

**PHYSICS EDUCATION: A PRAGMATIC APPROACH TO VOCATIONAL,
ENTREPRENEURSHIP AND ECONOMIC ADVANCEMENT**

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Being a paper presented at the 7th Annual conference of the School of Vocation and Technical Education, Adeyemi College of Education, Ondo. Held between 23rd – 27th of May, 2016

Theme:

Economic diversification for a mono-sector economy: the role of vocational and technical education.

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ABSTRACT

In this period of economy set back and stagnancy, which has resulted into a frequent vociferous cry of the masses, we need other practical and workable channels that can bring forth economic revival and multiple employments for the masses. Hence, this study critically reveals and elucidates the unnoticed vocational aspects of physics and the principles guiding them. Some of these vocational packages in physics are electrical repairs or installation and electronic appliance repairs or assembling, building of local boat, setting up of solar panels. Other realistic skills identified and explained in this study include operation of optical service centers, production of mirrors, assembling of some optical instruments such as camera, periscope and projectors, installation of refrigeration and cold room gadgets, setting up of x-ray and ultrasound services etc. the barriers that limit physics education from fully reaching and realizing the desired apogee of vocational exploit, entrepreneurship, economic development and the mechanism required to remove the limitation were also emphasized in the study.

Keywords: vocational aspects of physics, entrepreneurship and economic development, physics, skills.

INTRODUCTION

Physics education is a vital field in science that seeks to open door for vocational and technological creativity. In agreement to this, Ajayi (2008) said “the teaching of physics in secondary schools is intended to produce young scientists who would be able to design the technological devices that would make day-to-day activities easier and living more comfortable”. Thus, the teaching and learning outcomes of this all important subject need serious attention if it must enhance a technological oriented vocation. Entrepreneurial development according to Ifeanyi (2012) connotes the process of enhancing entrepreneurship skill and knowledge through structured training and institution building programme.

We will find a good answer to why we study physics if we reflect on the things that produce the major changes in the world like television and satellite station, hydroelectric power stations nuclear reactors, radio stations, solar energy generation etc. Since the things that produced major changes in the world are products generated from the ideas in physics, then the world cannot do without the study of physics. To get the most adoptable, prolific and result-oriented approaches that can serve as a messiah to rescue and boost the economy; we don't need to go far. All we've got to do is to discover and utilize the potency of multifaceted areas of physics education that can foster a dramatic change in the economy of the nation and pave way for entrepreneurial and vocational proliferation. This study therefore focuses on how we can pragmatically translate some concepts in physics to acquire some skills that can create a work, vocation or establish an individual as an entrepreneur in a new venture.

THE GENESIS AND OBJECTIVES OF PHYSICS IN ECONOMIC ADVANCEMENT

Physics according to is coined from an ancient Greek word “physis” meaning nature. It is the fundamental branch of science that was developed out of the study of nature and philosophy. Today, physics is ultimately defined as the study of matter, energy and the relationships between them. Physics is, in some senses, the oldest and most elemental pure science; its discoveries find applications throughout the natural sciences, since matter and energy are the basic constituents of the natural world. The other sciences are generally more limited in their scope and may be considered branches that have split off from physics to become sciences in their own right. The Elements of what became physics were drawn primarily from the fields of astronomy, optics, and mechanics, which were methodologically united through the study of geometry. Physics today may be divided loosely into classical

physics and modern physics. Classical physics elapses at the end of the 19th century while at the beginning of the 20th century; a major revolution shook the world of physics, which led to a new era, generally referred to as modern physics. The revolution sprang up prior to some shortcomings that were noted in classical physics which required modification through new ideas and more so, physics had evolved to the point at which classical mechanics could cope with highly complex problems involving macroscopic situations.

As a result of the great benefits that are embedded in this unique subject –physics, prominent physicists in their numbers have been able to contribute to the world at large by making diverse vocations and inventions out of physics, which has led to sporadic economic breakthroughs most especially in developed countries. Some of these physicists, who have made unforgettable impacts via physics are; Robert Hooke (1635–1703) who formulated the law of elasticity, invented the balance spring, the spiral spring wheel in watches, the Gregorian telescope, and the first screw-divided quadrant, constructed the first arithmetical machine, improved cell theory with the microscope; Alessandro Volta (1745–1827) who built the first electric battery (the voltaic pile) in the 19th century; Sir Isaac Newton (1642–1727) who established three laws of motion and a law of universal gravitation, built the first practical reflecting telescope (the Newtonian telescope), observed that a prism splits white light into the colors of the visible spectrum, formulated a law of cooling, co-invented calculus. (https://en.m.wikipedia.org/wiki/History_of_physics)

Hence, the general objectives of physics curriculum as stated in the curriculum document of 1985 by the Federal Ministry of Education (FME) and revised in 1998 are;

- ❖ To provide basic literacy in physics for functional living in the society.
- ❖ To stimulate and enhance creativity.
- ❖ To acquire essential skills and attitudes as a preparation for technological application of physics.
- ❖ To acquire basic concepts and principles of physics as preparation for further studies.

THE PACKAGES OF PHYSICS THAT CAN BE TRANSFORMED INTO VOCATION

Physics consists of various topics that can enable an individual to be self-reliant. According to Sunday (2010), frantic efforts have been made from the various contributions of science educators as well as different educational concerned boards towards making physics simple and easy for students of physics. The first of these successful efforts is the unification and curtailment of all the topics into five

major broad generalizations. This was done to show the relevance and connectedness of the topics. That's why the contents were further arranged in a logical, developmental and sequential order so that the relationships among the topics can be generated and assimilated. Hence, these concepts are classified into sectional packages while the major topics in Physics were distributed over the sections just as follows;

Section I: Concepts of space, time and Motion: the topics includes; Motion, Position, distance and displacement, Time, Speed and velocity, Rectilinear and derived units, Scalars and vectors, Equations of uniformity accelerated motion, Projectiles, Equilibrium of forces, Simple harmonic motion.

Section II: Conservation principles: this entails; Work, energy and power, Heat energy, Electric charges, Linear momentum, Mechanical energy, Heat energy (Temperature and its measurement, Heat energy measurement and Gas laws).

Section III: Waves: Production and propagation of waves, Types of waves, Properties of waves, Light waves, Sound wave, Application of light and sound waves, Electromagnetic waves.

Section IV: Fields: Production and description and property of a field, Gravitation of a field, Electric field, Magnetic field, Electromagnetic field, Simple A.C circuit.

Section V: Quanta: Particulate nature of matter, Plastic properties of solid, Crystal structure, Fluids at rest and motion, Model of the action, Molecular theory of matter, The nucleus, Energy quantization, Wave- particle paradox.

THE GUIDING PRINCIPLES AND APPLICATION OF PHYSICS CONCEPTS IN CREATING MULTI-VOCATIONS

Many of the aspect of physics curriculum stated earlier are vocation rooted either at the secondary school level or at the university level. The concepts of physics provide the needed factual and theoretical knowledge of the working principle for most of the devices and gadget we see or make use. For us to transform these principles into vocation form where one can become an entrepreneur, the acquisition of the applicative skills of those principles is paramount. Therefore, this segment of the study will reveal and shed more light into instances of some aspect in physics curriculum where vocation could emanate from.

First of all, we have electronic and circuit network analysis which occupy an important area of physics curriculum at both secondary school and tertiary level. According to Owolabi, Akintoye and Adeyemo (2011), the concept found in electronics and circuit are concepts that have direct bearing of electrical, electronic and computer job. Therefore, physics graduate can engage in further practical training or brief apprenticeship to learn and perfect in the act of repair of television, radio, handset, generator, computer and any others electronic devices. Physics curriculum according to Ifeanyi (2012) consist of the necessary ingredients needed to provide the pre-requisite knowledge of the mechanism of electronics device, which implies that the electronic courses offer are enough to give the theoretical knowledge of electronic related gadgets. In support of this, Ifeanyi (2012) added that electronic and circuit analytical networks provide all the theoretical knowledge of computer and electrical work. He said further that, it become more effective when the theoretical knowledge is back up with brief practical skill training in the electrical area of interest. In agreement to what he said, Owolabi, Akintoye and Adeyemo (2011) observed that it is now a common practice to find physics graduate rearing into computer engineering, and internet network as self employed individual and employer of labour. Additionally, the knowledge of simple connection of wires to terminals either in series/parallel can enable a physics student to engage in wiring house, office, church e.t.c.

Another aspect of physics that can lead to vocational creation is the study of optics where we are made to understand that all highly polished or shining surfaces can act as mirror. Under the concept of optics, best plane are produced by silvering one side of flat piece of glass and this way they become perfect reflector. Hence, through the study of optics, one can make a vocation and become an entrepreneur by engaging in the production of all shapes and sizes of mirror and the instrument that make use of them such as projectors. In fact, this can be carried out in a commercial scale at low cost; thereby, transmogrifying physics students during or after school to entrepreneurs. Apart from this, Ifeanyi (2012) argue that graduate of physics can also operate with little or no further training as an apprentice in setting up optical service outfit. Optical services are all about correction of sight defects in human beings. For normal human eye, the near point which is point at which an object can be clearly seen is 25cm from the eye and at this point the accommodation is greatest and the distance from the near point to the eye is called the least distance of distinct vision while the far point from a normal human eye which is the farthest point at which the object can be clearly seen is at infinity and at this point the accommodation is at the least. Hence, an individual experience eye defects like long-sightedness (hypermetropia) or shortsightedness (myopia) when the eye lens is unable to accommodate effectively.

A longsighted person can see far object but cannot see near object clearly which means that his near point is greater than 25cm (the normal near point) while a shortsighted person cannot see distant object clearly because his far point is less than the normal far point which is at infinity. The long-sightedness and shortsightedness can be corrected with the aid of convex (converging) lens and concave (diverging) lens respectively. What is essentially involve in both correction is fitting the required lens with estimated focal length that is also appropriate to the obtained and verified focal length of the patient's eye lens to revoke or eradicate the defects of vision. Optical service business can be operated in larger scale whereby the entrepreneur can produce lenses with different focal length fixed already in their numbers, so that when patients come to seek for their service, their eye focal lengths are confirmed and then they buy from the already fitted lens appropriate for their eye defects.

The prospect of vocation in the study of optics is not only limited to the stated ones but also covers the process of assembling various optical instruments such as lens, camera, microscopes, optical projectors, telescope, etc. The study of optics makes us to understand that optical instruments are chiefly made up of the arrangement of lenses and other accessories. A typical example is the lens camera which is basically made up of light proof box, biconvex lens placed in front of light sensitive film such that the opening of the shutter makes the lens to register the image of whatever is placed in the front of the lens in the name of photograph. The desired magnification and function of various optical instruments are achieved from how the lenses are positioned. All these are well detailed in the study of optics in physics. Hence, having known the various accessories of these instruments and their arrangement, physics graduates at various levels would find it easy to create a vocation in setting up their choice optical instrument. And based on the business's scope, the person can establish it in such a way that he is not just self employed but becomes an employer of others.

Another unique aspect of physics that can bring about vocational creativity is the study of latent heat and cooling effect. We are made to understand in physics that when liquids change into vapour (evaporation) a large amount of heat from the surrounding is involved and subsequently, the left over liquids and the environs undergo a fall in temperature (the cooling effect of evaporation). The cooling effect of the rapid evaporation of any volatile liquid (refrigerant) is apply in the setting up of refrigerator in which the refrigerant such as ammonia, Freon, ethyl chloride, sulphur dioxide, etc are often used for refrigeration. The working principle of the refrigerator utilizes the cooling effect of evaporation which can be set up by putting a volatile liquid in a closed pipe, and arranging for pump which pumps the

volatile liquid into condensed part of the pipe where it supposed to evaporated liquid gets condensed and on reaching to the part where it supposed to evaporate, it will cool the chamber and keep the temperature low. The vapour thereafter migrates to the condenser and the process continues in acyclic manner since it is a closed system. Basically, the process of refrigeration is attained with the use of a closed pipe, volatile liquid and cooling chamber. Therefore, physics curriculum enables us to understand to detail the refrigerators' set up and working principle and since it is very easy and straightforward to arrange or fit up, then there is possibility for us to successfully generate a vocation in refrigeration. And perhaps undertake or divert into the setting up of cold rooms and repairs of refrigerators.

Furthermore, radioisotope, nuclear magnetic resonance imaging, x-rays, gamma rays and ultrasound are some principles in physics curriculum. By passing through practical skill training in the operation of these machines, a physics graduate will efficiently deliver well when he wants to operate any of the stated machines. And if he like, he can make a full vocation out of it by acquiring many of such machines. And more so, their sales and services can make the physicist an entrepreneur creating mean of income generation for himself and others. These concepts have different ways they are being applied. A typical example is the application of x-ray in scanning, detecting, and revealing suspected area of fracture in a patient by taking the picture of the region of the bone. Gamma ray radiation also performs a unique function of treating patients with chronic cancer that cannot be operated upon. Human abdomen can be scan to reveal any internal disorder or to detect the size, position, age, etc of a foetus.

The production of local boats made of any materials work on the principle of flotation which is also in agreement with Archimedes principle. Archimedes principle states that when an object is totally or partially immersed in a fluid (liquid or gas), it experiences an upthrust which is equal to the weight of fluid displaced. Based on this, the principle of floatation then gave the final verdict that an object will float in a fluid (liquid or gas) if the upthrust exerted upon it by the fluid in which it floats is equal to the weight of the object. Therefore, it is the application of this principle in the building of ships that brings about their workability. And so, knowing full well that boats or ships should be made in such a way that the body will possess a big volume to displace large weight of water in order to make the upthrust to be high and able to carry the boat along the top of the water, then at our level, by following this way we can construct local boats or canoes that will be paddled manually.

The application of photoelectric effect principle on a photosensitive surface (when electromagnetic wave "visible light" is incident on it in such a way that the electrons are emitted and

accelerated towards the anode “the positive potential” with respect to the cathode), give rise to current flow and electricity. It is based on this photocell and photo-electricity occurrence that solar energy is generated and applied as an alternative and cheap source of energy derivation and production. The trend in Nigeria right now is the setting up of solar panels in establishments as other medium of generating power to complement the hydro and thermal electricity generation inadequacy and paucity. Those that specialized in solar energy aspects of physics especially at tertiary level are best suited for building solar energy panels and making vocation out of solar energy power generation as well as engaging in the production, sales and services of solar energy panels. This could more so be said to be an avenue to enhance energy generation worldwide which in return brings about economic advancement.

Apart from the aforementioned, the setting up, production and marketing of items like electric iron which make use of bi-metallic strip principle and the principle of reducing heat lost by radiation; thermos flask which operates based on the principle of reducing the loss or gain of heat by conduction and convection; pressure cooker which works based on the application and regulation of pressure and so on are some of the vocational prospects in physics. The construction or assembling or sales and services of direct current motors, generators and bicycle dynamos transformers through the principle of electromagnetic induction, etc are also inclusive. Hence, each of these are aspect where physicist can create a full vocation with little or no practical skill or apprenticeship training, having familiarized oneself with the theoretical fundamentals of these areas.

THE FACTORS MILITATING AGAINST THE CREATION OF VOCATIONS VIA PHYSICS EDUCATION

The following are some of the alarming challenges overwhelming the quality of physics education.

- 1. Inappropriate and ineffective teaching methods:** The teacher’s teaching methods goes a long way in enhancing effective learning by the students. But it’s a pity that most physics teachers or lecturers don’t take cognizance of this area during teaching-learning process. It is the usual traditional method of teaching science (physics inclusive) which involves “chalk and talk” activities that is often adopted. And this method is fully teacher-centered, which implies that the students are passive “robots” in the classrooms while the teachers are regarded as the repertoire of knowledge. Despite the fact that most teachers are aware of other approaches that can facilitate effective science teaching like inquiry method, collaborative teaching, discovery

method, etc which are purely child-centered approaches that guides students to discover facts and construct their idea and understanding of the concept of study. Nevertheless, science teachers according to Nwagbo (1995) shy away from activity-oriented instructional methods that are more effective and stick to inadequate traditional methods of teaching. One thing is to be well grounded in the conceptual understanding of a subject; another thing is to be well acquitted with the best method to pass the concepts across to the learners for proper comprehension Jegede et al (2013). (Bajah, 1984; Maduabum, 1986; Ajayi 2000) added that the practical activities that could enhance creative thinking in the learners are given “lip-service” in Nigeria schools.

- 2. Unavailability of qualified teacher and low teachers’ quality:** The situation in most secondary schools in Nigeria where physics is taught by graduates in other fields of science such as B.sc physics, Engineering; B.Tech Technology; HND etc. makes the objectives of physics to be unrealizable. Adebayo (2010) showed in the result of his study that professional teachers affect the students’ performance in physics positively more than the unprofessional teachers. Fajonyomi (2007) added that the success or failure of any educational programme rests mainly on the adequate availability of well-qualified (professional) and dedicated teachers. The use of unqualified teachers is one of the major constraints to the rate of vocational and economic development in Nigeria. Hence, the students taught by these incompetent teachers would invariably be shallow in physics concepts and principles.
- 3. Insufficient or lack of teaching materials:** If physics education must achieve its desired objectives, then all the needed elements that will make it to be successful must readily be available and accessible. However, educational researchers reported that most secondary schools in Nigeria have no physics laboratory and few that have it are rather ill-equipped (Madualum and Akuezulo, 1985; Soyibo, 1986; Ajayi, 2007). This implies that there are no enough functioning physics apparatuses in the schools, no wonder why some schools are find in the habit of pairing about 10-15 students to an apparatus during practical periods or conducting practical just to fulfill all righteousness. In the findings of Ajayi (2008), while investigating the level of students’ engagement in practical activities in physics laboratories. He deduced that only 23.23% of the schools did allow their students to carry out practical activities, which means that the practical activities on various areas of physics are inadequately performed in the schools. That’s why most physics students find it difficult and complex to operate simple tools in the laboratory.

The neglect of practical section in physics contradicts the objectives of physics education in senior secondary schools as stated in the curriculum and the National Policy on Education by the Federal Republic of Nigeria (2004) as well as in tertiary institutions. The teacher who ought to seek for alternative ways by improvising materials to bridge the gap of materials' deficiencies and insufficiency, find it tedious to do, simply because their attitudes toward improvisation of teaching materials are negative. In fact, many of the teachers are not aware of the improvisation method in teaching of physics (Madualum, 1983; Njoku 2000), while those that are aware of the use of local equipment and materials in teaching physics are hindered by a number of factors such as lack of fund, time constraints, laziness on their part, etc. Without the inculcation of practical skills, topics like current electricity, light, force on equilibrium of body, etc may not be fully understood.

- 4. Time limitation:** Time limitation is one of the major factors that affect the effectiveness of physics education and the realization of its set objectives. The time allocated for lesson varies and the teaching of virtually all the topics in physics required time than that allotted on the time table. Therefore, based on this, there's always difficulty to teach within the time allotted because each topic in physics has both practical and theoretical aspects which cannot be achieved within 45minutes framed on the time-table.
- 5. Negative attitudes of students toward physics:** According to soyibo (1985), it was observed that majority of the students in the secondary schools in Nigeria perceived physics as a very difficult subject. The impression cut across the gender while most parents do not also help the situation in that through their comments and reactions, they frighten or scare their wards away from physics. Ajayi (2000) noted that students generally classified the three core science subject – Biology, Chemistry and physics into their order of difficulty. He reported that Biology is considered the easiest, followed by chemistry and physics being the toughest of all. the cause of the negative perception of students towards physics was identified by Adebayo (2008) to include the fear of the mathematical skills involved, harsh teacher-students' relationship, students' unreadiness to study, wrong conception that physics is a difficult subject and poor method of teaching. This notion affects students' readiness and interests to the study of physics. The outcome of this is felt on the expected technological growth, vocational creation and economic advancement of the country.

6. Students' ignorance of the relationship between physics and the environment: It is rather incredible to remark based on the interview with some senior secondary school physics students, that most students offering physics lack the knowledge of the importance and relevance of physics with their environment and human development. They do not see the subject as a means of solving practical social problems but rather jest the acquisition of abstract concepts that have no bearable with the physical situation (Jegede *et al*, 2013). This is in agreement with Olarewaju (1986) who reported that “students felt that science curriculum is too rigid and irrelevant to their experiences in Nigeria”. Hence, the students' failures to relate physics to relevant societal problems make them to study the subject without objectivity or interest. Hence, they see the so-called rigorous tasks involved in its study as a mere waste of time and too abstract to study. Thereby seeing no need for such wasted time in doing exercises and eventually makes them conceive negative attitude towards physics. This attitude later boomerang and become a major threat to students' comprehension of the subject.

THE STRATEGIES FOR TRANSLATING PHYSICS INTO A VOCATIONAL GENERATING CHANNEL

Here are the gratifying ways out of the challenges that is facing the implementation of practicable physics.

- 1) Restructuring of physics curriculum to translate some principles and concept into practice:**
The various areas of physics where we have some vocational inclination should not only be taught theoretically but should be emphasized practically in order to ensure that the total practical skills needed to translate the aforementioned principles into vocational reality are enshrined into the curriculum. Thus, as students undergo these principles theoretically and practically according to Ifeanyi (2012), they should be required by the curriculum to locally produce and show these in form of project. Going by this, there will be a smooth transition from school into vocational reality and actualization.
- 2) Good mastery of all physics concepts and the application of suitable teaching methodology:**
Nneji (2003) elucidated the responsibilities of the teacher in the educational system noting that the teacher is responsible for the control and management of all that's obtained in the learning environment. Many researchers also agreed that mastery of the subject matter by the teacher is tantamount to effective teaching since it enhances the teacher's ability to plan and present the

lesson effectively. In accordance to this, Oforma and Ogah (2003) noted that effective teaching demands that the teacher should have a sound knowledge of all that the students must know together with a capability or an ability to relate content, method and sequence as well as the tempo of his work to the individual needs of the students.

Hence, to achieve the objectives of physics education, active teaching learning approach is highly recommended because of its benefits compared to traditional classroom lecture based teaching learning approach which have limited advantages in helping students to retain information, become self-learners and develop skills in transferring and applying knowledge and solving problems. Though no method is the best, but the teacher needs to study the students and identify the best teaching method for them. This gives a clarion call for expertise in methodology; thus, the necessity for skilled teachers.

- 3) **Regular teachers' training programme:** Organization of extensive training programme for all physics teachers can help to produce quality physics teachers or improve them. In the training, more emphasis should be placed not only on the mastery of the subject matter, but as well as on the improvisation methods, methodology, practical skills etc. In-service training in form of workshops and seminars can be organized regularly for non-professional teachers in order to enable them to cope with the present challenges of physics education Jegede *et al* (2013).
- 4) **Motivating and encouraging physics students:** Students are the center point of all activities involved in physics education. Hence, the teacher has a skilful task of presenting the subject (physics) in an interesting and captivating way to the students. The teacher's interaction with the students both inside and outside the classroom should not discourage or scare them away but rather draw their interest towards the study of physics. Apart from interpersonal relationship with the students, physics must be presented to the students as a subject that deals with physical phenomena around them; this is a fact which has been eluding the students. Thus, the teacher should endeavour to justify the fact that physics entails physical occurrences.

On the part of the government, scholarships should be awarded to students to boost their passion for physics or government sponsored participant should be initiated in highly focused graduate training programme designed to develop future leaders in various areas of vocational interests to realize this, the privileges for government supported study in foreign universities and establishments where technical knowhow is dominant should increase appreciably. The

emphases should be targeted on training that can contribute directly to vocational skills acquisition on scientific concepts and developing them up to entrepreneurial scale. Moreover, the government and the school authority also have the responsibility of providing motivation for the physics teachers through incentives and worthwhile science allowances.

- 5) **Enlightenment on the relationship of physics with other fields:** There are various areas in human endeavours where the application and outcomes of physics can obviously be seen in the society. Therefore, the students should be well sensitized as touching the relevance and significance of physics in other fields of human endeavours such as Medicine, Pharmacy, Sciences, Engineering, etc. The awareness of the link between physics and other fields of study would leave the students with the desire and readiness to learn the subject consequently, creating way for vocation creativity.
- 6) **Availability of resource materials:** Just as it has been emphasized earlier, that physics entails practical concepts and neglecting the practical approach “doing aspect” of physics renders its teaching-learning process ineffective, which simply implies that, for physics education to be effective, there must be adequate availability of resource materials to actualize the practical aspect of it. Therefore, the school authority and government should make adequate arrangement and provision for functional equipment in the physics laboratory. The teacher should improvise wherever the facilities are in bad condition or insufficient. The teacher should endeavour to adequately utilize the available materials for effective teaching and learning.

CONCLUSION AND RECOMMENDATIONS

This study has so far been able to unfold some of the innumerable packages and prospects of vocational skill that can be acquired in physics and the strategies to aid the acquisition process. By exploring physics, more practicable areas that can be turned into vocation can be discovered apart from the aforementioned ones. With this, it is possible for us to ascend to the peak of our economic breakthrough in Nigeria within a short time. Therefore, Physics curriculum should seek to its acquisition by modifying the curriculum to enhance vocational practice and creativity while in school, physics teachers should seek to its implementation by using the appropriate teaching method, the school authority and government should seek to its realization by organizing physics teachers' training and establishing more focused vocational schools, the students should seek to its actualization by having a positive orientation about the subject matter.

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