INDUCTIVE APPROACH IN HIGHER EDUCATION

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Abstract: *Both during university studies and at the beginning of their careers in different jobs, it has often been found that students and young employees face difficulties when they need to use their theoretical knowledge to solve practical professional problems. A possible cause of this phenomenon is the fact that the academic disciplines are usually taught in a deductive manner. The courses are conducted with focus on the presentation and explanation of new concepts and theories, and finally give examples or resolve some practical applications. This paper presents several ways to teach university subjects to develop students' abilities to effectively link the theories to practice. It is about the teaching in an inductive manner, which starts from the evocation of real professional situations in the professional environment and gives then theoretical support and practical suggestions to approach and solve problems*

Keywords: inductive strategy, higher education

1. Introduction

One of the basic goals of university education is to provide students with solid scientific knowledge in the field of study and a scientific conception of the world and life. For the future professionals, this is an essential condition to practice profession they are preparing for. If the link between theory and practice is not obvious and students have difficulty in applying in the real professional life the theoretical knowledge assimilated to university, then university studies are perceived by students as unattractive, useless, becoming a tortuous but compulsory activity by those with high professional aspirations.

2. Some pedagogical notices from the university environment

Many of the universities are confronted with this problem. Students often assert that some of the subjects they are studying seem unnecessary. They do not refer to the contents themselves, but to the impossibility of making sense of their usefulness for practicing the profession. Even though we cannot give full confidence to this appreciation of students because they cannot understand all the subtleties of the professional environment, yet one cannot ignore their perception that they do not advance in the understanding of the future profession, they only learn generalities, and they do not come close or become better in the real profession. These students' signals are accompanied by passive attitudes and disinterest at classes, especially in courses where the amount of abstract information is higher and the opportunities for solving practical applications are lower. Students motivate their indifferent listening attitude by saying that they will definitely have to deal with something else in the future job and will not require them to recite theories in a field.

Lack of student interest in some subjects

is also caused by the way they are taught. If teachers do not make certain changes in pedagogical terms, things will get worse. Even if working with adults, who are expected to participate consciously and actively in their own educational process, only teachers are actually fully aware of the educational process. It is therefore the responsibility of teachers to initiate change, to try different pedagogical approaches, to follow their effects with interest so as to ultimately increase the quality of education and the level of training of future specialists.

3. Arguments for inductive teaching

From a strictly scientific point of view, it is somewhat uncertain to resort to knowledge in the inductive way (from the private to the general), as it does not fully ensure a valid logical reasoning. Logic considers inductive reasoning a form of probabilistic thinking, which can lead to logical errors, to false conclusions, even if all the premises are true. Therefore, the mental generalization by the students of concrete experiences is a questionable pedagogical practice from the perspective of scientific truths. The conclusions obtained in this way are only probable, they are a stronger or weaker argument, in no case are certain.

This topic has recently been approached by the pedagogy specialists Constantin Cucoş and Florin Frumos, who assert: "If we consider that there is knowledge-process and knowledge-product, the problem of truth is also reflected in questions about the production of pedagogical knowledge, such as: How does pedagogical knowledge arise? (what are the valid mechanisms for generating knowledge), namely: How is this knowledge validated? (how we test validity, consistency of concepts, explanations, and theories)"[1].

In a constructivist paradigm, for the learner, it is not essential if certain knowledge is true or not, if what he finds at any given moment belongs to the objective reality or is a subjective perception. In fact, individuals are always building and actively reconstructing their own reality as a result of the effort to bring meaning and meaning to the experiences they live in. From this perspective, the task of teachers is to trigger the experiences of students, to create frequently contexts for confrontation of students with real situations from the professional environment.

Even though we are aware of the scientific, epistemological and logical limitations of the inductive approach, we still support the pedagogical approach of content from the private to the general, since positive pedagogical effects are unquestionable.

The inductive pedagogical approach refers to the way to teach from the private to the general. By evoking, studying or experimenting with one or more examples, situations, cases, students can assimilate concepts, ideas, and principles, abstract and general visions. "Topics are introduced by presenting specific observations, case studies or problems, and theories are taught or the students are helped to discover them only after the need to know them has been established"[2].

The classical stages of inductive teaching comprise three steps:

a) Careful choice of one or more concrete situations; establishing the best context or method to present to students particular concrete situations.

b) Establish clear steps of approach, discussion and reflection, through which the students will understand and will come to know the general aspects and basic concepts that the particular situation has highlighted.

c) Creating suitable situations for students to apply new theoretical knowledge in solving problematic situations (transfer of knowledge).

Synthesizing the inductive approach, Prince and Felder state the following: "to be effective instruction must set up experiences that induce students to construct knowledge for themselves, when

necessary adjusting or rejecting their prior beliefs and misconceptions in light of the evidence provided by the experiences"[3].

Learning will become stronger and more effective if students know why and for what they teach specific information, concepts and categories, abilities, ways or principles of conduct in the professional environment. Therefore, the stages of reflection and discussion at the end of the activities should not only draw general conclusions based on examples or concrete cases studied, but also to raise awareness of the whole process of learning.

In this way, it is possible to avoid the creation of a closed, artificial, fictitious system, isolated from the real world, in which the contents approached are chosen by the teachers and whose later use is not understood by the students, the target of the students being often only getting grades to pass.

4. Procedures for the application of inductive pedagogy in higher education

Students should be helped by teachers to understand a very important thing about the necessity of studying university subjects: they will be more effective in exercising the profession of officer than a military without a university degree in the field who only has knowledge and skills practically formed in military domain. People without a higher education in the field can solve the demands of the professional environment through intuition, relying on experience in similar situations and on their personal qualities. But such an approach is more a craft than a professional approach that always requires adjustments that improve through trial and error, with time and resource consumption. Efforts are often made to find solutions and conclusions that have already been discovered long ago by specialists, written in specialized books and taught in schools as essential elements of a field. It is important for students to understand that theoretical knowledge relieves them of waste of time, uncertain results in activity, troublesome search for solutions to problems that have previously been solved by others. Much more productive would be to use their own intellectual capabilities to make good decisions promptly and to bring additions, creative improvements to existing ideas, to open new horizons of knowledge in the field.

Although it is almost a truism, the understanding of the pedagogical principle outlined above is not as outrageous as it might be. Both students and some professors, unfortunately, may be in great difficulty if they have to give unprepared a pertinent answer to the question: Why should a particular subject be taught? The answer to this question depends on the teaching and learning of a subject.

A winning pedagogical solution may be organizing the teaching and learning of academic disciplines, starting from real professional problems and authentic situations in adult life, studying in class some typical situations, cases where solving it is necessary to know the laws of some phenomena in the field.

An algorithm that can be followed in delivering courses to a discipline is that developed at Vanderbilt University Learning Technology Center and named the *STAR Legacy module,* [4] which consists of the following steps:
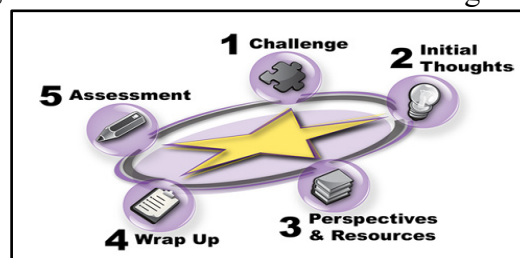

Figure 1: STAR Legacy module

a) *a).Challenge* - students are presented with a case, a real situation, and a professional or life problem that needs to be solved. Thus, it becomes obvious that some knowledge and skills are needed that will be acquired at that course. The motivational value of this moment is invaluable.

b) *Initial thoughts* – students are challenged to launch ideas, capitalize on the knowledge and skills they already have about the subject, be creative, and identify possible approaches and solutions.

c) *Perspectives and resources* – the teacher offers the students, for the study, expert opinions, the results of relevant scientific research, as well as their own points of view (lectures, reading materials, videos, simulations, homework problems, links to websites, and other materials relevant to the challenge).

d) *Wrap up* – the professor, an expert in the field or one of the students presents a comprehensive vision, a model solution for the problem in question, demonstrating the usefulness of the knowledge and skills that were intended to be acquired.

e) *Assessment* – students are asked to apply what they have learned but also to identify what they do not yet know and have to learn to successfully solve that kind of problems (homework, projects, essays, reports, tests, exams).

The teaching methodology that can be applied to the courses and seminars following this pedagogical model is very extensive, many of the methods and techniques being very popular in order to develop students' critical thinking: case study, inquiry learning, discovery learning, project-based learning, problem-based learning, just in time teaching, brainstorming etc.

Regardless of the methods used, it should not be forgotten that university studies have the ultimate goal of supporting young people to integrate into the labor market and to build successful careers. If we want more than to passively memorize abstract content, if we want to think and use what they have learned, it is necessary to implement an educational framework that provides two basic elements: *rigor* and *relevance* [5].

5. Conclusions

Inductive teaching implements the idea that students' sustainable and useful knowledge is acquired through interaction with reality and phenomena. It is the responsibility of teachers to create opportunities and a suitable context for confronting students with reality of the professions, in the classroom or virtual space. Multimedia means, verbal evocation of situations or direct experimentation can be used if the facilities and facilities of the institution allow this.

The correct completion of generalizations at the end of inductive teaching is very important, so that students do not only solve particular cases and make inappropriate conclusions due to particular anchoring in concrete. Thinking must be rigorously conducted towards relevant ideas that offer students the opportunity to apply them in various professional and life contexts.

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