

Improving Academic Curriculum in Science Education Through Technology: Implications for In-Service Training of Science and Mathematics Teachers

By

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This paper aims to present curriculum changes in science education through the use of technology and also the techniques to cope with these changes. Changes always come with some amount of discomfort. The resulting tension can generate valuable constructive and creative outputs. Over the past 10 years or so, seven major transformations have been happening in science education in the Philippines, namely: (1) Classroom teaching has shifted from low technology to high technology, from 'low touch' to 'high touch'; (2) There is a paradigm shift in classroom teaching from teacher-centered instruction to student-centered instruction; (3) Science curricula are developed for long-term sustainable development to replace those for short-term general development; (4) The methods and scope of research have varied widely; (5) The training programs in science education are decentralized; (6) The mode of delivery of knowledge has changed from indoor to outdoor, from structured classroom learning mode to online education, and, (7) The job orientations of the teacher and staff in science education have become IT based. The techniques to cope with the tension of changes include: (a) screening the issues/concerns carefully, (b) controlling the issues/concerns seriously, and (c) implementing the issues/concerns constructively.

Introduction and Historical Background

Science Education in the Philippines can be traced back to the pre-Spanish period to the post World War II period where the emphasis was focused on science with health orientation (Ibe and Ogena, 1998). The launching of Sputnik by Russia in 1957 has totally revamped the science education curriculum in the United States. This wave of putting emphasis on science and technology reached the Philippines with the establishment of the National Science Development

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Board (NSDB) in the following year, 1958. In 1963, the first Philippine Science High School was established in Diliman, Quezon City which aims to develop a critical mass of feeders for S and T professions. Aside from the one established in Quezon City, there are six (6) more campuses of Philippine Science High Schools scattered all over the country today.

The role of science and technology education in Philippine development is now well organized. No less than Art. II of the Philippine 1987 Constitution mandates that the state gives priority to research and development in science and technology education, to support indigenous, appropriate and self-reliance technology capabilities and their application to improve national productivity and lifestyle of the Filipino people.

The development of science and mathematics curricula in the Philippines have been greatly influenced by the developments in foreign countries like United States, Germany, United Kingdom, Australia, Japan and Singapore. New teaching strategies tend to be adopted from them as revealed in the researches done by the science and mathematics teachers in their theses. As a whole, science educators have been putting in their special effort to bring about some improvement in teaching and learning of science and mathematics through technology. As early as 1960s, each decade has been featuring a distinctive effort to improve the learning-teaching process.

In the 1960s, a huge and expensive effort was launched to work with science teachers toward the improvement of teaching. This training program was

usually held during Summer Institutes. The Science Education Department of the Graduate School of Education, Arts and Sciences (GSEAS) of De La Salle University (DLSU) was established in 1963 in response to this need of updating secondary education in the country through teacher training and faculty development program.

The 1970s were a decade of research, evaluation and development of new science curricula. In 1976, DLSU-GSEAS went a step further by enriching the curriculum at the tertiary level. The Master of Arts in Teaching program, major in Physical Sciences was developed and implemented.

The 1980s were a decade of growth nationwide for faculty development where Department of Education, Culture and Sports (DECS) implemented the Program for Decentralized Educational Development (PRODED, 1982-1988) and the Secondary Education Development Program (SEDP, 1988-1993) following the recommendations given by EDCOM. Science Education Institute (SEI) under the Department of Science and Technology (DOST) implemented an Institutional Building Program (IBP) to improve the quality of science curriculum with the following objectives: (1) To provide laboratory equipment; (2) To provide library grant for the procurement of books, journals, and library materials; and, (3) To offer a ladderized faculty development program in the form of a Certificate Program, then a Diploma Program and finally a Master's Degree Program. Batches of science faculty in the tertiary level were sent to either De La Salle University (DLSU) or University of the Philippines (UP) to earn their master's

degree in teaching science. Numerous in-service teaching training programs were conducted at the University of the Philippines, Institute of Science and Mathematics Education (UPISMED) during summers to upgrade and update the content knowledge and teaching pedagogy of the science and mathematics teachers in the secondary level. The first doctoral program in science education was offered in 1980 by DLSU in consortium with UP. In 1989, DLSU-GSEAS was restructured. Since then, the Science Education Department (SED) was integrated into the College of Education.

The 1990s was a decade that emphasized the recognition and reward of good teaching. The Medium-Term Philippine Development Plan (MTPDP) popularly known as 'Philippine 2000' was implemented which aimed to bring quality science and technology education to the forefront of national development. Philippine 2000 envisioned the attainment of a newly industrialized country status for Philippines in the year 2000. This was followed by Science and Technology Master Plan (STMP) which charted the future direction of the Philippine industrialization through the Science and Technology Agenda for National Development (STAND) and Science and Technology Education Plan (STEP) in 1993. STAND aims to upgrade and update the national storage of knowledge and skills for future needs while STEP assures the Philippines of the adequate number of S & T manpower to gear towards industrialization through S & T education in the country.

As science educators of this decade, we are always faced with the dilemma to choose between concentrating on producing a quantity of science and mathematics teachers and producing a group with world class quality education, whatever its size. We are struggling either to conform to what others are doing in the academe or to diverge from the mainstream and come up with creative and innovative ideas.

With the advent of minicomputers in the early 80's and LCD projector in the 90's, these two objects have permeated practically all aspects of human activities and life has never been the same again. The best way for us to anticipate the future is to understand the present. As we all know, quality education is the only means for upward mobility of the underprivileged groups, an excellent means for retraining the work force and a key for developing scientifically and technologically literate citizenry. To cope with the rapid and complex changes in technology, this paper undertook an in-depth description and long-term exploration on how academic curriculum programs in science education were modified and transformed as a result of these changes.

Research Approach

This study is a qualitative research both exploratory and descriptive in nature. Qualitative data were collected thru active participant observation, in-depth interview and archival or document analysis. In in-depth interview, the role of the researcher is active participation into the lives of the respondents in an

informal conversation and she also helps them out with small chores as well as large chores. Such interaction is usually highly informative while remaining informal. Aside from this procedure, the information obtained thru in-depth interview was further triangulate with data obtained thru other methods like phenomenological interview or grouped interview. The participants of the study were limited to the graduate students randomly chosen from the two universities (DLSU and UP) offering graduate programs in science education. Other data or documents related to Science and Technology Education Plan (STEP), a joint project of the then National Science and Technology Authority (NSTA) – the precursor of the Department of Science and Technology (DOST) – and the Ministry of Education, Culture, and Sports (MECS) – now DECS, were obtained thru the courtesy of Science Education Institute (SEI) under the directorship of Dr. Ester B. Ogena, then the Chairman of the Interagency Committee.

Data Management and Analysis.

Data were gathered and grouped into significant classes of items, persons and events according to the properties that characterize them. Realist tales were written to account for the factual events happened under study or published in articles or scholarly monographs.

Results

In this paper, there are seven major transformations taking place in science education in the Philippines over the past decade. There are: (1) Classroom teaching has shifted from low technology to high technology, from 'low touch' (typewriter) to 'high touch' (computer). The use of typewriter to prepare report had become obsolete. Information technology (IT) and multimedia have crept silently into the academe. In contrast, the influences pressing for the instructional usage of technology are relatively weak for two reasons. The first reason is that the need to develop the computing skills of our students for employment does not demand that computing skills be used as an instructional process; and secondly, there are no powerful external agencies threatening dire consequences if faculty members do not use computer-based instruction. According to experts, almost 50% of faculty teaching science and engineering courses own a computer but less than 10% of faculty use computer for classroom instruction (Diamond, 1998). In the two universities where this study was conducted, more than 80% of the faculty in science and engineering either own or have assessed to a computer but only one-third of them use it for classroom teaching. Majority of them use computers for doing their research or processing the grades of their students. This may be attributed to the fact that new advances in computers come too fast that there is very little time for careful curriculum planning for faculty to contemplate and adopt for classroom instruction. A variety of circumstances are creating the potential awareness for the instructional use of computers but the process of

screening still remains slow. Sometimes change requires a plateau – period of accommodation and reflection.

In the mid 80's, word processing was one of the best uses of computers on campus and it still remains so even for today. But today, electronic mail or email has changed the daily lifestyle of the faculty. Students interact with students and tutors with students through email; sending assignment or solution to problems through fax machines are some common practices among our students in the urban areas.

The computers have been used for instruction at several levels. Computer assisted instruction (CAI) for enrichment and remediation has been on campuses a long time. Expensive and dangerous experiments were simulated with the use of a computer like Kepler's law, motion of a charged particle, nuclear reactions, and the like. Other well-established uses of computers include word processing, spreadsheet, graphic packages, information retrieval, the Internet – a worldwide communication system, and the CD-ROM. Accessed through the Internet, the World Wide Web allows practically an infinite and seamless link of graphic images, sound and text. The possibilities of viewing things that have not been visible before can now be made three dimensional, like models of crystals and molecules. On CD-ROM, expensive laboratory slides in biology and in medical fields can be stored and retrieved without the danger of breakage and deterioration. Students can browse through encyclopedias, atlases, practically most of the holdings of a library, researches and even theses and dissertations

without much effort. Through Local Area Network (LAN) and STEdNeT (Science and Technology Education Network), numerous computers are linked to transfer information or work on a problem jointly. On some campuses, students 'download' the professors' notes and even assignment from an electronic blackboard to their own files. The professor can provide individualized attention through email and prompt immediate feedback. Interactions among students or between faculty and students are made possible through teleconferencing and emails among individuals who never meet. Electronic interaction can even encourage shy students to enter into the discussion. To make learning better or more interesting, the use of technology inside the classroom is a must.

On the other hand, the use of technology will not relieve the faculty from asking the questions about the links between the expected outcomes and the instructional process. For example, we may ask the questions on how to move our students from being novice problem solvers to expert problem solvers, novice learners to intuitive learners, information seekers to information synthesizers, consumers of researches to producers of researches, and aspiring professionals to competent professionals. However, there are also issues and concerns related to computer technology revolution which include copyright issues, technology transfer profits, royalties for software production, privacy and ethical use, data security, threats of losing one's job especially the faculty, and potential closure of institutions. Such a list calls for a similar lengthy list of problems when computerized instructions will be fully utilized in the learning teaching process.

Secondly, there is a paradigm shift in classroom teaching from teacher-centered to student-centered instruction. The key to success in education is adopting the teaching style that will match the learning styles of the students. “To educate” means “to lead out from”. The task of a teacher is to lead out from their infinite resourceful minds those things that will best serve the emerging creative personality of the learners. The young people of this generation reach for education in multiple ways, for it is a collaborative effort. The care, skills and sensitivity we bring to our interaction with our students, of course, depend on us. Studies have shown that student-centered teaching/learning processes like (a) individualized instruction, (b) peer tutoring, (c) group dynamics, (d) cooperative learning, (e) inquiry approach, (f) discovery method, (g) concept-mapping, (h) constructivist approach, and the like are more effective in enhancing learning in science or mathematics than the traditional lecture method where the teacher is the sole dispenser of knowledge.

Why use a learner-centered instruction? According to Diamond (1998), the following are the advantages for students. The learner-centered instruction serves a wide range of functions such that the role and responsibilities of students are well defined in the course outline for successful completion of the course. It is self-paced and the students don't feel the pressure in note taking and studying. It reduces their test anxiety by providing them with sample test items in the manual. It provides the logistic of the course so that students know what to expect at each session. In some manuals, supplementary readings that are

difficult to find are also provided. As a whole, it gives detailed descriptions of the major assignments that can help the students to prepare for their work and improve their time management skills. For faculty, it enables them to give a variety of handouts and readings effectively and efficiently. Faculty from other institutions can easily adapt and adopt the materials with minimal assistance from the writer of the manual. Lastly, it provides a standardized instructional material to all faculty members handling the course.

Thirdly, science curricula are developed for a long-term sustainable development. One of the major projects undertaken by the different agencies in the government was the Medium Term Philippine Development Plan (MTPDP) that seeks to bring the status of nation to Newly Industrializing Country (NIC) by the year 2000. Through human empowerment, a total of 58 projects and programs were categorized. This plan period covered from 1994-1999 although some of the targeted projects were still on going during the time when this report was prepared. By a simple count, only 17 out of 58 or about 30% were completed on time. Based on the accomplished reports provided to SEI by the agencies involved in implementing STEP, environmental education was infused into the S & T curriculum at all levels. Values are integrated in the design of core curriculum and value grids are identified in the course syllabus or syllabi. Knowing that our Mother Earth is not getting any better for the survival of the human beings, environmental awareness and consciousness were integrated in the design and development of new curriculum in science education. A technology-

based curriculum was initiated and implemented in three high schools as a feeder program for engineering. In order to motivate more high school graduates to take up basic science or technology as a career in the future, attention was given to 110 science-oriented high schools for which these STEP components like science oriented curriculum and instructional materials development, faculty and staff development, research, library and laboratory equipment and facilities as well as construction of school building were implemented. The real impact of STEP on these 110 node schools can be gauged from how well they were monitored to meet the criterion of producing qualified feeders to tertiary level courses in basic and applied sciences.

To create a pool of scientific and technological specialists in the year 2000, Science Education Institute (SEI) spearheaded two (2) Manpower Development Projects to improve science education in the country. In 1989, SEI fully supported the faculty development projects for the teacher educators of the Regional Science Teaching Centers (RSTCs) with UP and DLSU as the training institutions. This project aims to develop competent leaders in science education, highly qualified teachers in science and mathematics in the RSTCs, and competent researchers in the field of science education. Eight batches, about 10-12 doctoral grantees per batch, have been trained under this project from 1989 - 2000. As part of the training program, the students are sent abroad for their enrichment program after passing the comprehensive examinations and after successfully defending the topic and research outline of their proposed

dissertation. In 1995, nine doctoral grantees had their enrichment program at Edith Cowan University, Western Australia; and in 1996 there were 12 and in 1997 there were 8, all grantees had their enrichment program at The University of British Columbia, Vancouver, Canada, respectively. Aside from the monthly meeting between the project director and the grantees, term-to-term reports on the academic performance or research status of the grantees were also made to update SEI about their progress. This report was also used as the basis for the extension of the scholarship grant from 24 to 30 months for the master's grantees and from 36 to 48 months for the doctoral grantees. Majority of these grantees were able to graduate with their doctorate degree in science education within the grace period granted by SEI.

In 1992, SEI launched the project on "Investigatory Research in Science Education" or popularly known as "Action Research" for science and mathematics teachers in the secondary level. Since then seminar-workshops on action researches or school-based researches were organized and conducted at the different RSTCs to sharpen the research skills of the science teachers chosen from the 110 science oriented high schools. As reported, within the STEP period, only 17 action researches were completed and published in three separate monographs. The RSTCs also help in conducting Certificate Programs during summers for Physics and Chemistry teachers who are not actually major in these areas but are teaching the subjects in the secondary level.

Fourthly, the scope and techniques of research are varied. In the 70's and early 80's, the researches done in science education were mostly on intellectual factors related to students' achievement in science and mathematics or on development of instrument to measure classical knowledge as taught by the teachers. Quantitative researches superseded qualitative researches where statistics were heavily used in analyzing data. In 1999, Ong conducted a study on the status and research statistics in science education in the Philippines. Out of 162 volumes evaluated, 101 master's theses and 61 doctoral dissertations, researches done on teaching-learning process topped the list for the focus of study for both groups. This shows that there is a felt need to improve learning-teaching process inside the classroom. The trends of the research output can be divided into three periods: 1985-1989, 1990 –1994, and 1995-1999. During the period of 1985-1989, most of the graduates are engineers by profession, they preferred to conduct their research experimentally either in the area of designing and developing indigenous equipment's in physics or chemistry as substitute for expensive imported laboratory equipment or in the area of developing laboratory manual in physics using modern technology. Due to time constraints, survey or quasi-experimental research with intact classes was usually their choice. Follow-up interviews were usually conducted to verify the statement given in the survey questionnaire.

The period between 1990-1994 marked the beginning of a new era of research on science process skills (Hiura, 1990; Quinay, 1990; and Ale, 1991).

The development of cognitive skills (Gengania, 1991; Basco-Silva, 1991; Asuncion, 1991; and Reyes, 1994), various teaching strategies such as modular approach (Young, 1991; Nocom, 1992; Silva, 1992; Abalajon, 1993, de Castro, 1993; Cayaoyao, 1993; Molano, 1994 and Saclot, 1994), group or cooperative learning (Partosa, 1991 and Pahila, 1994), the use of molecular models (Tribiana, 1992) in teaching chemistry, and the use of educational technology like calculator (de la Rosa, 1990; Torres, 1990; de Sagun, 1992; and Dionio, 1993) and computer (Ong, 1990) were introduced to make the learning-teaching science and mathematics better and more meaningful.

With the influx of constructivist approach from abroad, the period 1995-1999 marked with efficacy of the different teaching methods taken into consideration individual differences in the design and development of coursework. The 3C's – Cooperative learning (Palmes, 1995 and Bachiller, 1998), Computer-Assisted Instruction (Urbano, 1995; Caleon, 1996; Avila, 1998 and Corpuz, 1998) and Constructivist approach (Limjap, 1997 and Aumento, 1998) were the focus of study during this period. Most of these researches were conducted in the school where the researcher is affiliated for convenience.

In summary, the research trend in science education in the Philippines is greatly influenced by the researches done in foreign countries. Today, more emphasis is laid on qualitative research, case study or a combination of quantitative and qualitative researches. Shaping school culture, perception of students on their learning environment, the beliefs and perceptions of teachers in

teaching science, the efficacy of new approaches of teaching and learning science and mathematics, factors affecting the career choice of students in science and engineering, science process skills (SPS), scientific literacy, computer literacy, reasoning patterns of students, and higher order thinking skills (HOTS) are some of the topics pursued by science educators in their areas of specialization. For searching for researches done on science education in the Philippines, consult the website of DOST-SEI <http://www.sei.dost.gov.ph> or <http://STEDNET.sei.dost.gov.ph>. Knowledge networking is the easiest way to transfer data or information or exchange of knowledge. Collaborative researches done by the group of experts are more common than sole-authorship researches.

Fifth is the decentralization of training programs. Decentralization challenges us to tackle problems and create change at the local level. Decentralization creates more learning centers. Due to scarcity of qualified science or mathematics teachers in the teaching field, this phenomenon usually hampers those teachers who are aspiring to work for a graduate degree to stay behind for they can't find a qualified substitute. For people who have to leave the country craving for greener pastures, decentralization could be a possible solution. This means more choices and opportunities for individual learners. Home computers and word processor, email could enable one to work at home and earn a degree in a place far away from school. People can stay in their hometown, less the high cost of traveling from the province to the city and living allowance in the urban areas, yet they could also avail of the same quality education. This scheme

has been designed and implemented by SEI under the Department of Science and Technology in training the science and mathematics teachers from different regions at the Regional Science Training Centers (RSTCs). These RSTCs are usually affiliated with a state university or college. As mentioned previously, Science Education Institute through its Manpower Development program trains the science educators from selected teacher education institutes at the top-level universities in the country, send them abroad for enrichment program to broaden their horizon and majority of these graduates eventually become the trainers at the Regional Science Teaching Centers.

Another feature is the mode of delivery knowledge from indoor to outdoor, from structured classroom learning mode to online education. This is an alternative approach of running a science education program where the students are just required to report at the learning centers near their home or school that were previously identified by the school offering the degree program for their monthly consultation with the tutor. These learning centers must be well equipped with the necessary library materials and laboratory equipment. This is cost effective and efficient because only the tutor will travel from the school offering the degree program to the learning center.

In December 1995, SEI established a Philippine Database in Science Education known as Science and Technology Education Network (STEdNeT). This project aims to provide science educators, researchers and policy-decision makers quick access to data in science education. All master's theses and

doctoral dissertations as well as faculty researches in science education done from 1985 up to the present time were put into this network. Action researches undertaken by science and mathematics in S & T oriented high schools and DOST-ESEP node institutions were also included. Statistical data such as enrolment rates, number of schools, scholarship programs, manpower training programs and curricular programs were also added into the database. At present, more than 20 educational institutions offering science education programs, science related professional organizations, government agencies and UNESCO are actively participating in this project.

One drawback is that it deprives the student from knowing the school culture and learning environment of the school where he/she is pursuing a degree. This is analogous to what we termed as “extension program”.

Today, more than 50% of our graduate students are part time and potential distance learners. Our traffic situation is not getting any better. Virtual on-line university where students would take all classes lives on computer networks is something to be taken into consideration in the future.. Many have predicted that by year 2010 many students will be able to take courses from universities all over the world, while the students enrolled in courses sponsored by a single university will be actually receiving courses from different learning centers in different countries.

E-learning or online education is slowly replacing the structured learning environment starting from downloading the instructional materials; submission of

assignment, student consultation and even examination is given online. There are several barriers that can hamper the widespread of distance learning due to following reasons: (1) the slow adoption of computerized instruction inside the classroom, (2) lack of qualified faculty for the new roles, (3) the difficulty of designing an academic plan in advanced, most often for students with less information, and (4) college faculty and administration are somewhat apprehensive that their on-campus status will be at a lost.

The last transformation is that the job orientations of the teacher and staff in science education have become IT based. More than 80% of jobs related to science and mathematics involve computers in some way and people who don't know computer will be at a lost.

Implications

Based on the abovementioned seven transformations that took place to improve the science education curriculum through technology, below are some implications for in-service training programs for science and mathematics teachers in the future:

1. The development of a handbook on action research could be a good 'survival kit' for science and mathematics teachers in designing action research or school-based research. A 3-day seminar-workshop is too short to conceptualize a good research proposal.

2. Very little training on science and technology management, administration and supervision of manpower development program was seen in the implementation of the project. It is good to designate a personnel to monitor, evaluate and follow up the academic performance of the grantees.
3. Training on the use of educational technology was minimally mentioned with the exception of big universities in the metropolis. Through the help of the industry and civic organizations in the locality, some schools were given computers but there was no follow-through conducted to sustain the project either in the training on the use of computers in teaching or in doing research.
4. Close monitoring of the grantees academic performance should also be implemented to minimize the mortality rate.
5. Monitoring, evaluation and follow-up the content knowledge and teaching skills acquired by the science and mathematics teachers during summer training at the Regional Science Training Centers to probe whether the acquired skills and knowledge were put in good use in improving their teaching efficiency.
6. Those teaching strategies that are found to be effective and efficient in learning/teaching science inside the classroom should be affirmed, reinforced and supported financially.

7. The software programs used in developing CAI or CBT must jibe with the advancement of science and technology.

How do we implement this change effectively? Change has tension and tension usually creates internal or external consequences. Inside the classroom, we have four types of teachers. The first group is the theoreticians, those who know the content knowledge very well but with minimal knowledge about teaching pedagogy. Opposite this are those who know the teaching techniques but they don't have the necessary content knowledge to teach. The best type of teachers that we would like to have are those who are girded with the content knowledge and equipped with necessary teaching pedagogy on how to impart their knowledge to their students. Opposite this is the worst type of teachers that we can't afford to have. Let us pause and reflect for a while. Which type of teacher do you belong?

In implementing change in the academe, there are at least three kinds of science educators. The first are the lone rangers. They are going to do what they want when they want to do it. His decision is not based on whether something in the academe is to be done now or later, but whether or not it is what he wants to do. A lone ranger feels no ownership of the goals or the institution identity with the people of his own school.

Another type of science educators is the long ranger. Everything can wait. No sense in getting things done now. One who does not want to act. Being

decisive is not part of his lifestyle. The easiest way out is to form a committee. They aren't willing to take the risk. They want all the information, all the answers and all the resources on-hand before they are willing to act. By the time the long range is ready to act, the opportunity or the need for a decision has vanished.

Opposite the long ranger is the third group called the short rangers. Everything is a crisis and things must be done immediately, if not sooner. They are usually impulsive. If they want it, they get it. If they feel they should do it, they do it. They view the process of discussion or committee work as something futile. They see going through the process or proper procedure of allowing time for discussion or study as a waste of time and effort.

Our generation is becoming short rangers. We use more and more instant products. It is more difficult to discern or taste the difference. There are instant drinks; potatoes, cereal, fruits and vegetables grow at accelerated rates in greenhouse. In short, short rangers want action. Committees are formed when it is necessary. If a committee is needed, it should be an "ad hoc" committee. "Ad Hoc" means a concern for a particular end or purpose without any consideration for wider applications or implications.

We, as science educators, cannot achieve our goals and objectives through lone rangers. And it can be successful if we eliminate either long rangers or short rangers. What work best is to strike a healthy balance between these last two types of educators. Sometimes it is essential to do things now. At other times, it

is better to do them later. In order to adjust the tension between the two, it is wise to distinguish three kinds of commitment in the academe: continual, seasonal and immediate.

Our continual or perpetual commitment is always be prepared to give an answer to the questions asked by our students. Avoid being a seasonal teacher. As teachers, our lectures and mode of delivery demand that we be consistent. We should impart our knowledge with great pleasure and careful instruction. We live in a day when people are interested in shortcuts. Food and products (even our diploma) are instantly prepared. But there is no short cut to quality education.

When crisis comes in the academe, it is essential to respond immediately. There is no time for selecting a committee or conducting a survey to study the situation. Although there are risks involved in responding in a wrong way, most efforts are better than no response or a late response.

In responding to immediate commitments, we must be patience by examining the priorities in our education in light of our objectives and apply appropriate process to reach our objectives. Patience is not sitting back with our arms folded, doing nothing and waiting for the inevitable to happen. Patience does not mean either procrastinating or being presumptuous. And lastly, there are steps to follow, committee to contact and inquire, information to gather and discussion to take place before a decision can be reached. The problem with our educational system is that there are too much procrastinations and presumptions and very minimal improvement. It is not enough to merely increase activity by

introducing new programs. Process should result in progress. Decisions need to include a means of evaluation. Results can be measured when there are specific objectives to achieve within a set time frame. Thus, the techniques in coping with the tension of changes in the academe are to screen the things to be changed carefully, control them seriously and implement them constructively.

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