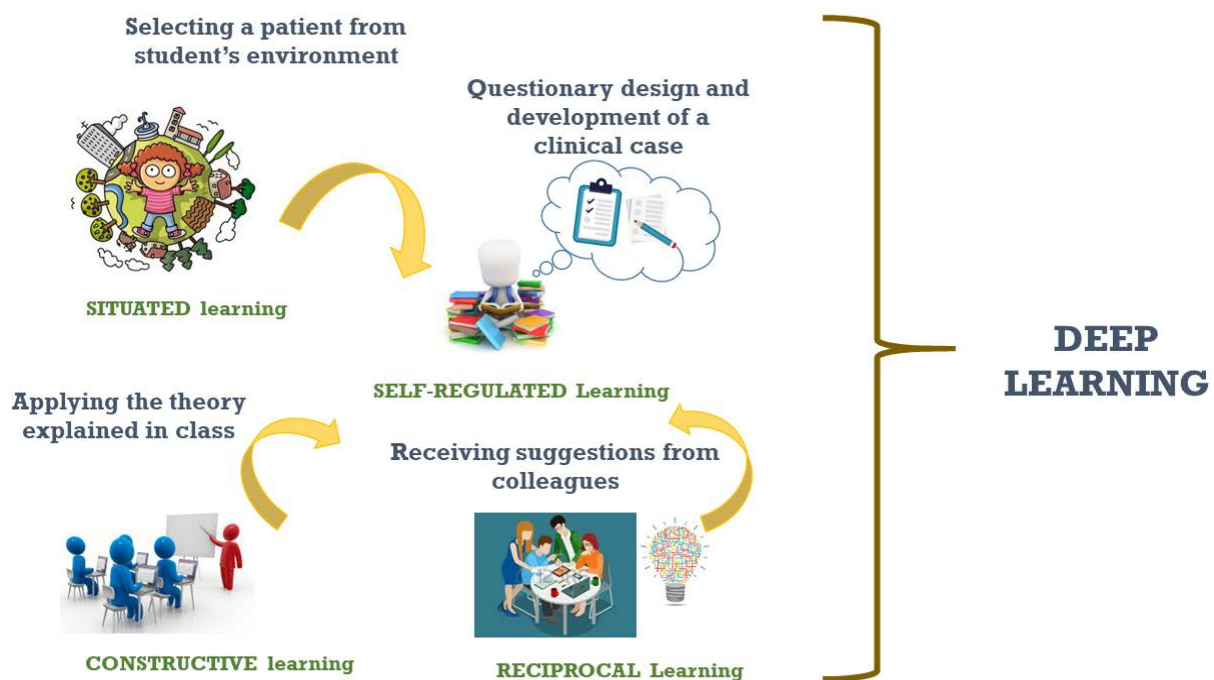


Figure 2. 4CRAS for deep learning

Furthermore, developing this activity in their real surroundings allows the student to experience first-hand the direct application of the acquired theoretical knowledge, thereby strengthening the understanding, the deep learning process and promoting his/her intrinsic motivation for the subject. This proposal allows the students to become not only the protagonists and instructors of their own learning but they also pay forward, contributing to the benefit of their student peers, as well as the patients (family member or friend), as they guide the latest towards a better understand of their pathology and drug treatments. In this context, a report published by the WHO in 2003 suggests that between 30% and 50% of prescribed drugs for chronic diseases are not taken properly. Interestingly, scientific evidence indicate that a patient's adherence to treatment improves directly with the level of awareness about him/her disease, as well as with the information and help provided by the pharmacist. In a pilot test carried out the past academic year (2019-2020), the students who participated in this clinical case activity were able to detect several medication errors related to posology.

## 6 CONCLUSIONS

We propose the implementation of the development of clinical cases by the students of Pharmacy Degree as a strategy to achieve deep learning in pharmacology. The main goal is to transform the student from a simple passive receiver of theoretical information to the leading character and active creator of knowledge from direct experience for his/her own benefit, that of his/her peers and further contributing to the benefit of the patient (family member or friend), as they can help them to better understand their pathology and treatments.

## REFERENCES

- [1] R. Porlán. "Enseñanza universitaria. Cómo mejorar". (2017) Madrid, Morata.
- [2] M. Fullan. "*The nuance. Why some leaders succeed and others they fail*". (2019) California, Corwin.
- [3] M. Vega. "Creando comunidades de aprendizaje en la Universidad. Una propuesta de formación experiencial". (2020). Madrid, Morata.