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A PBL Aplication in Biochemistry Big Data to Student Learning

Ana-Maria Neculai[1]
Department of Biochemistry,
Ovidius University of Constanta
Constanta, Romania

Timur Chis[2]
Oil-Gas Engineering Faculty
Petroleum-Gas University of Ploiesti
Ploiesti, Romania

Alina-Maria Gligor (Fădălau)[3]
Department of Mechanical,
Lucian Blaga University
Sibiu, Romania

Doru Bârsan[4]
Oil-Gas Engineering Faculty
Petroleum-Gas University of Ploiesti
Ploiesti, Romania

Abstract:- The production industry of para pharmaceutical products (for beautification or non-threatening treatment of some health problems) is based on the practical experience and theoretical training of pharmacists and biochemists. Starting as an alternative to classic synthetic drugs, the manufacture of natural ointments has gained a lot of momentum in Romania, not requiring a complex authorization similar to the drug industry. That is precisely why training courses in the use of natural products in the beauty industry and the manufacture of bio-natural products with applications in beauty have been introduced within the framework of universities of medicine and chemistry. The stages of team formation necessary for learning in the PBL (Project Base Learning) system are presented.

Keywords:- *Biochemstry, Student Lectures, PBL, Control Strategies.*

I. INTRODUCTION

Romanian higher education underwent several stages of application of learning techniques after the education reform in 1948.

Following Romania's transition from the multi-party system and private property to the single-party system and state property, the education system adapted to Soviet pedagogical principles.

Thus, in this system, the student's brain was considered to be sponge-like and able to absorb information on a conveyor belt. In this case, the teacher distributed the information during the course, and the assistant taught the applications during the knowledge consolidation classes.

The examination consisted of retaining all the information taught by the teacher, not accepting a modification or especially an interpretation of it.

Also, medicines and products necessary for cosmetic treatments are produced according to Russian manuals, and students in specialized laboratories carry out the practical applications.

The theory of the education system was to create specialists (from people with low incomes) in the priority fields, even if they had no call to work in the professional field of theoretical and practical training.

After 1968, when Soviet coordination was removed from Romania, and higher education was improved according to the teaching techniques of the United States of America and France, medicine was transferred to the training of medical faculties, and the chemistry faculties developed the structure of beauty products.

During this period, a governmental industrial center was also created to coordinate and develop the beauty products industry (balms, creams, ointments, etc.).

New products are also being developed for the Romanian market, starting from the properties of some sapropelic muds (produced in Techirghiol and Balta Albă lakes) and geriatric products (Ana Aslan range).

Researchers patented the products, but their practical production was given to chemical factories.

Also, economic espionage and the copying of some products from developed countries resulted in the production of other components of the beauty industry (in line with those from abroad, but without paying licensing fees).

Higher education has moved to a new phase of development, namely the creation of specialists depending on the needs of the production market. The number of places for admission to the faculty is correlated with the number of places needed for industrial development or to fill the vacancies left after the retirement of specialists [1, 2].

Teaching was done according to textbooks copied or imported from Western countries, and education was correlated with the demands of the market and especially with the material and financial resources of the communist government.

During that period, selective learning of some chapters (depending on the exam subjects) and teamwork in the chemical and biochemical studies laboratories are put into practice [3].

After 1980, the reduction in funding led to the use in university laboratories of some techniques and reagents at the level of a chemical experience per student class, the phenomenon being discussed more from a mathematical point of view and less the reactivity of some chemical products or compounds.

Repetitive learning techniques were also used; after completing the faculty, students had to start learning industrial techniques (which were not deepened in university education classes) all over again.

The revolution of 1989 led to the creation of new units (faculties) of pharmacy and biochemistry (from six faculties—Bucharest, Timișoara, Iași, Cluj Napoca, Târgu Mureș, Craiova—six more were created—Oradea, Arad, Brașov, Constanța, Galati, Suceava), two of which are private.

Also, the number of admission places increased from 300 to over 3000 per year.

In this way, a trained workforce was created for the international pharmacy chains, especially for the new drug and beauty processing plants.

Following the privatization of the cosmetics factories (Iași, Cluj Napoca, Bucharest, Brașov), the products made were increasingly difficult to distribute and sell due to the claim of production patents (Niveea claimed the patents of the products obtained in the factory in Brașov), factories began to close and the business to be liquidated.

The patents for the cosmetic products Aslan (for geriatrics) and Pell Amar (based on the sapropelic mud from Balta Albă) were taken over by the researchers' heirs, and small production units were developed or ceded to strategic investors.

Also, new units were created for research, implementation of production techniques, and marketing of new products based on the existing flora in Romania (being developed industrial units at Piatra Neamț-Plantavorel, Bucharest-Hofigal, Plafar), as well as small production laboratories (Techirghiol-Techir, Dobrogea Natural Farm-Comana).

Thus, new study programs were created within the Faculties of Medicine and Pharmacy and the Faculties of Chemistry, namely:

- Cosmetic techniques,
- Elements of biochemistry of medicines and natural treatments.

- *Analyzing the Industry Producing Compounds Necessary for Cosmetic Treatments, we can draw the Following Conclusions:*

✓ The industry is highly fragmented, being dependent on cheap imports from Turkey and African countries,
✓ The products are too little legislated; the factories only have the obligation to implement ISO quality standards,
✓ The products are too little accepted for distribution by pharmacy chains (they are dedicated to their products),
✓ Phytosanitary pharmacies were created, in the vast majority of cases being coordinated by elderly or passionate chemists and pharmacists,
✓ Faculties study more the toxicology of products and not their manufacture, marketing, and use in the beauty industry,

In this case, it appeared necessary to use Romanian or imported flora (lavender, etc.) in the production of medicines and natural products, Romania having the richest collection of chemically and toxicologically unpolluted flora in Romania.

Also, the large number of students makes their preparation difficult. Education is currently focusing on the budget of creating specialists only due to the demand of the students and without considering their employment prospects.

II. PROJECT PRESENTATION

After the Coronavirus pandemic, education had to be recreated according to the concept [4]:

➢ *Each Student must be Prepared according to his Needs during the Discussion with him.*

This concept had to be implemented due to the emergence of material shortages (many companies closed) and especially because many students work to supplement their income or support themselves (mostly coming from families that emigrated).

That is precisely why we have implemented a new concept of learning and developing their personality in laboratory hours based on the following:

- The study of their personality (each student being tested regarding team behavior and especially understanding of working in bureaucratic and team structures),
- The creation of products that could ensure the opening of small productive units of graduates (for example, soap or conditioner production units created from multiple natural elements and small production),
- Obtain new teamwork skills, especially working with modern equipment, under stress, and individually.
- Creation of new ecological products applicable to the Beauty industry (new creams or perfumes),

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- Obtaining products by creating mixing recipes of industrial compounds or obtained through chemical synthesis,
- The creation of products necessary for the beauty industry, based on the change in the environment (increasing the temperature of the ambient air, the multiplication of spores from spontaneous flora, the presence of ambrosia in everyday life),
- Understanding the elements of automatic management of productive processes, based on the theory of automatic systems,
- Obtaining products based on aspects of artificial intelligence, especially user requirements;
- Working with statistical tests on the population's needs, starting from the data obtained on the samples.
- Obtaining skills to discuss in a team and present their products and results in public (at conferences and symposia) and in specialized journals.

As part of the project, the students will carry out the following work protocol [5]:

- The choice of a necessary product to obtain,
- The specialty documentation and the development of the work techniques necessary to obtain this product;
- Writing laboratory techniques and procedures for calculating work steps,
- Computer simulation of obtaining the product (with software specialized in this field),
- Making the necessary chemical substances and ingredients,
- Realization of the technological scheme and the necessary laboratory technique and equipment,
- Establish biochemical, bacteriological, and public health safety control elements and work area.
- Creating the work installation and establishing the work parameters,
- Creating chemical precursors and starting experiments,
- Analysis of environmental factors that can influence the process and elimination of absurd results,
- Step-by-step analysis of the obtained product and the creation of new techniques for the development of the final product, depending on the results obtained,
- Optimizing the process and determining staffing requirements,
- Realization of the final product prospectus and marketing strategy,
- Conduct independent tests and publish the product prospectus and elements of uniqueness and use (description of possible contraindications).

In this case, it is proposed to work in teams, based on the project technique, namely:

- Establishing four products required to be obtained by the work teams,
- Creating teams according to students' desire to work in groups related to their training and affinity,
- Carrying out the personality test and redistributing the teams according to the data obtained during the tests,
- Establishing the roles in the teams, depending on the wishes of the study group members and the data obtained in the personality tests,
- Analysis of the requirements of the roles within the team and the redistribution of tasks according to the intellectual and skill possibilities of the students,
- Establishing the team leaders and discussing with them the minimum quality requirements of the products needed to be obtained,
- Establishing the roles within the teams by the team leader and assigning the necessary time to the documentarian to study and present the documentation for the creation of the product,
- Establishing the product recipe and work technique by the group technologist,
- Creation of the working plant and risk analysis in operation by the process engineer and the risk assessor,
- Process and work technique analysis and discussion of elements that could affect product quality and process biochemical safety. This is done by the critic (dissatisfied) of the group.

All process stages are monitored based on standard worksheets and all safety elements being met.

During the practice hours, the following were achieved:

- Ecological soaps made from plants (lavender, dandelion, etc.) harvested from the flora of Spota or grown in Dobrogea,
- Ointments are necessary to protect hands at work in the automotive industry,
- Crème is for the beauty industry, and
- Conditioners for the treatment of human skin and hair.

Each product has been tested using artificial intelligence based on clinical tests and user feedback.

In principle, the users were family members or fellow students.

III. EXPETED RESULTS OF THE PBL STUDENTS PROCESS

➢ *At the end of the Applications, Students will be able to [6] (fig.1) (Table 1):*

- To write a project to obtain a bio-natural product,
- Lead a process to obtain a salable product,
- To know the bio-chemical safety work procedures applicable to biochemical technological processes,
- To be able to obtain a numerical simulation model of obtaining a new product,
- To be able to create the necessary documentation for the promotion and distribution of a new product,
- To work in a team,
- To write articles and present the results in public, at conferences and symposia,

- To be a critical voice of chemical products and realize the possibilities of replacing them with environmentally friendly products (from renewable resources),
- Be able to run a chemical unit and develop their own business in that field

Table 1 Expected of Students Finally Abilities

	Type of activities	**% Procents**
A	To write a project to obtain a bio-natural product,	10
B	Lead a process to obtain a salable product,	10
C	To know the bio-chemical safety work procedures applicable to biochemical technological processes,	10
D	To be able to obtain a numerical simulation model of obtaining a new product,	10
E	To be able to create the necessary documentation for the promotion and distribution of a new product,	10
F	To work in a team,	10
G	To write articles and present the results in public, at conferences and symposia,	20
H	To be a critical voice of chemical products and realize the possibilities of replacing them with environmentally friendly products (from renewable resources),	10
I	Be able to run a chemical unit and develop their own business in that field	10

IV. CONCLUSION

The industry dedicated to biotechnologies is an industry full of challenges, the students being prepared mainly theoretically and less practically to face the challenges they will be subjected to during employment or the development of future design and engineering activities.

That is precisely why the use of project-based learning techniques is one of the best techniques, being useful in the rapid development of students' practical skills.

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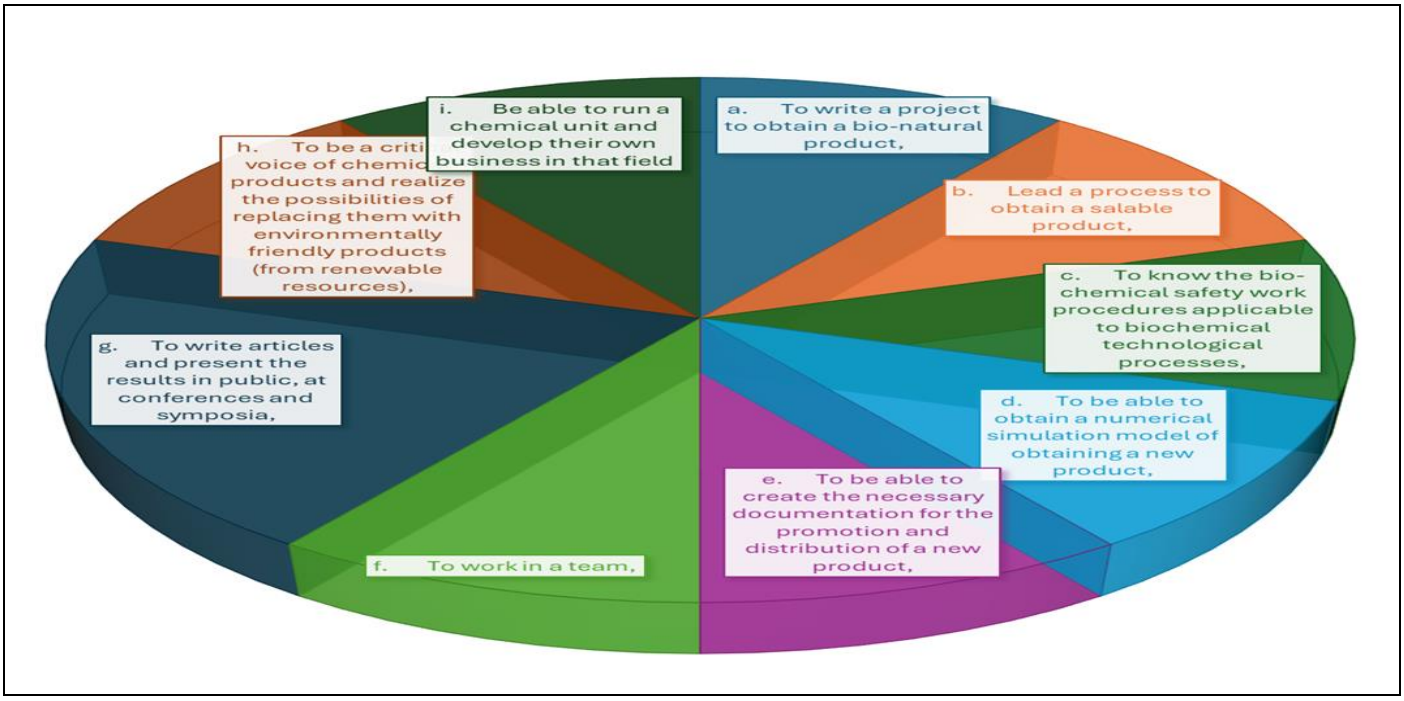

Fig 1 Expended Result to PBL Aplication