

## **Building Structure of Self-Learning Capacity about General - Inorganic Chemistry for Students at the Medical College**

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### ABSTRACT

Self-learning is the process by which learners perform activities such as self-learning, self-expression, self-examination (may or may not need the support or cooperation of others) Self-learning ability has a general structure from two groups which is the intellectual competency group and the action competence group. In particular, the intellectual capacity of the internal element, it is revealed through the power of action. At the same time, it is also a fundamental element, the basis of action capacity. Based on the theory of competence and self-learning; general structure of capacity; the reality of developing self-learning ability and psychological characteristics of students at the Medical Colleges; college standard on Health Science output. The structure of general-inorganic Chemistry self-learning competence is built in 3 stages corresponding to 3 elemental competencies: (1) Develop a self-learning plan, (2) Implement a self-learning plan, (3) Self-check and assess. They are represented by 8 criteria and each criterion is described by 3 levels.

**Keywords: Self-learning capacity, structure, motivation formation, planning, implementation, self-assessment**

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### 1. Introduction

Currently, the problem of self-learning is becoming more urgent, so there have been many researches on the use of measures to develop self-learning capacity for students. In the field of teaching chemistry at university, there are a number of research works that mention the formation of self-learning ability for students through self-learning materials and the process of using them in teaching. Typically, the authors are Dang Thi Oanh, Duong Huy Can, Nguyen Thi Nga, Nguyen

Thi Kim Anh (2008), Innovating Teaching Methods at Universities towards strengthening self-learning capacity, and Self-research students. [1]. Duong Huy Can (2009), Strengthening self-learning capacity for chemistry students at pedagogical university by self-guided module learning. (Ph.D. in Educational Science, Hanoi University of Education) [2]. The dissertation assessed the status of learning and self-learning of chemical pedagogical students, proposed scientific bases to propose measures for fostering self-learning capacity and proposed 4 measures to

implement fostering skills. self- learningforce for students: Motivational education, proper awareness about learning, Self- learningand the necessity and benefits of self-study; Fostering students the right method of self- learningand science; Guide students to organize learning and self- learningactivities; Instruct students to use the learning facilities. Nguyen Thi Nga (2010), Develop and use self- learningmaterials guided by the general chemistry basic knowledge module - the specialized high school program that contributes to improve the self- learningcapacity of students (Doctoral Thesis in Educational Science, Hanoi University of Education) [3]. The thesis has built the principles and designed learning materials according to modules; Instruct students to use self- learningmaterials. However, the research authors in the field provide overall support for pedagogical students and students specializing in modular self- learningmethods. They have not formed the method and form of developing mathematical representation in Chemistry.

Self-learning is one of the determinants of the quality of education and training quality at the Medical College. General inorganic chemistry is a module that combines experiments with theory on the basis of logical reasoning; There are many contents related to practice, so it is suitable for applying modern teaching methods. Accordingly, teachers guide the role of organizing, supporting, evaluating and encouraging students to promote their autonomy and creativity in learning. Since then, forming and developing self-learning capacity for students. Self-learning ability is only measured through manipulations and results of performing specific tasks of the components of self-learning ability according to a certain logic. Self-learning capacity is a multi-level and multi-level structure including a system of skills. Each skill consists of a system of intellectual manipulations and practices. In order to formulate and develop self-learning ability, students must always have a sense of perfecting a system of skills in the structure of self-learning ability; forming a complex sequence of conditioned reflexes in the order of cognitive development.

This article deals with the principles and procedures of building inorganic self-learning chemistry structure for medical college students including 4 stages corresponding to 4 elemental energy. They are represented by 10 criteria and each criterion of each competency is described in 4 levels.

## 2. Content

### 2.1. Self- learning and forms of self-learning

#### 2.1.1. Self-learning

Self-learning is an activity that occupies an important position in the teaching process. According to Russian professor Zinoviev: "Self-learning - it is the independent learning of students taking place in parallel with the teaching process". Author Luu Xuan Moi [4, p.18], Hoang Anh, Do Thi Chau [5, p.97] said: "Self-learning is a form of individual cognitive activities in order to master the knowledge system and skills conducted by students themselves in class, outside class according to or not according to the prescribed curriculum and textbooks. TH is a basic form of teaching organization in universities with high independence and imbued with individual nuances but closely related to the teaching process".

Self-directed learning definition of Malcolm Shepherd Knowles is used more often in the learning of school education, namely: Self-learning is a process where learners conduct learning activities by themselves. , may or may not need the support of others, predict their own learning needs, identify learning goals, discover resources, and help people with the learning process , know how to select and implement learning strategies and evaluate performance [6, p.18]. In our opinion: Self-learning is the process by which learners conduct learning activities by themselves (self-learning, self-express, self-test), may or may not need the support or cooperation of others (direction). lead, organize, arbitrate). Learners are always proactive in putting themselves into learning projects, handling learning projects to gain knowledge, form and develop their own skills and techniques in order to achieve their learning goals.

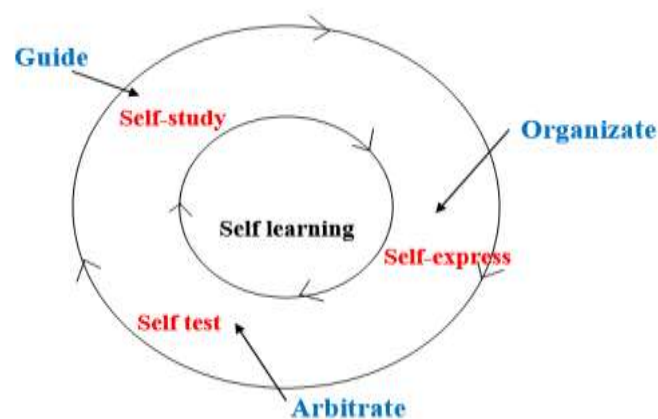


Diagram 1. Self-learning cycle

#### 2.1.2. Forms of self-learning

We can identify it through the following forms of self-learning:

+ Self-learning without guidance (through practice): This form is popular in social life, learning through communication, learning through labor, learning through the mass media, etc. In this form, knowledge, skills, and attitudes are experienced by the learners themselves through practical activities (learning without knowing they are learning). This form of self-learning is done by the learners themselves. There is no teacher instructing on purpose, without a set plan and purpose. This form is random in everyday life: "Take a day, learn to be smart", learn anytime, anywhere, in labor as well as play, entertainment, ... Professor, advance Doctor Nguyen Canh Toan stated that learning at all levels is: Learning everywhere, learning at any time, learning by all means, learning in all situations, learning people, learning through all contents [7].

+ Self-directed learning: Students who want to learning effectively need to learn by themselves. But it is not possible for students to grop for their own self-learning but to learning how to guide students and create conditions for students to successfully implement self-learning. Self-learning instruction is to teach learners how to gain knowledge effectively, and at the same time guide students to self-assess their abilities. Thereby each student will have the appropriate adjustments to their learning. Self-learning takes place outside of class time (with instructional materials or not); Self-learning in class (with the help of teachers directly or through instructional materials).

The process of achieving students' learning goals in the form of self-learning requires the active and highly independent of each person in learning. The amount of knowledge in a subject becomes knowledge of students only when students master the knowledge and skills to practice professions.

**Diagram 2. The process of achieving students' learning goals in the form of cases**

## 2.2. Capacity, self-learning capacity and the general structure of self-learning capacity

### 2.2.1. Capacity

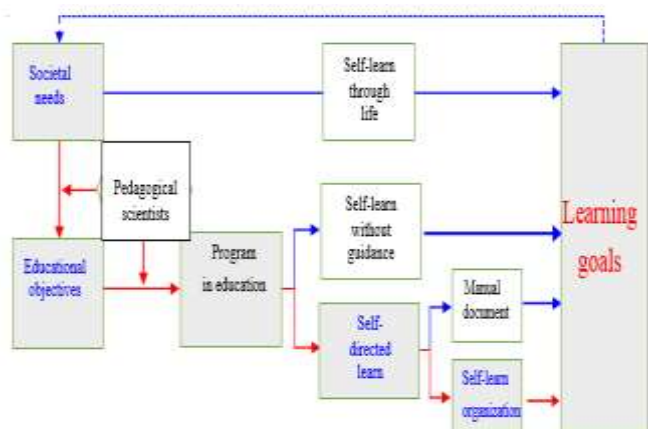
From the point of view of psychologists: Capacity is a combination of characteristics and psychological attributes of an individual in accordance with the specific requirements of a certain activity to ensure the activity. Emphasizing on the performance of competencies, FEWeinert (2001) defines "Capacity is the ability to perform effectively and responsibly actions, solve tasks and problems in professional fields. industry, society or individuals in different projects on the basis of applying knowledge, skills, techniques and experience as well as willingness to take action"[8].

According to the general education program of the Ministry of Education and Training: "Capacity is a wing attribute formed and developed thanks to the available qualities and the process of learning, practicing and allowing people to mobilize. synthesize knowledge, skills and other personal attributes such as interests, beliefs, wills, etc. to successfully perform a certain type of activity"[9]

From the above points of view, we think that: "Competence is the ability to master the system of knowledge, skills, attitudes and apply them appropriately to successfully perform a task in the most appropriate context. "

### 2.2.2. Self-learning ability

Self-learning ability is one of the most important competencies that university students must have, because self-learning is the key to a lifelong learning society. According to the authors Thai Duy Tuyen: Self-learning ability is not only a learner actively acquiring knowledge, attitudes and skills suitable for learning but also the ability to apply knowledge and skills into the prize. decide on a specific learning task; It is the result of a school learning process combined with personal experiences gained from out-of-school experiences [10]. At the universities and colleges of our country today, the self-learning process of students manifests itself at various levels, Students can learning passively, spontaneously or under the process guidance. and supervision and inspection by lecturers. Passive and spontaneous self-learning inevitably leads to students' limited learning outcomes, the amount of knowledge gained is only discrete knowledge through reciting and naturally



not being able to form energy Active force, creativity in learners. In the process of self-learning, students' learning ability will be developed if each individual knows based on their inherent characteristics and skills. Find learning methods and materials that are appropriate for your own cognitive abilities.

Summary, it can be generalized that: Self-learning capacity is the ability of learners to flexibly and proactively use existing knowledge and skills to successfully perform learning tasks by self-selecting and developing. identify activities that affect the lesson content to gain knowledge, develop skills and techniques to achieve the learning goals.

### 2.2.3. General structure of self-learning competence

Self-learning skills are only measured through manipulations and the results of performing specific tasks of the components of self-learning ability according to a certain logic. The self-learning ability has a complex structure, it is made up of two groups of competency components, the group of intellectual energy and the group of action ability. In particular, the intellectual capacity of the internal element, it is revealed through the power of action. At the same time, it is also a fundamental element, the basis of action capacity. However, the capacity for action plays a key and decisive role in self-learning results.

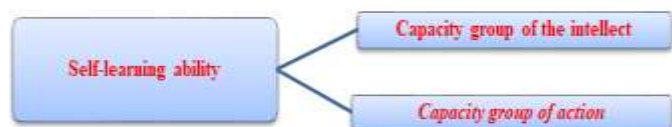


Diagram 2. General structure of self-learning capacity

Specifically:

The group of intellectual competency elements includes knowledge of self-learning methods for the subject itself wants to learning; identify the roles, meanings and results that self-learning brings. From there, forming the attitude, motivation and interest of the learners themselves with self-learning as well as the level of mobilization and concentration of resources and conditions for self-learning to achieve the set goals.

The group of action capability components includes:

(1) Self-development and implementation of an individual's learning plan: is an important component of the learner's self-learning ability because when students know how to develop a

learning plan, they are self-committed. with yourself about your studies, thereby inspiring them to learning hard, overcome difficult obstacles to achieve the defined goals.

(2) Self-working with learning materials: shown in students self-learning the content of the textbook before listening to the lecture; think for yourself about the contents of the curriculum; self-learning, the system of the content of the textbook after listening to the lecture. Working with the curriculum will train students the ability to think logically, self-learning ability, educate thought, healthy emotions and correctness for students.

(3) Self-discovery and problem-solving: self-reliance on old and new knowledge, analyzing characteristics and manifestations to find out problems, deepening the knowledge and experience of self accumulated. In the process of solving the problem, students can consult additional resources from the media or seek support from faculty and friends. Therefore, problem discovery and problem solving is not only an important element of self-learning competence, but also a combination of elements of thinking capacity; capacity to work with documents; ability to find learning materials; cooperation capacity.

(4) Self-recording and collecting information: In self-learning, students must know how to combine and apply many activities such as listening, taking notes, thinking, answering questions, exchanging, discussing, activities. group. It is very important for students to know how to take notes appropriately and to select their knowledge so that they can take notes according to their own understanding. Students also need some skills in note-taking such as itemization to track, key ideas, comprehension, use of abbreviations and consistently self-convention symbols. , there are things that can be generalized into diagrams and tables.

(5) Self-researching materials and exploiting teaching facilities: Searching for learning materials to help students access and use rich, quality and effective learning materials. Traditional types of audio-visual materials - media, such as pictures, magazines, books, newspapers, documentaries, tables, diagrams, CD, VCD, DVD, films, videos, materials, modern media such as computers, internet, electronic boards, ICT software, virtual movies.

(6) Self-test, assessment, review and consolidation of knowledge: Self-identification and correcting

self-errors and limitations in the learning process to help students reflect on their learning style, summarize experience to be able to share and apply to other projects. Based on the feedback, students know how to plan and adjust their learning styles to improve their learning quality.

Summary: Self-learning capacity is a multi-level, multi-level structure consisting of a system of skills. Each skill consists of a system of intellectual manipulations and practices. In order to formulate and develop self-learning ability, students must always have a sense of perfecting a system of self-learning structure skills, forming a series of complex conditional reflexes in the order of development. cognitive development.

### 2.3. Building a structure of inorganic general self-learning capacity for Medical College students

#### 2.3.1. Principles of building an inorganic general self-learning capacity structure

To determine the principles when building self-learning competency structure, we base on the following bases: Theory of capacity, capacity structure, the reality of developing students' self-learning capacity at Medical colleges, characteristics, psychology of students of Health, standard of output level College of Health Sciences On that basis, we offer the following 5 principles:

##### Principle 1. Ensure systematic and scientific

This is a general principle, mandatory for all competencies. Accordingly, the structure of self-learning capacity must be logical, clear, have a reasonable correlation between component competencies, between evaluation criteria, and the terms must be easy to understand, accurate and scientific.

##### Principle 2. Ensuring reliability

To ensure this principle, after building the self-learning capacity structure, it must be tested by expert methods.

##### Principle 3. Ensuring conformity

This principle dictates that the selection of assessment criteria must be consistent with the criteria in the College of Science Health output standard, the psychological and cognitive characteristics of Health students. According to this principle, the criteria for assessing self-learning ability should be divided into levels from low to

high to suit the assessment of self-learning ability for students.

##### Principle 4. Ensuring practicality

This principle requires that when building the capacity of self-learning capacity, it must come from studying, analyzing and assessing the situation of teaching inorganic General Chemistry at the College of Health, appropriate teaching methods.

##### Principle 5. Ensure diversity and comprehensiveness

To ensure this principle, in each elemental capacity will have specific criteria. All evaluation criteria in the capacity structure are closely related, playing a comprehensive assessment of students' self-learning. At the same time, when building component competencies, it is necessary to pay attention to the dialectical relationship between the elements of the teaching process, in which the teaching method is closely linked and influenced by goals and contents.

#### 2.3.2. The process of building self-learning competence structure

The structure of self-learning capacity plays an important role in learning for Health College students and is meaningful for both lecturers in building assessment capacity. We built the inorganic General Mechanism self-learning capacity structure in a 5-step process:

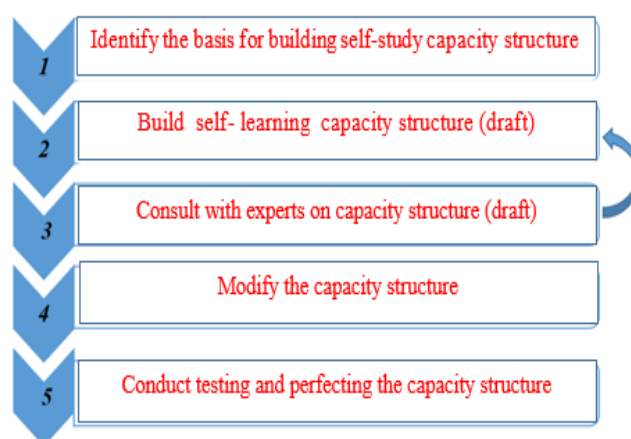


Diagram 4. Process of building self-learning capacity structure

##### Step 1: Identify bases for building self-learning capacity structure

In order to structure the mathematical representation in accordance with the educational practice in Vietnam, we rely on the output standards of the health science college sector. Stemming from

the process analysis, the meaning of self-learning activities, self-learning capacity and the overall structure of self-learning capacity

**Step 2: Building self-learning capacity structure (draft)**

We propose the structure of general and inorganic self-learning capacity including 3 stages corresponding to 3 component competencies as follows: (1) Capacity to develop self-learning plan, (2) Capacity to implement successive plans self-learning, (3) self-assessment capacity

After proposing component competencies, we proceeded to build criteria and describe criteria across three levels.

**Step 3: Consult experts on capacity structure (draft)**

After completing the draft self-learning capacity structure, we send to experts who are teaching chemistry at the Pedagogical Universities and experienced lecturers in chemistry teaching at Medical College. To self-learning, everyone needs to be motivated to study (motivation for awareness, responsibility for learning) and answer the question: "What is the purpose of learning for?", But only profit when students use their knowledge in learning and life projects. Therefore, it is necessary to have more criteria to apply knowledge

**Step 4: Modify the structure of self-learning capacity**

After receiving feedback from experts, the draft general and inorganic self-learning capacity structure was revised. Through the process of analyzing opinions, we realize that if you want to learn by yourself, each student needs to have 3 basic

**Table 2.1. Describe in detail the level of 8 criteria through 3 component competencies of self-learning ability**

(M1. Students are at a moderate level of competence, need to be fostered and developed ; M2. Students are at a fairly good level, need to continue fostering and developing; M3. Students with high competence , need to maintain)

| Elemental capacity           | Criteria evaluate     | Level          |  |
|------------------------------|-----------------------|----------------|--|
|                              |                       | M <sub>1</sub> | Identify learning goals but not clear and not specific   |
| Develop a self-learning plan | Define learning goals | M <sub>2</sub> | Identify Clearly learning goals but not yet focused  |
|                              |                       | M <sub>3</sub> | Identify your learning goals fully and correctly   |
|                              |                       | M <sub>1</sub> | Identify learning tasks but not enough for each content  |
|                              | Define learning tasks | M <sub>2</sub> | Identify the full learning task for each content but not clearly defining the activities to be carried out |

components. We have revised the structure of self-learning capacity including 3 component competencies with 8 criteria

**Step 5. Experiment and improve the structure of Self-learning capacity**

We have conducted experimental self-learning capacity structure for medical students in two classes of the Ca Mau Medical College, the Bac Lieu Medical College to test the feasibility, objectivity of the scale and complete the structure. We propose the structure of general and inorganic self-learning capacity for medical college students including 3 component competencies and 8 corresponding criteria according to the capacity of the action.

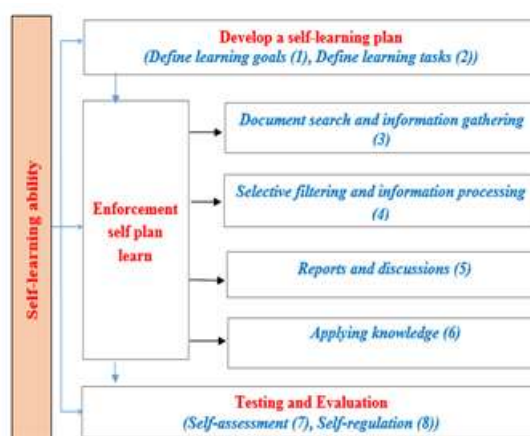


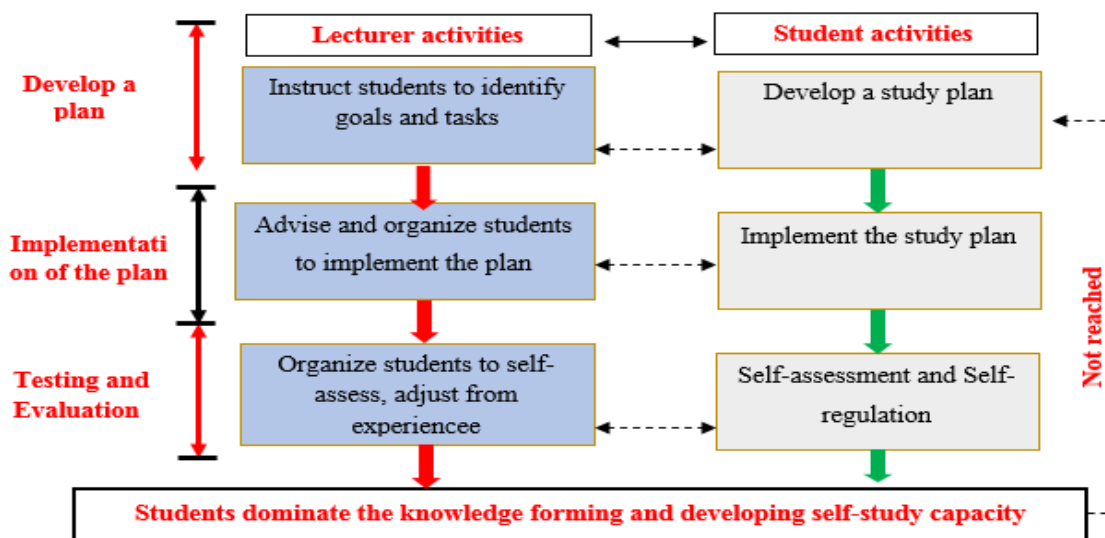
Diagram 6. Organizational structure of general and inorganic self-learning activities

From the structure of self-learning capacity, we propose a detailed description table with 3 levels of expression of the following criteria:

|  |   |                |  |
|--|---|----------------|--|
|  |   | M <sub>3</sub> | Identify adequate learning tasks for each content, activities to be conducted, and time for activities.  |
| <b>Enforcement<br/>self plan<br/>learn</b> | <i>Document search and information gathering</i>      | M <sub>1</sub> | Collected very little information about references, need to find using basic methods like reading and writing  |
|  |   | M <sub>2</sub> | Collected a lot of information sources but the reliability is not high in many different forms, not paying attention to learning goals and tasks                           |
|  |   | M <sub>3</sub> | Collected a full range of information to be found with confidence, high selectivity in many different forms and very suitable for learning goals and tasks                 |
|  | <i>Selective filtering and information processing</i> | M <sub>1</sub> | Select and analyze a small amount of information for each content and know how to check the accuracy of some information   |
|  |   | M <sub>2</sub> | Select and analyze quite a lot of information for each content and know how to check the accuracy of quite a lot of collected information.                                 |
|  |   | M <sub>3</sub> | Select and analyze sufficient information for each content and know how to check and evaluate the accuracy and completeness of the collected information.                  |
|  | <i>Reports and discussions</i>                        | M <sub>1</sub> | Present clearly, with accents, but not appealing to listeners.   |
|  |   | M <sub>2</sub> | Present clearly, coherently, with highlights that attract listeners but have not yet answered all the additional questions from the lecturer or classmates.                |
|  |   | M <sub>3</sub> | Present clearly, coherently, action that attracts listeners and answers additional questions from lecturers or classmates.   |
|  | <i>Applying knowledge</i>                             | M <sub>1</sub> | Applying knowledge to some specific situations   |
|  |   | M <sub>2</sub> | Applying knowledge to solve many different situations  |
|  |   | M <sub>3</sub> | Applying knowledge to solve most of different situations   |
| <b>Testing and Evaluation</b>              | <i>Self-assessment</i>                                | M <sub>1</sub> | Recognize the pros and cons of yourself, but not yet determining the cause   |
|  |   | M <sub>2</sub> | Recognize the strengths and weaknesses, begin to identify some causes  |
|  |   | M <sub>3</sub> | Recognize the strengths and weaknesses clearly, identify the cause based on the results achieved   |
|  | <i>Self-regulation</i>                                | M <sub>1</sub> | Overcome and adjusted some errors and limitations but not yet know how to self-adjust the way of learning  |
|  |   | M <sub>2</sub> | Overcome and adjusted some errors, limiting and self-adjusting the way of learning, but there are still some points that are not consistent with learning goals and tasks. |

|  |  |                |  |
|--|--|----------------|--|
|  |  | M <sub>3</sub> | Overcome and adjust errors, limiting and self-adjusting learning styles to suit learning goals and tasks |
|--|--|----------------|--|

From the structure of Self-learning capacity and problem research on the teaching-learning relationship in organizing Self-learning teaching (self-learning must be organized and guided). We propose a process of organizing general and inorganic Self-learning for medical students through the following stages:



### Capital 2.2. Process of organizing general and inorganic Self-learning activities

### 3. Conclusion

Teaching in the direction of developing Self-learning capacity in schools in general and Medical College in particular, forming in students basic element competencies to apply knowledge and skills learned by students to solve urgent problems that arise in life. In order to formulate and develop Self-learning ability, students must always have a sense of perfecting a system of skills in structure; forming a complex sequence of conditioned reflexes in the order of cognitive development. The identification of principles and building the structure of Self-learning outline General chemistry and inorganic chemistry consists of 3 phases with 8 steps corresponding to 4 component competencies with 8 criteria, contributing to the establishment of Self-learning organization process for medical students on the teaching-learning relationship (self-learning must be organized and instructed).

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