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USING VISUAL MEDIA IN TEACHING BASIC CHEMISTRY CONCEPTS AT SECONDARY SCHOOL TO DEVELOP THE EXPERIMENTAL CAPACITY OF STUDENTS

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INTRODUCTION

1. REASONS OF CHOSING PROJECT

In the tendency of complete integration of Viet Nam with all nations of the world, the Viet Nam education must be a spearhead pioneering in self innovation and improving quality. Viet Nam education including the chemistry subject has understood its obligation that Viet Nam education must produce the students' generation who have a thinking competence as well as a good morality satisfying the economic and social development of nation.

At secondary school, chemistry is a new subject for students, therefore there are difficulties for student to approach and understand stablely. In order to overcome one of the most difficult in teaching chemistry, The basic concepts of chemistry must be taught by a suitable method and euqipments.

Document of national party congress stated that: "Renew basic and the whole education and training", "Continue to develop and upgrade the techincal facilities for education and training departments.

With the investment of the government, the educational scientists must guide the gavernment and use effectively the loand invested including visual and technical equipments. A suitable teaching method is a method which can guarantee to improve the creative thinking of learner, get good results using the abailable conditions efectively. This can be revealed by the quality of learner after being trained via the skillful of worker, professional scientists or excellence leaders.

By investigating the teaching concepts in chemistry at secondary schools, we recognited that there are several limitation in using visual media and teachnical facilities to help students to perceiving knowledge. So far in Viet Nam, there are several works which studied the formation and development of basic concepts in chemistry. In this dissertation, we study, approach these in term of advanced teaching methods and propose some way to combine effectively teaching method with visual media and technical equipments used for national education. Therefore we chose the project with a tiltle: "**Using visual media in teaching basic chemistry concepts at secondary school to develop the experimental capacity of students**".

2. AIM OF STUDY

- Study the time to form and develope some basic chemical concepts at secondary school. Study the needed condition to guarantee the formation, development and the relationship of concepts mentioned above.
- Study the role of visual media and technical equipments in the present situation in teaching to form and develop the basic chemical concepts.
- Study the ways to combine and use visual media (VM) mentioned above effectively to guarantee the formation and development the basic chemical concepts with the best results.

3. TASKS OF STUDY

- Study theory and reality of project. Collect and analysize materials; summarize and write introduction. Study the reality of teaching chemistry at secondary schools (concentrate in teaching basic chemical concepts)

- Based on the structures and contents of curriculum of textbook of chemistry at secondary school, we chose visual media and technical equipments used for suitable lessons at reasonable time and conditions to guarantee the formation and development of the basic chemical concepts.
- Carry out the education experiment to prove the appropriateness, effectiveness and realizability of the project and the proposal.

4. OBJECTIVITY AND STUDY SUBJECTS

- Objectivity: Chemistry teaching at secondary schools.
- Study subjects: Visual and technical equipments used for teaching some basic chemiscal concepts at secondary school.

5. SCIENTIFIC HYPOTHESIS

If the isual and technical equipments are used scientifically and suitablely in teaching some basic chemical concepts at secondary school, the quality of the formation and deveploment of these concepts and the stability and accuracy of chemistry knowledge will be improved, therforce quality of teaching is also improved.

6. STUDY METHOD

6.1. Theoretical study method

Study theory and analysize the contents mentioned above. Update the advanced teaching theories, promote the activeness, creativeness of students at secondary school in the process of approaching chemistry knowledge. Investigate, determine the postition and the role of VM and clarify its relationship with other factors in teaching process.

6.2. Actual study method

6.2.1. Investigation method

6.2.2. Expert method

6.2.3. Method of education experment

6.3. Method of information handling

7. LIMITATION OF PROJECT

- Investigate the use of VM in teaching for forming some basic chemical concepts in grade 8 and 9 at secondary school.
- Concept of substance, atom, chemical element, elelement and compound, molecule, chemical formula and valence. The change of substances, chemical reaction, chemical equation and types of chemical reaction (combination, decomposition, replacement, oxidation-reduction). Mole, relative density of gases and chemical calculation.
- Properties of compounds: Oxide, acid, base, salt and some organic compounds. Properties of elements: Metals and non-metals...
- These basic concepts all present the content of the two most basic concepts and they are also the study subjects of chemistry, they are ***substance*** and ***Chemical Reaction***.This project was studied in some provinces of the northern Viet Nam including city, villages and remote areas....

8. SCIENTIFIC POINT OF VIEW AND CONTRIBUTION OF THE

DISSERTATION

8.1. Scientific point of view

Teaching process is the complete system in a systematically relationship of many factors. Visual media and Technical equipments are two important parts of teaching media. The study and use of them must be considered as they are in the closed relationship between parts of teaching process including: Aim content method equipment organized form teacher student result assessement and condition in which teaching process occurring.

Nature of teaching process is to organize the perceiving activities for students, orient students to approach and perceive knowledge, skill creativeness under controlling of teacher. The importance of improving the efficicency of teaching and reinforcing efficiency of using VM is orient positively the perceiving activities of students.

8.2. The main contribution of dissertation

8.2.1. Theory

Complete and develop teaching theory on formation and development basic chemical concepts at secondary school. Investigate and clarify the problems in theory related closely to visual media and teaching technical equipment (TTE) in teaching chemistry at secondary school, identify the relationship between the use of VM with positive way in perceiving activities of students and three basic methods: The use of technical equipments, TTE for illustration, reapearing,testing and solving problems for carrying out study method in teaching chemistry.

Propose 6 principles and establish a procedure containing 9 steps using TE, TTE to orient teachers to carry out teaching methods effectively according to positively perceiving activities of student in teaching chemistry. While, the established procedure is a good orientation for student and education college before taking part the real teaching at secondary school.

8.2.2. Reality

Survey and conclude the teaching result in formation and development basic chemical concepts (BCCs), deduce suitable education conclusion. Survey and evaluate the TE and the use of them at secondary schools.

Propose and carry out some ways using TE in the collected study. Build plan using TE, carry out the teaching at secondary school to improve quality of teaching process in forming some BCCs

Test and eveluate the fact efficiency then give the conclusions, required advices in using TE in teaching BCCs at secondary school.

CHAPTER 1. BASIC THEORY AND REALITY OF USING VISUAL MEDIA IN TEACHING BASIC CHEMICAL CONCEPTS AT SECONDARY SCHOOL TO DEVELOP THE EXPERIMENTAL

CAPACITY OF STUDENTS

1.1. Study situations in Viet Nam and in the world

Discribe the general studies related to visual media in teaching.

1.2. The visual media and teaching technical euqipments

1.2.1. Concept

In teaching chemistry, senses of student must be used effectively to gain every knowledge, skills. Therefore, "all study subjects (matter, phenomena, devices and models represented for objective reality), information resources from matters and phenomena are basic for direct perceiving (based on senses) knowledge, skills on study subjects, are called visual media"

"*Visual media are all tools (or media) used in teaching process by teachers and students in oerder to support knowledge, skill to students through their senses*".

1.2.2. The role of TE in teaching chemistry at secondary school

1./ TE are toolswhich help teachers to obtain the aim of lecture due to the active perceiving and excited perceiving of students.

2./ TE help us to save time, carry out the specification of division, develop observation skill, application and practical skill; develop perceiving competence, thinking, compared ability, generalization and summarization of students.

3./ TE guarantee safety; help teacher in guiding the use of experiment equipments, a standart manipulation of doing experiment for student to do experiments. Teacher can control the general activity of the class as well as individual student easily.

4./ TE help teacher teastand evaluate with different methods, high accuracy, short time and maximum objectivity.

5./ TE helps lectutes to become more lively and helps students to be more interesting in the subject and therefore get higher result in study

1.2.3. The use of VM with the positive trend in perceiving activity of students.

1.2.3.1. The positive trend in perceiving activity of students

Positiveness: "*There is an activity producing the change with the developmet trend"*. With aspect of teaching theory, the nature of positiveness is the renovation of subject according to objectivity, surrounding matters and phenomena.

Theacher can recognize the positiveness via following tips:

1. Students show their interest, contact with objectivity actively. They wish to know the contacting objectivity, give the questions about the objectivity: Who, what, how, why...? They also concentrate, listen, watch, always give idea and tend to have argument, discussion with friends and teacher.

2. They express the effort in activity, development of thinking, and recognize fast problems and relationship between factors in the study objectivity. They can understand fast people and make people understand them fast.

3. Study results of students show a reality of positive perceiving. Only

students who get a high degree of perveiving can have a good resulst.

The positive perceiving can be calssified into three degrees: Positive reapearance, positive using, ahigher degree in positive perceiving and positive creativity, that is the highest degree in perceiving revealed through the nature characteristics of subject, the overcoming the ordinary principles and the giving of new valuable things. The positive creativity shows impression of individual person and helps them to get good archievement, outstading of the average of perceiving in comparison to the rest.

1.2.3.2. Requirements when using visual media with the positive perceiving activities of students

- The VM neeed to be equipped synchronously at schools. For chemistry subject, this becomes more important. The equipments and chemicals need to be guaranteed for experimental tasks and for studied need of students and teacher
- The schools must be digitalized widely, the schools must be equipped well with informatics devices as well as internet connection.
- Teachers have to understand the functions of equipments used in teaching. They need to operate well, control well the running of the equipments and know how to guide students to operate those equipments.
- For using experiments in teaching chemistry, teachers have a good skill will impress students much, thereforce excite the curiosity, ambition of students to get the standard of teacher and make them to love science more.
- There must be a good procedure for using teaching equipments for getting the highest result. This need to hatucsa serious study producing a suitable procrdure. Otherwise, this will become dangerous and produce insignificant and waste as well as the boring of student.
- Combine the using of teaching media with traditional teaching or complex teaching method and advanced teaching techniques.

1.3. The formation and development of concepts in teaching chemistry.

1.3.1. Significance of the formation and development of concepts in teaching chemistry

1.3.2. Basic theory of the formation and development of concepts in teaching chemistry

1.3.2.1. Definition and characteristics of a concept

1.3.2.2. Structure of a concept

1.3.2.3. The principles of the formation of chemical concept at schools.

1. The formation of chemical concepts initially bases on the simple fact experience, knowledge which students obtained form other subjects. The chemical concepts formed must be accurated, united, precised and impressed students and make them to remember long time.

2. In teaching, VM must be used suitablely in which chemical experiments must be used effectively to make students understand lectures, excite and interest in studying chemistry subject. For example: The collected or prepared photos, models, samples, scheme, diaagrams. The experiments in lectures are caried out,

students will do themseves at home. Use projector, internet and smart phone with intelligent software to help students effectively for instant: Using films or imaginary or modelling experiments.

3. Train students the use of chemistry language accurately, scitifically and frequently from the begining lecture, such as, naming, symbol and chemical formulae; write and balance chemical equation.

4. Carry out all experiments from easy one to complex one to form and train the skill of doing chemical experiments of students.

5. Drill content, skill of applying knowledge, solving different types of chemistry problems in order to form the method of perceiving method in learning chemistry subject of students.

1.3.2.4. The important stages of the formation of chemical concepts.

1.3.3. The formation of basic chemical concepts of secondary school curriculum

1.3.3.1. System of important basic chemical concepts of secondary school curriculum

1.3.3.2. The formation of concept of a substance in secondary school curriculum

1.3.3.4. The formation of concept of a chemical reaction in secondary school

1.4. Innovation of teaching chemistry

1.4.1. Trend in innovating teaching chemistry

Our education is, step by step, innovating with the aim of solving two important tasks: Equip students the advanced and the most sophisticate scientific and technical knowledge, so they can apply on manufacturing.

Psychology and advanced teaching theory state that: *The most effective way to make students owing knowledge and developing creative competence is to introduce students to the position of subject of perceiving activity. By his/her self activity, he/she can gain knowledge, develop the creative ability and form morality idea*.

Exploit the characteristics of chemistry subject to form different types of activities of students in the class. Increase time for student with activities in the class. Increas degree of positive brain activity of student.

1.4.2. The positive teaching method

1.4.2.1. Concept of positive teaching method

1.4.2.2. The basic characteristics of positive teaching method

1. The teaching methods which concentrate in organizing, controlling student to be subject of activity and to investigate the unknown knowledge. In the class, students are organized, supported to take part in the study activity, so that they simultaneously gain knowledge, skill and perceiving method and study. In positive teaching method, the organizing students to gain knowledge is always related to skill and study method according to process from gaining knowledge-acting, knowing how to act to desiring to act. By this process, students develop their working personality and are active and creative.

2. The teaching methods which concentrate in skill, method and the habit of self learning will make students to form interest, desire to study and therefore

ignite the nature ability existing in each student. This help them to fit with life in the development of society.

3. The teaching methods concentrate in organizing the study activity of each student, study activity in a group, class via interaction between students and teacher, studenst and students. Student can understand knowledge, thinking way, and cooperating in a group with exchanging, discussing and revealing opinion of each person.

4. The teaching methods use combination of visual method widely, especially the teaching video, computer and software. The method offers individual study activity based on ability and need of each student, it helps student approaches to advanced media in developed society.

5. The teaching methods use diversity, objectivity testing and assessing methods. Thiss make student to take part actively in self assessement and alternative assessement. Content, method and model of testing and assessing are variety with the help of technical devices, computer and testing-assessing software in order to guarantee the objectivity, fact of the student's knowledge and training process. The change in assessement will affect much to the innovation of teaching method with positive teaching.

1.4.2.3. Visual method

1.4.2 Conversation- detection methods

1.4.2.5. Teaching method based on angle

1.4.2.6. Hand-on method

1.4.2.7. Teaching based on group cooperation

1.4.2.8. Some advanced teaching techniques

1.5. Constitute and develop student's chemical competence of experiment in shools

1.6. Reality of using visual media at some secondary schools

1.6.1. Investigation of reality

We have done an investigation with 2589 students (grade 8 and 9) and 108 chemistry teachers at secondary school located at: Quang Ninh, Hai Phong, Thai Binh, Nam Dinh. Bac Giang, Lang Son and Dak Lak provinces. The results are listed in the table below:

Survey sheet:

1./ Question: *Your comment on chemistry subject?*

Idea	Number	Rate %
Interesting	247	9.54%
Normal	1995	77.06%
Boring	347	13.40%

2./ Question: Degree of using learning equipment in chemistry lecture?

N#	Learning equipment	Degree of using /%			
		Always	Frequently	Rarely	Never
1	Photo	0/0%	0/0%	2318/89.53%	271/10.47%
2	Sample, model	0/0%	2553/98.61%	36/1.39%	0/0%
3	Film	0/0%	962/37.16%	1627/62.84%	0/0%
4	Computer – projector	183/7.07%	886/34.22%	1520/58.71%	0/0%
5	Experiment	810/31.27%	874/33.76%	905/34.96%	0/0%
6	Prepared equipment	0/0%	0/0%	116/4.48%	2473/95.52%
7	Collected materials	0/0%	0/0%	78/3.01%	2511/96.99%

3./ Question: *How to carry out experiments in textbook?*

Idea	Number	Rate %
Sufficient	2208	85.28%
Insufficient	381	14.72%
No experiment	0	0%

4./ Question: What lecture makes you interested in chemistry subject?

With this question, students themselves write the answer into the blank on answer sheet. Almost students (2554/98.65%) said to be interested in **chemistry lecture in which teacher uses projector, computer or does experiment and student are allowed to do experiment.** Some students said that, there are different way to solve problems producing interest. Many students said that lectures with experiment mentioned in the textbook have a high efficiency.

Besides, there are some ideas which mention the interest of chemistry subject in which films shown relationship between chemistry and real life are shown.

14/19 schools investigated all have from 1 to 3 projectors to serve mainly for meeting or school opening ceremony or teaching competition time, but not for teaching daily in the classes.

5/19 schools are equipped a projector for each class, these are bought by students' parent. 19/19 schools connected with internet system. Teachers all have own desktop or laptop.

1.5.2. Analysize results and give comment

From the results obtained from the survey mentioned above can see both teachers and students are very aware of the important role of the VM, especially the information technology equipment invaluable assistance improving efficiency for chemistry lessons.

However, we can see the real situation is common secondary schools have physical facilities, equipment and insufficient and poor; generally result in unsatisfactory. In the survey data, appears a very interesting point, namely: The

majority (90.46%) students that chemistry does not bring excitement to the children in learning activities (average and often boring), but most students (98.65%) are very interested in the school can use the VM with information technology applications; Student means including not find interesting chemistry is also interested in the chemistry lessons with the support of teaching media and information technology; Such lessons, but very few. Moreover, many teachers are qualified to exploit information technology at very limited. The training course of teaching method for teachers are insufficient. Teacher has no sense of self-collection, use teaching materials for his documentary.

CHAPTER 2. DEVELOP STUDENT'S COMPETENCE OF CHEMISTRY EXPERIMENT THROUGH USING VISUAL MEDIA IN TEACHING BASIC CHEMISTRY CONCEPTS AT SECONDARY SCHOOL

2.1. Analysis of the high school chemistry curriculum

2.1.1. The curriculum distributrion of high school chemistry

2.1.2. The objectives of the subject

2.1.3. The tendency of the renewing of curriculum and books in high school chemistry

2.2. The principles and procedure of using visual media in the formation and development of some fundamental chemical concepts in high school

2.2.1. The principles of using visual media in the formation and development of some fundamental chemical concepts in high school

*** Make use of available visual media.** As a source of the first signal system and the basis for the second signal system, the visual media always is the first choice for helping student to have initial image of a specific scientific issues, therefore to evoke excitement, focus the attention of students, train them observant, feeling and ability to act.

In the learning process, the abstractess of the knowledge is gradually increasing. To In the learning process, to clarify the scientific knowledge, we have to increasingly understand about the microscopic world. Cognitive route has to begin from simple to complex, so we must take advantage of visual media to ensure the initial steps of cognition, facilitate the following stages of cognition.

It is necessaty to take advantage of available visual media because our economic conditions are still limited, the funding for these equipment is in short supply. Moreover, the regular and continuous use create the habit and demand in the scientific and dialectical cognition for teachers and students.

*** Visual media is to incorporate with the lesson content and with the active learning methods to ensure the specificity of Chemistry.** The selection of visual media should firsly be conducted on the base of content knowledge that students need to acquire during lessons. The visual media has to highlight the main contents, make a profound difference in comparison with the perceived process without the support of visual media.

Based on the practical conditions of teachers and students, schools and

teachers should choose the active learning methods and modern techniques with its specific characteristics accompanied by the appropriate visual media that leads to the highest efficiency of the lesson, and avoid the excessive abuse leading to the disparating from the core knowledge. Each active learning method has its advantages in influencing the cognition of students, the visual media must be to strengthen and complete these benefits; particularly in chemistry it can be applied a various number of active learning method so the visual media must be properly incorporated.

*** Use visual media with suitable period and duration.** The visual media is capable to impact on multi-sensory of students, but it is not the universal tool to help students find knowledge. Teachers need to choose the suitable period of using them so that the visual media can evoke the scientific passion, orientate their thinking. When the role of visual media has been fully implemented, the teachers need to transfer the knowledge to other information channels.

During a lesson, teachers should plan in using visual media and conduct the lesson flexibly to ensure the maximum of their advantage rather than a complete replacement of leading role of the teachers.

*** Ensuring the safety and savings.** The Department of Chemistry always needs the visual media, so there are many potentially unsafe factors, such as from glassware, metal, hazardous, toxic and flammable chemicals, so there must be proper procedures for storing and using them. Currently in many institutions, this issue is careless, the storage rooms for chemicals and equipment are to use for learning equipment of many other disciplines, there is no responsible specialized division. Teachers, sometimes, in some places pay insufficiently attention to ensure the safety of using them.

There still have been chemistry lesson with using chemical experiments which are conducted on regular classroom but not the specific classroom and are not guaranteed with the minimum safety requirements. The safety issues depend on the consciousness of both the teachers and the pupils. In our opinion, it is necessary to quickly build subjective classrooms for Chemistry in the places which are safe for when using visual media, especially chemistry experiments.

In the general economic situation of our country, there still have been many difficulties and problems posing crucial saving issue. Teachers must be not too dependent on the provision of resources from the government but have to save and preserve the equipment, machinery, for multiple reuse. It is necessary to use the chemicals with suitable amount to avoid the waste of chemicals to reuse the chemicals. The cheaper chemicals are suggested.

*** Create, collect and improve visual media and learning tools.** This is an important tendency not only in Viet Nam but also around the world. The lessons using self-improvement tools are always highly evaluated and achieve the appropriate educational effectiveness. Furthermore: *"The self-improvement tools can satisfy the mandatory and fulfil the social demands which are suitable with local characteristics and the level of students' cognition in the specific conditions,*

so they bring the higher pedagogical effectiveness. These are the advantages that the instruments manufactured in the factories can not meet". So creating, collecting, and improving the visual media and learning tools are an important work of teachers and students for teaching in general and for teaching chemistry in particular.

Visual media is created, innovated, and collected to fulfil the topicality of the lesson, to update new knowledge, to excite students with the new knowledge from the tools. In addition it also considerably saves the money. In the learning process, the teachers need to realize some of the less reasonable visual media to give a reasonable improvement.

*** Make condition and opportunity for students to develop their chemistry compentence of experiment.**

2.2.2. Procedure of using visual media when forming and developing the basic Chemistry skills in Secondary Schools

Naturaly as a source of diverse knowledge, which can actively and effectively control the cognition activities of students, it is necessary to properly and scientifically develop a procedure of using the visual media. In our viewpoint, an optimal procedure has to go through the following three stages:

Stage I: Selection the method of using the visual media suitable with learning content

Stage I includes the following steps:

- Step 1: Study the lesson content carefully, determine the focus of knowledge, skill, technique needed to train students. Find out the proper relationship between them and active learning method to figure out the appropriate method.

- Step 2: Identify the main method (mostly) needed to use the visual media.

- Step 3: Choose the appropriate visual media. Teachers need to assess the specific impact of chosen visual media on the senses of students so that they create the effective concentration to control cognitive processes of students quickly, accurately, properly.

Stage II: Implementation

Stage II involves the following steps:

- Step 1: Design lesson plans and prepare visual media.

To do this step requires it is necessary to prepare carefully in all aspects, teachers should study carefully and clearly identify the objectives of the lesson, the level that students must achieve (what to know? what to understand? and how to use them?). Which learning method will be suitable to the knowledge of the lesson? Answering these questions will help teachers orientate the approaches and conduct the lesson better.

Teachers need to rely on the standards of knowledge and skill given by Ministry of Education and Training for chemistry in Secondary Schools; rationally use textbooks and reference books. In particular, teachers should have a reasonable method when guiding students in using textbooks, consider it as a source of information, suggesting and orientating the learning and cognition

process of students.

Lesson plans must show the visual media used at mentioned period, and how to explore it; the system of questions must help students discover and solve problems is a vital requirement for effective lesson. Lesson plans need relatively accurately estimate time for each specific activity.

The preparation of visual media preparing for each lesson is the work that requires a lot of time and effort. Depending on the actual situation of the school, students, teachers themselves have to be well prepared. Visual media should be divided into groups to manage, prepare scientifically; there are tools which can be used as many times as pictures, samples, experimental instruments that should be checked regularly; if there is loss or damage, it is necessary to repair.

- Step 2: Implementation

This is a complex combination of many activities mix to reach the ultimate goal is the advancement of students. Know the location and role in the process of visual medium teaching helps teachers get to use them effectively, through their properties

To evoke curiosity, passion for scientific knowledge, promote the sensitivity of the senses of students to help them realize the shortest path to reach scientific truth.

The information contained in the visual media must be fully exploited. Doing this will help teachers save a lot of time, effort and create passion, excitement student. The order takes steps need to be tight to ensure, however, that may arise from unforeseen circumstances, the teachers need to apply their pedagogical capabilities for controlling the operation of the classroom, avoid the loss of control.

In the process of implementation teaching can use visual media combined with positive teaching method need to pay attention to the following important issues: Ensuring safety, sanitation, engineering, arts of media used. To closely follow the general requirements for the content of lessons, avoid backsliding on aspects not the nature of issues to study, study.

Stage III: Testing and evaluation results using visual media. Unit this phase includes the following steps:

- Step 1: Organizing the inspection form written test after the end of the Unit. Scoring and collect data on students' scores.

- Step 2: Organize processing results of students scores and comparisons between the two experiment groups and geology, draws the quantitative assessment.

- Step 3: Investigation, consult with teachers and students interested in learning about the opportunities to be active, collaborative abilities of students in each lesson the students are learning with positive visual media in teaching method.

- Step 4: Summary of results, general assessment and conclusion, complete directions, supplemented. In our opinion, in this process, phase I act hinges, Phase II plays a central role, Phase III supporting role. On the basis of the general processes described above, we introduced the combined positive teaching method use chemical processes of TTE be consistent with the unit forming and developing

basic teaching of concepts of chemistry in Secondary School.

2.2.3. Visual media combined use of some specific positive teaching method when forming and developing concept of Basic Chemistry in Secondary School.

Use the teaching method of visual in chemistry should be done according to the general procedure described above. Phase I, III and Phase II step 1 of general application to all method. The difference is shown in Step 2 of the second phase (phase to realize the idea of specific actions: Teaching in class), which is due to the particular nature of specific teaching method should process implementation dissimilarity. Here are the specific work needs to proceed in step 2 of Phase II of the process used in the teaching using visual media.

2.2.3.1. Process using visual media under study characteristics

Visual media may be the starting point for the exploration of new knowledge and develop skill for students. Base options:

Goals, tasks and content unit (usually the unit of the quality or the basic theory can use this method); specific conditions of teachers, students and the existing infrastructure of the university.

The process of organizing the class - specific teaching: Method of study conducted over four phases.

Phase I: Orientation (two-step).

Step 1: Put the problem, use this step visual medias impact on the senses of student raises in them the need to learn the knowledge in accordance with available navigation system; characteristics of the nature visual media here suggestive of student curiosity about specific scientific issues.

- Step 2: Addressing the problem, students are self speaking his opinion according to the suggestion of the visual medias was given if the problem need to study, explore, solve here is. Phase II: Planning (two-step).

- Step 3: Recommend hypothesis, student-based self-understanding of their available, based on the suggestions of teachers to set out the possible hypotheses to solve the problem.

- Step 4: Plan settlement for each hypothesis, this is a very important step, must be supervised and if necessary adjust the teacher.

Phase III: Implementation plan (three steps).

- Step 5: Implement the plan, teacher control visual media they use under planned out by the manipulation right, ask them to record the necessary information, process information, giving the too.

- Step 6: Review the implementation plan.

For each hypothesis, we performed an evaluation plan and work it. If confirmed the hypothesis is correct, then go to step 7. If the hypothesis is denied return to step 3, select another theory.

- Step 7: Closing statement.

Phase IV: Test and final assessment (concluded).

¬ Step 8. Testing and ends.

After experimental conclusion by application of the plan, if the problem has been

solved completely, we finish the study. If presented with a new problem, depending on the severity of it, but move on step 1 or step 2.

Research can be fully applied in the form teaching chemistry research assignments. It is also applied in the form of partial studies in student when studying new experiment, practice, visiting... Which visual media are very important role in shaping public awareness and access to knowledge scientific understanding of the student.

The requirements to make: Use visual media goal must be clear, specific; consistent with the objectives, tasks and content unit. The VM must ensure pedagogical, scientific, and especially to ensure the safety of students as they are the direct contact and work with those objects. Through the process of doing so, students who discover knowledge, but knowledge is not supplied teachers.

2.2.3.2. The process uses illustrations to the method of visual midea

Features: Visual media was cited to illustrate the correc of the new knowledge provided by teachers.

Base options: Based on the objectives, tasks and content lesson (usually applied with mainstream theory lesson hard and lessons about the specific nature of the relative nature of the complex); specific conditions of teachers, students and the existing infrastructure of the university.

The process of organizing the class-specific teaching: Follow these steps:

- Step 1: Teacher notice, introduce new knowledge.
- Step 2: Teacher provide explanations and appropriate modes of settlement.
- Step 3: Students or teachers using visual teaching conduct operations to illustrate the content in step 1 and 2.

The requirements to implement: The visual teaching relatively simple, how to conduct or exploit experiment science content knowledge is rapidly while relatively impenetrable. Generally, the use of method for students make less proactive in understanding the knowledge and less opportunity to show my talent. Want to solve this issue should use proven method.

2.2.3.3. The process uses proven visual media according method

Features: Visual media tool, student verifiable evidence teacher given new knowledge. Base options: Goals, tasks and content of lessons; the specific conditions of the school, students, teachers. The process of organizing the class-specific teaching: To help students draw conclusions fully and accurately about a rule, the nature of the substance and the most important is the formation basic concepts of Chemistry, teachers should use proven visual method under method. Normally, this experimental method used for lessons on physical or chemical elements following the lessons of mainstream theory; lessons to help students generalize individual knowledge related to law.

In the process used to verify visual media according method, teachers need to organize, control of student activities so that the children who are acting as true researchers. When using this method, teachers should follow the following steps:

Step 1: Teacher stated purpose, the necessary preparation and implementation

requirements students.

+ Observation status, the color of the reaction substance.

+ Prediction reaction occurs or not? Why?

+ Observing the phenomenon, documented results.

+ Explaining the phenomenon, writing equations of chemicl reaction.

- Step 2: Teacher (or student) made experiment verified. After students collected enough results, request student compared with the initial estimate, which verified its accuracy and make comments about their own knowledge.

- Step 3: Teacher reasonable adjustments concluded, comments, additions and key knowledge for students.

These requirements when implemented: Attention ensure absolute safety for students and teachers; research content can be simple or complex, but the level of comprehension of students must reach the positive, proactive, creative; prevent the imposition, forced if the results experiment not occur as anticipated.

2.2.3.4. Processes using visual media according method detect and solve problems features

Teacher use of visual media according method detect and solve problems themselves when problems arise student cognitive scientific laws, which appear urgent needs to be done clear through the implementation of several specific tasks.

Base options: Goals, tasks and content of lessons; the specific conditions of the school, student, teacher.

The process of organizing the specific teaching in class:

- Use visual media to pose before student scientific issues anonymous rule, these problems have been provocative over the relevant knowledge ago, hidden behind it is new knowledge, required learn, explore.

- Use visual media to organize and guide the self-study, self-discovery and dominate the scientific truth in a creative way. Specific:

+ Make student understand the problem;

+ Student determine the approach, outlined the theory itself;

+ Check the correctness of the theory or hypothesis by experiment, to find the most correct hypothesis, most clearly evidenced by the implementation of the operation on the visual media are provided;

+ Teacher reasonable adjustments and supplements correct hypothesis and indicating to acquire knowledge;

+ Check your newly acquired knowledge and to apply new knowledge student to address the specific situational awareness.

These requirements when implemented: Teachers should firmly grasp the characteristics of method, choice of visual media suitable for creating problem situations such as unexpected situations, conflict situations, situations need option,... to design, organize activities to suit student.

Lesson content to choose this method is not too complicated, has many links with the old knowledge to ensure student who discovered the problem; teacher provides intuitive means intentionally making student from where detection will

find the solutions and finally come to a conclusion.

2.3. Use of techniques of teaching, including information technology, while forming and developing basic chemistry concepts in secondary schools

2.3.1. The role of thuatday technical schools means including information technology in teaching chemistry

2.3.2. Some software can be exploited to teach the formation and development of basic chemistry concepts in secondary schools

2.3.3. Construction of electronic lectures

2.3.4. Using the internet as a tool for teaching chemistry

2.4. Design some of the typical teaching chemistry using visual media and facilities thuatday technical schools

2.4.1. Design a post teaching chemistry using visual media according to research methodology

2.4.2. Design a post teaching chemistry using visual media according to the call detection method

2.4.3. Design a post teaching chemistry using visual media according method detect and solve problems

2.4.4. Design a post teaching chemistry using visual media according practice schools phapday cooperation in small groups

2.4.5. design a post teaching chemistry using visual media according to the angle method phapday schools

2.4.6. Design Chemistry lesson some may use visual media according handon method.

Example 8: Article 12, section 17: "The transformation of" Chemistry 8

Activity 1: The situation stems and raise questions

Activities of Teacher: Let Students experiment observed categories:

1. Put the ice cubes in the air.

2 Cups boiling water with the glass cover on the mouth.

3. Put the sugar into the water.

4. Heat the white diameter.

5. Mix flour with iron and sulfur powder heated.

6. Members of zinc in hydrochloric acid solution.

- Here we need to find out what substances can happen any format change? What kind of phenomenon?

Activities of student: Record questions in their notebooks experiment situations.

Content: The substance can occur any change forms?

The format change that kind of phenomenon?

Activity 2: If the original idea, proposed research questions student.

Teacher's activities: - Request student stated predictions about phenomena and physical form (the original substances or other substances) of the variation on the experiment in their notebooks.

- Request student group representatives presented oral predictions (teacher

saved on the board).

- Allow them to compare the opinions of the group, then the system again.

- With these changes there are many things it is not clear. Mention your question is about the change that.

Student's activities: - Description into play Tests.

- Representatives of all presentations, can be raised in the following reviews:

Phenomenon	**Substance formed**
1. Ice melts	1. Liquid water (reactant)
2. there are water drops on the glass	2. Water (reactant)
3. Sugar dissolves in water	3. Sugar solution
4. Sugar is burned	4. Carbon
5. Red hot	5. unknown
6. No phenomenon	6. no new substance

- Recommend the following questions:

+ Why, when exposed to air, the flow of ice into liquid water.

+ Why greenhouse gases covered morsel to his mouth again found a hot cup of water droplets condense?

+ When heated sugar, in addition to other quality coal is formed?

Boil mixture + iron and sulfur powder phenomenon happen? What constitutes quality is quality?

+ Zinc is soluble in hydrochloric acid solution is not?

Content: The question was proposed.

Activity 3: Develop hypotheses and design experiments plan

Teacher's activities: - To address the questions above we need to perform any experiment?

- Provide Laboratory utensils and ask the group to discuss how to conduct experiments. (Cup of hot water, ice, glass, alcohol lamp, test tubes, wood clamps, glass rod, glass pots, sugar, flour S, Fe powder, aqueous HCl).

- Note: Remind student closely watch these new chemicals and instruments received. In Experiment 5: Need mixing iron powder and sulfur powder are real and powerful heating. **.**

1. Put ice the air.
2. Put the glass on a boiling water bath.
3. Put the sugar into the water.
4. Heat the sugar.
5. Mix the iron with sulfur powder and then heated.
6. Member zn in hydrochloric acid solution.

- Get utensils experiment and discuss how to conduct the experiment.

Activity 4: Conduct research laboratory research

Teacher's activities: - For student conduct experiments.

- Covers the class, go to the group for further instructions, adjust the mistakes, help student (when necessary).

- Request student mentioned phenomena observed in the experiment and explain.

- Note student: In change of 5, comparison of solid color after boiling the mixture at first.

- Organization for student experiment comparing results with the initial estimate, commented.

Student activity: Conducting experiments, recorded the phenomenon observed and explained in the play tests.

1. Department of liquid water flowing ice, due to changes in temperature (the temperature of the air is higher than 00C).

2. Hot water meets cold evaporator condenses into water droplets.

3. Road to form water-soluble sugar water.

4. When heated, the road transformed into charcoal and water.

5. The mixture of hot red, gray solid form other than the original mixture.

6. Gas bubbling, melting metal member.

- Compare the results of experiments with the original understanding.

- Remember conclude new knowledge into play Tests.

- The quality may occur 2 modified:

+ Converters that remains is the original substance, kind of physical phenomena. Experiment: 1, 2, 3.

+ Converters can create other substances, which are chemical phenomena: Experiment: 4, 5, 6; there is a change in status, shape,...

Content:

1. The phenomenon of physics: As the phenomenon of change that remains is the original substance.

For example, to air ice into liquid water flowing.

2. Chemical phenomenon: As the phenomenon of transformation can produce other substances. Example: When heated, decomposition transforms sugar into carbon and water.

Activity 6: Consolidation.

Activities of teacher: Let student see some footage of phenomena in physics and chemistry.

Exercise 1: The main sign to distinguish the chemical phenomena with physical phenomena is what?

Exercise 2: Among the processes listed below, to know where is the chemical phenomenon, where the physical phenomena. Explain.

a. Sawn timber is to close out a table and chairs.

b. Rusty bicycle rim.

C. Dissolve salt in water to soak the salad.

d. Heated iron to forging knives, hoes and shovels.

e. Fresh fish smells fishy, fat when frying smell good.

Exercise 3: What are some examples of physical phenomena and chemical phenomena that are often encountered in everyday life?

Activities of student: Observe, comments, statements, exchanges (if any).

Exercise 1: In the chemical phenomenon has created a new substance.

Exercise 2: The phenomenon of chemistry: b, e. Because of this process of change has created other substances.

- The phenomenon of physics: a, c, d. Because these processes changes only to the state, while physical shape remains the same.

2.5. Website designed to support the teaching process

We have built and put into operation a Https://uongbi.net website domain name. This website provides a lot of teaching materials for teachers as well as reference materials for student in the learning process. Through this website, the administrator can contact exchange for a large number of users with information exchange capacity is very large, while creating an environment to interact and exchange information multidimensional.

The structure of the website includes multiple modules with the main contents as: Resources (tools of information technology, chemical materials), register, contacts, statistics and search. In which the contents are closely linked and easy search.

CHAPTER 3. PEDAGOLOGICAL EXPERIMENTS

3.1. Objectives and mission of pedagological experiments

3.1.1. Objectives of pedagological experiments

Eigh lessons in the chemistry program for secondary-school have been chosen for pedagological experiments, which aims are:

- Verifying the validity of scientific theories outlined in the dissertation.
- Assessing the feasibility and effectiveness of proposed pedagological methods.

3.1.2. Accountability of experiments

3.2. Contents of pedagological experiments

3.2.1. Statergies

3.2.1.1. Choosing schools

3.2.1.2. Choosing objectives

The experiemnted classes and standard classes have been chosen with the same number of students; the similar results in general subjects and chemistry; one teacher; the same schedule.

3.3.2. Procedure of experiments

3.3.2.1. Guidancing teachers

Dicussing with teachers about:

- Objectves, content, organizations
- Pedagological methods, procedure of using chemical experiments, technical means of teaching, analyzing novel points and differences from the usual way of teaching that teachers are implemented, expecting problems and how to fix it.
- Identifying and dicussing a number of skill, teaching techniques, incorporating the organization of teaching and teaching methods with visual media, teaching technique; necessary notes for teachers and students in a number of active teaching methods.
- Requiring teachers preparing the experiments, test topics, questions and difficulties.

3.3.2.2. Organiztions

- ***Stage 1:*** *Year 2012-2013.*

+ Excecusing chosen experiments and assessing the results.

+ After three lessons in experiment classes, there is a 45 min-test in both experiment classes and a standard class.

+ Collecting raw data from the marks of the 45 min-tests and assessing. Conducting lessons learned, completing lesson plans and continuing stage 2.

- ***Stage 2:*** *Year 2013-2014*

The stage 2 was excecused similarly with the stage 1. Collecting raw data from the test, observasing and analizing results and continuing the stage 3.

- ***Stage 3:*** *Year 2014-2015*

+ The stage 3 was excecused similarly with the stage 1 and 2. The final result was combined from the results of three stages.

Experiment excecusion was shown in table 3.1.

Table 3.1. Selected teaching methods ans teaching techniques using in experiment lessons.

Lesson	Teaching methods	Major techniques
Transformation of matter	Molding, group activities, observation	Computers, projectors, experiments, film, animation, broad
Chemical reaction	Molding, group activities, observation, detecting talk	Computers, projectors, experiments, film, animation, broad
Mol	group activities, observation, detecting talk	Computers, projectors, experiments, film, animation, photos, broad
Acid – Base – Salt	group activities, observation, detecting talk	Computers, projectors, film, animation, photos, leaning notes.
Chemical properties of metals	group activities, observation, detecting talk	Computers, projectors, experiments, film, animation
Operating range of metals	Molding, group activities, observation	Computers, projectors, experiments, film, broad
Aluminium	group activities, observation, detecting talk	Computers, projectors, experiments, film, animation, self-making stuffs of students
Etanol	group activities, observation, detecting talk	Computers, projectors, experiments, film, animation, self-making stuffs of students

3.3. Results

3.3.1. Methods of analyzing and assessing

Choose class: Two classes student experimental class in each school and class capable of learning equally based on learning outcomes in academic subjects before the experiment of two layers. after the experiment, with each stage of learning we are evaluating the results candidate way qualitative analysis and quantitative analysis.

3.3.1.1. empirical analysis of qualitative results

3.3.1.2. Analysis of quantitative experimental results

3.3.2. Pedagogical experimental results

3.3.2.1. Qualitative results

Choose class: two classes student experimental class in each school and class dc capable of learning equally based on learning outcomes in academic subjects before the experiment of two layers. after the experiment, with each stage of learning we are evaluating the results candidate nghiemsp way qualitative analysis

and quantitative analysis.

3.3.1.1. empirical analysis of qualitative results

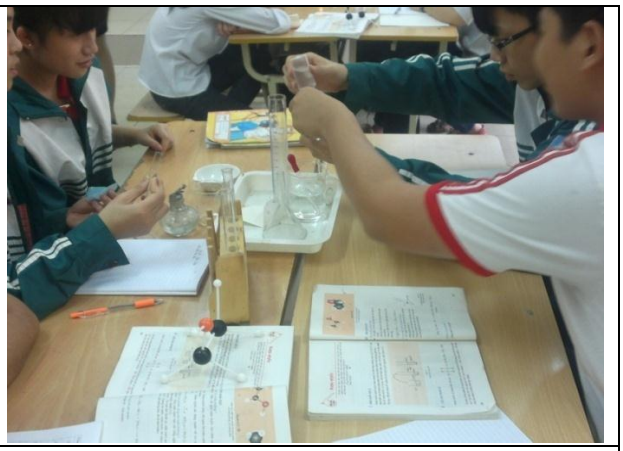
Based on the assessment and evaluation of research on the impact of the measures, procedures for teacher formation and development of basic chemical concept for student, general observations as expected now, the opinions, replies of the teacher, student class experiments, opinions teacher judgment, evidence of learning activities, searching, reporting results, evaluate the results of student.

3.3.1.2. Analysis of quantitative experimental results

3.3.2. Pedagogical experimental results

3.3.2.1. Qualitative results

3.3.2.2. Some pedagogical experiments image



ethanol lecture at 9 grade class, teacher: Dang Thu Huyen

Figure 3.3. Some more pictures of puberty nghiemsp

3.3.2.3. Quantitative analytical results

Results evaluated through tests

Table: Synthesis of the difference and the degree of influence over 3 rounds experiments ES

	round 1		round 2		round 3	
	8 grade	9grade	8 grade	9 grade	8 grade	9 grade
$\overline{X_{TN}} - \overline{X_{ĐC}}$	0,76	0,93	1,83	1,60	1,49	1,51
ES	0,51	0,65	0,95	1,14	0,89	0,96
chi– square	$6,74.10^{-5}$	$3,12.10^{-12}$	$9,35.10^{-27}$	$6,17.10^{-24}$	$8,12.10^{-28}$	$2,76.10^{-26}$
t-test	$3,55.10^{-5}$	$2,16.10^{-10}$	$1,65.10^{-28}$	$1,08.10^{-29}$	$6,67.10^{-30}$	$2,72.10^{-32}$

Results showed that the average score of tests in laboratory classes are always higher quality grades dc proved student learning better grade class experiments dc. allow verification chi - square in the classification results of the study valuable student p <0.01; such correlation between grade class experiments with fca and classification results are significant student. all data do not occur randomly. this means that in class experiments fell student weak rate - average rate

and increase student good and excellent compared with fca classes.

Allow verification t - test average scores between the two groups of test experiments and dc <0.05. this result confirms the disparity average of two classes is not by accident but by the impact of the measures proposed pedagogy, gave the experimental group.

Value scale effects of the tests in smaller round 1 round 2; in the experimental class 1 school year (grade 9 for 1) experiment 2 classes in the school year (grade 9 round 2 and round 3). this means that the influence of experimental methods to the learning process, the awareness of the average student (over 1 year) to large (over 2 years).

Section 3. General conclusions and recommendations

1. General conclusions

the thesis has fulfilled the objectives, research tasks set out, in particular:

1.1. System studied theoretical basis of the research and practice; the role and the use of visual media, facilities technical schools thuatday with the new directions schools chemistry method phapday towards positive perceptions of the operation student. has conducted investigations and 108 teachers 2589student in 6 provinces and cities of the state using visual media and facilities technical schools in teaching chemistry recently.

1.2. Based on theoretical analysis combined with the content, goals, program structure, secondary school chemistry textbooks, proposed lists of phapday practice schools, active teaching and learning techniques can be used in combination of visual media, facilities thuatday technical schools.

1.3. Construction and proposes 06 principles; 09-step process consists of three stages using visual media as a basis to design lesson 08 lesson basic chemistry concepts in grade 8 and grade 9 junior.

1.4. 3 candidate conducted within the academic year 2012-2013 to the academic year 2014-2015 in 09 secondary schools of four northern provinces, conducted with 08 lesson plans were designed to be. candidate nghiemsp collect results, treatment of the data. Since then we have some general assessment:

- Students and teacher and excited about school, teaching laboratory deploying relatively favorable.
- The laboratory lessons are highly effective and practical, the quality of learning of chemistry is remarkably improved in the experimental class.
- Use of means of regular technical schools thuatday forming positive effects of teaching in general, encourage the positive, creative and student teacher both.

These results were confirmed candidate theme: "Use of visual media and teaching the technical means to improve the quality of teaching some basic concepts of chemistry in secondary school facility" is necessary, feasible, effective and confirmed the correctness of scientific hypotheses proposed.

2. Recommendation

Through the research process and implement the project, we boldly made a number of recommendations as follows:

- Need to make class sizes small and medium level (≤ 30 student/class), to ensure the control of the teacher is optimal.

- Quickly build and put into operation a specialized subject classrooms for chemistry, investing installation of machinery and equipment (especially infrastructure, telecommunication network) for secondary schools in particular as schools in general.

- Review, supplement and replace some chemicals and instruments laboratory, chemical practices provide secondary schools throughout the country.

- Implement widely practice schools phapday positive, with high efficiency.

- Products of the subject is a documentation system and lesson plans that use of visual media, facilities technical schools can be used by chemistry teacher at the secondary in teaching as well as student generation in college chemistry training teachers can refer and apply.

LIST OF PUBLICATION

1. Nguyen Duc Dung, Vu Tien Tinh (2011), *Improving the quality of teaching all the basic chemistry concepts in secondary school programs*, symposiums Proceedings 60th anniversary of the Faculty of Chemistry.
2. Nguyen Duc Dung, Vu Tien Tinh (2012), *Chemical experiments and improve the quality of practice, experimental chemistry in secondary school*, year book researcher seminars young scientists, Hanoi Pedagogical University number 2.
3. Nguyen Duc Dung, Vu Tien Tinh (2012), *Information and communications technology training for teachers of Chemistry Secondary School in Quang Ninh province*, Proceedings of scientific seminar Develop professional capacity of educators chemistry students, Hanoi National University of Education (Post reported at the seminar).
4. Nguyen Duc Dung, Vu Tien Tinh (2013), *Using media technology to enhance teaching quality teaching chemistry concepts in grade 8 junior*. Proceedings national seminar Vietnam Chemical Society.
5. Nguyen Duc Dung, Vu Tien Tinh (2014), *The visual media and other means of teaching techniques to teach the importance of implementing integrated chemistry with other subjects in secondary school*, Proceedings national scientific conferences, Hanoi National University of Education.
6. Nguyen Duc Dung, Vu Tien Tinh (2015), *Using the method of molding powders hand to improve the quality of the unit basic concepts in chemistry Middle School*, Journal of Hanoi National University of Education, Vietnam No. 8/2015.
7. Nguyen Duc Dung, Vu Tien Tinh (2016), *Use visual media combined with active teaching methods in the teaching of basic chemistry concepts in secondary school*, Journal of Hanoi National University of Education, Vietnam No. 6A/2016.