SCIENCE EDUCATION ISSUES AND DEVELOPMENTS pdf

1: Science, technology, society and environment education - Wikipedia

*Science Education Issues and Developments [Calvin L. Petroselli] on www.enganchecubano.com *FREE* shipping on qualifying offers. This book presents significant new analyses in the field of science education. This is hardly another field in education which is more important for a country's future than science education.*

Over the last twenty years, the work of Peter Fensham, the noted Australian science educator, is considered to have heavily contributed to reforms in science education. The key aim behind these efforts was to ensure the development of a broad-based science curriculum, embedded in the socio-political and cultural contexts in which it was formulated. However, although the wheels of change in science education had been set in motion during the late s, it was not until the s that STS perspectives began to gain a serious footing in science curricula, in largely Western contexts Gaskell, This occurred at a time when issues such as, animal testing , environmental pollution and the growing impact of technological innovation on social infrastructure, were beginning to raise ethical, moral, economic and political dilemmas Fensham, and Osborne, In addition, alarmed by the poor state of scientific literacy among school students, science educators began to grapple with the quandary of how to prepare students to be informed and active citizens, as well as the scientists, medics and engineers of the future e. Osborne, and Aikenhead, Hence, STS advocates called for reforms in science education that would equip students to understand scientific developments in their cultural, economic, political and social contexts. This was considered important in making science accessible and meaningful to all studentsâ€”and, most significantly, engaging them in real world issues Fensham, ; Solomon, ; Aikenhead, and Hodson An interdisciplinary HI approach to science education, where there is a seamless integration of economic, ethical, social and political aspects of scientific and technological developments in the science curriculum. Engaging students in examining a variety of real world issues and grounding scientific knowledge in such realities. Enabling students to formulate a critical understanding of the interface between science, society and technology. As mentioned before, STSE is a form of STS education, but places greater emphasis on the environmental consequences of scientific and technological developments. At best, STSE education can be loosely defined as a movement that attempts to bring about an understanding of the interface between science, society, technology and the environment. In Canada, the inclusion of STSE perspectives in science education has largely come about as a consequence of the Common Framework of science learning outcomes, Pan Canadian Protocol for collaboration on School Curriculum [2]. This document highlights a need to develop scientific literacy in conjunction with understanding the interrelationships between science, technology, and environment. Developing the capacity to read about and understand issues pertaining to science and technology in the media. Having the knowledge, skills and attitudes that are essential for a career as scientist, engineer or technician. Broadening knowledge and understanding of science to include the interface between science, technology and society. Formulating knowledge and skills that are essential to the economic growth and effective competition within the global market place. However, many science teachers find it difficult and even damaging to their professional identities to teach STSE as part of science education due to the fact that traditional science focuses on established scientific facts rather than philosophical, political, and social issues, the extent of which many educators find to be devaluing to the scientific curriculum. For example, rather than learning about the facts and theories of weather patterns, students can explore them in the context of issues such as global warming. They can also debate the environmental, social, enconomic and political consequences of relevant legislation, such as the Kyoto Protocol. This is thought to provide a richer, more meaningful and relevant canvas against which scientific theories and phenomena relating to weather patterns can be explored Pedretti et al. Social responsibility Critical thinking and decision making skills The ability to formulate sound ethical and moral decisions about issues arising from the impact of science on our daily lives Knowledge, skills and confidence to express opinions and take responsible action to address real world issues Curriculum content[edit] Since STSE education has multiple facets, there are a variety of ways in which it can be approached in the classroom. Curriculum content[edit] Approach Example Historical A way of humanizing science. This approach examines the history of science through concrete examples, and is viewed as way of demonstrating the fallibility of science and scientists. Learning about inventions or scientific theories through the lives and worlds of famous scientist. Students can research their areas of interest and present them through various activities: Through this kind of exploration, students examine the values, beliefs and attitudes that influenced the work of scientists, their outlook on the world, and how their work has impacted our present circumstances and understanding of science today. Philosophical Helps students formulate an understanding of the different outlooks on the nature of science, and how differing viewpoints on the nature and validity of scientific knowledge influence the work of scientistsâ€”demonstrating how society directs and reacts to scientific innovation. Using historical narratives or stories of scientific discoveries to concretely examine philosophical questions and views about science. Watson is an account of the discovery of DNA. This historical narrative can be used to explore questions such as: What kind of research was done to make this discovery? How did this scientific development influence our lives? Can science help us understand everything about our world? It stimulates an understanding of the science behind issues, and the consequences to society and the environment. A multi-faceted approach to examining issues highlights the complexities of real-life debates. Students also become aware of the various motives for decisions that address environmental issues. Real life events within the community, at the national or international level, can be examined from political, economic, ethical and social perspectives through presentations, debates, role-play, documentaries and narratives. Real life events might include: Opportunities and challenges of STSE education[edit] Although advocates of STSE education keenly emphasize its merits in science education, they also recognize inherent difficulties in its implementation. The goals of STSE education may challenge the values and beliefs of students and teachersâ€”as well as conventional, culturally entrenched views on scientific and technological developments. Students gain opportunities to engage with, and deeply examine the impact of scientific development on their lives from a critical and informed perspective. As they plan and implement STSE education lessons, teachers need to provide a balanced view of the issues being explored. This enables students to formulate their own thoughts, independently explore other opinions and have the confidence to voice their personal viewpoints. Teachers also need to cultivate safe, non-judgmental classroom environments, and must also be careful not to impose their own values and beliefs on students. The interdisciplinary nature of STSE education requires teachers to research and gather information from a variety of sources. At the same time, teachers need to develop a sound understanding of issues from various disciplinesâ€”philosophy, history, geography, social studies, politics, economics, environment and science. This ideal raises difficulties. Most science teachers are specialized in a particular field of science. Lack of time and resources may affect how deeply teachers and students can examine issues from multiple perspectives. Nevertheless, a multi-disciplinary approach to science education enables students to gain a more rounded perspective on the dilemmas, as well as the opportunities, that science presents in our daily lives. Depending on teacher experience and comfort levels, a variety of pedagogic approaches based on constructivism can be used to stimulate STSE education in the classroom. As illustrated in the table below, the pedagogies used in STSE classrooms need to take students through different levels of understanding to develop their abilities and confidence to critically examine issues and take responsible action. The table below is a compilation of pedagogic approaches for STSE education described in the literature e. A recent movement in science education has bridged science and technology education with society and environment awareness through critical explorations of place. The project Science and the City, for example, took place during the school years and involving an intergenerational group of researchers: The goal was to come together, learn science and technology together, and use this knowledge to provide meaningful experiences that make a difference to the lives of friends, families, communities and environments that surround the school. The collective experience allowed students, teachers and learners to foster imagination, responsibility, collaboration, learning and action. The project has led to a series of publications: Visual journeys in critical place based science education. Searching for Science Motive: Community, Imagery and Agency. Research and writing in science education of interest to those new in the profession. Science and the City: A Field Zine One collective publication, authored by the students, teachers and researchers together is that of a community zine that offered a format to share possibilities afforded by participatory practices that connect schools with local-knowledges, people and places. Students might, for example, use their knowledge about nutrition and issues relating to for-profit food manufacturing, along with data from their own inquiries into eating habits of students in a school cafeteria, to lobby the school administration to improve the nutritional value of foods on offer in the school. Educate all students to the best of their ability; Address relationships among different learning domains e. A forum for discussing STSE socioscientific issues and actions is at: Tokyo Global Engineering Corporation, Japan and global [edit] Tokyo Global Engineering Corporation is an education-services organization that provides capstone STSE education programs free of charge to engineering students and other stakeholders. These programs are intended to complementâ€”but not to replaceâ€”STSE coursework required by academic degree programs of study. The programs are educational opportunities, so students are not paid for their participation. All correspondence among members is completed via e-mail, and all meetings are held via Skype, with English as the language of instruction and publication. Students and other stakeholders are never asked to travel or leave their geographic locations, and are encouraged to publish organizational documents in their personal, primary languages, when English is a secondary language.

2: New PDF release: Science Education Issues and Developments - Christian Coin Library

Additional resources for Science Education Issues and Developments Example text 22 Robert Adjiage and FranÃ§ois Pluvinage organized a play, called "our boat is sinking", with a group of 12 pupils.

But there is hope. Colburn, who is training a new crop of science teachers and helping midcareer educators to advance their practice, promises to launch his students on the road to becoming exemplary science teachers. NCLB is driving schools to take a closer look at how they teach science and to improve their practices accordingly. Science testing under NCLB is slated to begin in the â€" school year, prompting a flurry of activity among educators. State departments of education have been busily devising standards-based tests that will be administered annually within grade bands at the elementary, middle, and high school levels. Additional concerns have joined in the push to improve science teaching. In many countries, public and private groups are demanding better science education at all levels because they see science and technology as the keys to economic advantage in the global village. Europe has recognized the importance of science and math education for economic success Wellcome Trust, , and even Asian nations, consistently high achievers in international comparisons of math and science, are not immune from worry. During the last decade, while U. Ironies in international education reform aside, one thing is clear: Experts say the national science education standards developed by the National Research Council NRC in have not yet gained a strong foothold in the science teaching practices found in most U. Fordham Institute in Washington, D. Some standards-based curricula have created other problems as well, say the authors of the Fordham survey. In a solid science curriculum, the accumulation of facts and concepts should go hand in hand with laboratory or field investigations. Calling On the Cognitive Sciences The next step in science education reform makes use of research within the cognitive sciences, which seek to uncover the mental processes of learning. According to this promising model, concepts, facts, and inquiry in both its intellectual and hands-on aspects play mutually supportive roles in learning science. Within each domain, conceptual frameworks promote organization and understanding. In science, for instance, the concept of the adaptation of species gives new meaning to what a student already knows about the characteristics of fish, birds, and mammals. In How Students Learn: First, find out what students already know. Help students reflect on their learning process. Addressing Preconceptions Students enter the classroom with their own ideas about how the world operates. Some incomplete ideas persist as misconceptions into adulthood. One well-known study Harvard-Smithsonian Center for Astrophysics, showed that a majority of randomly chosen Harvard University graduates, faculty, and alumni could not give correct explanations for either the change in seasons or the phases of the moon. One featured misconception held that the earth has a pronounced elliptical orbit that swings closer to the sun during summer and farther from the sun in winter. The study also showed that such fixed personal understandings are hard to root out, even after teachers provide correct information see illustration on facing page. Accordingly, teachers who understand the individual preconceptions that students bring to a science topic can address misunderstandings directly and thus better focus their lessons. In addition, teachers must be ready to address preconceptions that students hold about the science field itself and the procedures within it. For example, Donovan and Bransford point out that many students believe experiments are performed mainly to attain a certain outcome or that data correlation is itself sufficient to show a causal relationship. Donovan and Bransford point out that research has shown that experts in a field acquire and retain knowledge differently from novices. Using Metacognitive Strategies The third principle for effective science instruction involves teaching students to use metacognitive strategies to monitor their own thinking. Such strategies can be as simple as having students compare outcomes of an experiment or leading a class discussion that exposes students to different viewpoints on a topic. With guidance and support from skilled teachers, students will reconsider and refine their own ideas. A metacognitive strategy called reflective assessment involves giving students a framework, such as a rubric, for evaluating their inquiry. For example, students may rate their understanding of the main ideas, understanding of the inquiry process, systematicness, inventiveness, careful reasoning, application of the tools of research, teamwork, and communication skills. Donovan and Bransford found that when given a reflective framework for their thinking, academically disadvantaged students, in particular, made significant gains Such a shift is not easy, however. It requires that teachers have a solid grounding in the topic so that they can help students use their reasoning abilities to question their prior understanding. For upper-elementary students and those entering middle school, inquiry calls for students to become more attuned to the role that evidence plays in forming their explanations. Even young schoolchildren can engage in scientific inquiry, says Chris Ohana, field editor for Science and Children magazine and science education professor at Western Washington University. Students in grades Kâ€”4 should be able to Ask a question about objects, organisms, and events in the environment. Plan and conduct a simple investigation. Employ simple equipment and tools to gather data and extend the senses. Use data to construct a reasonable explanation. Communicate investigations and explanations. These students weigh a balloon to find out. Rick Allen Students in grades 5â€”8 should be able to Identify questions that can be answered through scientific investigations. Design and conduct a scientific investigation. Use appropriate tools and techniques to gather, analyze, and interpret data. Use evidence to develop descriptions, explanations, predictions, and models. Think critically and logically to relate evidence and explanations. Recognize and analyze alternative explanations and predictions. Communicate scientific procedures and explanations. Use mathematics in all aspects of scientific inquiry. Scientific inquiry for students can involve using simple tools like magnifiers to extend the senses. Inquiring Teachers Ought to Know: Alan Colburn Inquiry-based instruction encourages students to learn inductively through concrete experiences and observation rather than rote memorization, gaining problem-solving skills that will help them throughout life. In science, inquiry-based instruction is founded on several assumptions: Learning to think independently and scientifically is a worthy instructional goal. Learning to think independently means that students must actually think independently. Thinking is not a context-free activity. To gain a deep understanding of scientific concepts, learners must actively grapple with the content. The inquiry approach represents a broad range of instructional possibilities. At one end of the spectrum, students make few independent decisions; at the other end, students make almost all the decisions. Science educators commonly refer to three different kinds of inquiry-based instruction: The teacher or lab manual might give students step-by-step instructions, but students must decide for themselves which observations are most important to record and must figure out, to some extent, the meaning of their data. Students make almost all the decisions. In the quintessential open inquiry activity, a student thinks of a question to investigate, considers how to investigate the question and what data to collect, and decides how to interpret those data. Implementation Teachers may face challenges in implementing inquiry-based teaching practices, largely because many students are not used to figuring out so much on their own. Teachers can make the transition by implementing changes gradually. For example, a teacher accustomed to students performing verification lab activities could remove any ready-made data tables, conduct a preliminary classroom discussion to point students in the right direction, and, after the experiment, ask students to share information about the variety and significance of the data they collected. Students will inevitably place a variety of volumes in their test tubes. Consequently, results may varyâ€”prompting great possibilities for class discussion on how and why the results varied as they did. Extend the experiment by having students develop further questions to investigate after interpreting their data. Have students come up with a procedure to address a question and situation similar to the question already investigated. Colburn, , Educational Leadership, 62 1 , pp. To ensure that kits promote inquiry-based teaching rather than merely entertain requires that teachers receive training in inquiry-based approaches. Professional development is one way in which teachers can gain theoretical and practical knowledge about implementing the inquiry approach, as well as other innovative instructional practices. Many states and schools are already using NCLB funds targeted at the preparation, training, and recruitment of highly qualified teachers to help teachers better engage in such practices. Most educators agree that standardized tests have a limited capacity to convey what students know. The shortcomings of a minute paper-and-pencil exam become even more apparent when it comes to science, researchers say. Science education researchers, like Bertenthal, have high hopes that upcoming tests will at least mark the beginning of change in how schools assess scienceâ€”and ultimately influence curriculum and instruction. Whittling down and streamlining the science standards could only help the cause of learning science, the report concludes: One such test might be a classroom assessment that teachers could conduct over a longer stretch of time than a class period. This requirement compels states to take a hard look at how they select and organize those standards. Typically, state science standards overwhelm educators with a welter of topic-based information to teachâ€”mostly disconnected facts, formulas, and procedures. For example, to eventually understand the concepts of matter and atomic molecular theory, a student at the elementary school level should first understand that the physical world around her consists of material that can be described, measured, and classified according to its properties. Next, the student learns that such matter can be transformedâ€”but not created or destroyedâ€”by chemical and physical processes, such as decay or erosion or, closer to home, chewing her food.

3: Current Issues in Education

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This nation is once again demanding a reform of education with attention directed especially at deficiencies in the teaching of science and mathematics Hurd, , In the last 5 years, , over national commission, panel, or committee reports have been published, in addition to dozens Of books by informed educatorsâ€"all critical of precollege education in the United States. It should be noted, however, that the Vast majority of reports were developed by citizen groups, government agencies; economic Organizations, or business or industry, and not by schools or educators. The need for educational reform has been viewed as a national crisis, and immediate action has been demanded. Leadership for the reform was assumed for the most part by politicians, particularly state governors ECS, ; Kirst, , and by business and industrial organizations CED, Currently, a number of private foundations are studying critical aspects of the overall school-reform effort, such as urban educational problems and education of teachers Carnegie, ; Ford Foundation, The various science teachers organizations have been cautious about entering the debate on curriculum reform. A few of the organizations have used ad hoc committees to refine previous statements of science-teaching goals. These organizations have been active in forming networks, alliances, or coalitions among teachers to share ideas about what should be done to improve the condition of science education, but to what ends is not clear. A study of articles in 12 leading science-education journalsâ€"such as The Science Teacher, The Physics Teacher, Journal of Chemical Education, Science Education, and American Biology Teacherâ€"in found that only 22 of 4, feature articles were responses to the concerns represented in the national reports on educational reform. Of the 22 articles, 16 stressed the importance of including technology in science courses and four recommended including scientific-societal issues. None of the science-education journals carried an article that systematically explored the scientific and social issues that underlie demands for a reform of science education Hurd, unpublished data. The s are not the first time in this century that attempts have been made to redirect the teaching of science. Reform issues arise whenever a perceived economic or social crisis appears on the American scene, such as the shift from an agricultural to an industrial economy or, as is now the case, a shift from a "postindustrial society" to an "information age. World War II led to renewed attention on precollege science education with the goal of strengthening the U. Politicians take the stance that schools must be doing something wrong, or the United States would be first or on top of the situation. A persistent theme in the s reform movement is that the United States has lost its competitive edge in world markets and therefore should revise the school science curriculum. It is frequently suggested in the public press that we should adopt the science curriculum of our chief competitor, Japan. Japan, however, is in the process of reforming its educational system to ensure that it will not lose its competitive position in the world Hurd, unpublished manuscript. Bringing about a fundamental change in the science curriculum is a complex process. In fact, it is a process that has yet to be resolved. A major reason for this situation is a tendency in the United States always to deal with problems, rather than first identifying and interpreting the underlying and interacting social, cultural, and scientific developments that project new educational demands. A brief look at some current efforts to foster educational changes will demonstrate why the movement is failing so far. One action has been to use the public press to deliver the worst bashing that schools have ever had to endure. A common means for dealing with these problems is to reduce financial support until schools do better. Another policy has been to legislate change. Within the last 5 years, over laws, mandates, or regulations have been established by states to influence practices in schools. On the one hand, requirements for teacher certification are increased for graduates of teacher-education institutions; on the other hand, there are lower qualifications for any citizen who wishes to teach and has had little or no training. The most common recommendation for educational improvement is for everyone concerned to try harder. This idea is implemented by requiring more of everything: About the only "less of" recommendation is less opportunity for students to participate in competitive sports or other extracurricular activities if they do not meet certain academic standards. There may be merit in some of these recommendations, but in the aggregate they reinforce the conditions and circumstances that give rise to the quest for educational reform in the first place. What have been the results from these strategies? Teachers are demoralized, parents disillusioned with schools, and students "turned off" by science; and there is a growing attitude that it is probably better to go back to traditional curricula and modes of instruction and learning. Considerable publicity has been given to "effective schools," schools that appear to be doing something better than they did in the past. I have searched the published reports on these schools, and I did not find changes in their philosophy of science education, a recognition of the impact of modern science and technology on society, or evidence that student learning was more productive. A reform of high-school biology has been under consideration for nearly a century. At roughly year intervals, a committee is formed with new perspectives on the teaching of biology Hurd, ; Mayer, Conferences are convened, resolutions passed, reports published, a few workshops given for teachers at regional or national conventionsâ€"and soon all are forgotten. A few years later, the cycle is repeated; but there is no review of the accumulated history that might lead to a new conceptual framework for an education in biology. They are similar in their recommendations. Neither of these reports has as yet stimulated the development of a biology curriculum that recognizes the issues identified by the reformers. And it can be added that none of the other national reports on the improvement of science education published in the s has so far brought about significant change in what is taught in schools. A good deal of the ineffectiveness of the national reports is inherent in the reports. As one reads these reports, one realizes that they tend to be more critical than creative, more speculative than informed, more slogans than solutions, more visible than valid, and more problem-directed than issue-directed. Theft positions on education tend to be supported by passionate rhetoric and uncertain statistics. The central problem is how to introduce into schools a biology curriculum that represents the ethos of modern biology, ensures more productive learning by students Resnick, , considers social changes and cultural shifts, and is in a context that has educational validity for the foreseeable future Cole and Griffin, All biology-reform committees over the last years have failed in attempts to implement a curriculum in which the goals were the proper education of a citizen in the sense of being better informed about life and living, more concerned about biosocial problems, and more competent and confident in reaching decisions. This is a much more difficult task than educating scientists and technically trained journeymen to carry out the practice of science. There is a plethora of reports indicating quantitative deficiencies of science education, but nowhere is there to be found a unifying theory of either science or biology education that has a modicum of consensus IEA, ; Raizen and Jones, ; Buccino et al. Efforts to bring about a reform of science education that proceed "ahistorically" and "aphilosophically" have no anchors in reality and no flag to follow. The most difficult phase of implementing a reform of science education is changing the prevailing beliefs of teachers, parents, school administrators, and school-board members about what an education in science ought to mean. A lack of such a statement of belief only serves to create more confusion than insight and neutralizes reform efforts. A well-recognized principle in social psychology is that effecting change in an institution requires that all the actors be considered. For schools, this means not only teachers, but parents, students, principals, top administrators, school-board members, politicians, and college and university faculty members in the sciences and in education. In the science-curriculum projects of the s and s, only the scientists and a few token teachers were involved in developing the curriculum rationale and choice of subject matter. All other teachers were to be trained in various types of institute programs taught by scientists who were not involved in producing the materials Hurd, School administrators, parents, and students alike were left out of the picture. So were the science educators in colleges and universities, with the result that the next generation of science teachers were never trained to implement the new curricula. The same situation occurred in the departments of science in colleges and universities. A study by the U. General Accounting Office published in concluded that the institute programs of the s and s for the retraining of science teachers were largely ineffective GAO, Science courses are taught today in the way they were in the s and with the same goals in mind Serious blocks in implementing a new curriculum are the misconceptions that teachers have about the various ways of knowing in the sciences and what is meant by knowledge and wisdom. Using biology as an example, when T. Huxley, in , developed a biology coarse for use in high schools, the prevailing theory of learning was known as formal or mental discipline. Because of the extensive terminology and taxonomyâ€”much of it ideally Latinziedâ€”biology was considered an ideal course for training memory and observation. One needs only to examine a modern textbook in life science or biology to find that the theory of formal discipline still prevails in practice. Most textbooks are little more than beautifully illustrated dictionaries. Note also the number of recommendations in the current science-reform movement that stress making science courses more rigorous and academic as a way to improve learning. Throughout the whole history of biology, teacher-made and standardized tests Murnane and Raizen, have reinforced the notion that the memorization of a large technical vocabulary is equivalent to understanding biology. There has never been a mechanism or a system developed for channeling the research on learning and cognition into the education of biology teachers, the textbooks and tests they use, and instructional procedures for making student learning more productive, in terms of knowing what it means to understand something and how to make intellectual use of it. Now that we have reached a phase in history in which there is a need for all people to be able to renew and extend their knowledge base throughout their entire life span, what is meant by knowing, understanding, and using are major components of a curriculum-implementation program. It has been my purpose here to indicate that there is much more to a viable implementation of a reform in biology education than restructuring institutions and reformulating the curriculum, although both these endeavors are essential. As every ecologist knows, there is never an instance in which only one thing happens at a time. We would do well to think in terms of the ecology of educational reform. What Science is Most Worth Knowing? Chemistry in the Community. Science and Engineering Education: Carnegie Carnegie Forum on Education and the Economy. Teachers for the 21st Century. Carnegie Corporation of New York. Contextual Factors in Education, pp. Wisconsin Center for Educational Research. Investing in Our Children. A Recognition of Progress. Biological Education in American Secondary Schools American Institute of Biological Sciences. Rand McNally and Co. The Search for a New Vision. Council for Basic Education. Science education for a new age: Science Achievement in Seventeen Countries: Who Controls Our Schools? Biology education in the United States during the twentieth century. Science and Mathematics in the Schools: Report of a Convocation. Bulletin of Science, Technology and Society. National Commission on Excellence in Education. A Nation At Risk:

4: Calvin L. Petroselli (Author of Science Education Issues and Developments)

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View next table Despite all the great things science education can accomplished in the national development of a nation there are many problems militating against it especially in Nigeria. This paper focused on the importance of science education and problems militating against the development of it and the way forward. Importance of Science Education to National Development Science education is very important to the development of any nation in many areas. A graduate of physics education can be self employed as opined by [22]. Many of the physics graduates have some knowledge of electronics that is enough for them to be able to have a little period of training as apprentices and then stand alone as electronic technician. For instant, Semiconductor is very important in the modern technology that if properly learnt it is enough for one to stand upon for a living; semiconductor physics is part of what any graduate in physics will learn and should learn. In [1] semiconductor, is very important in a growing economy like ours in Nigeria; it is useful in ceramic industry and a well trained physics education graduate can be well established in ceramic industry. Without science education Information and Communication Technology would be impossible. Science and technology will not be possible without science education; for instance engineering, medicine, architecture etc will not be possible if there is no one to teach the students the core subjects needed for these courses. Biology education is very important to any growing economy like Nigeria. Many graduates of biology education are self employed and employers of labour; many owned schools for themselves where people works and earn their living while some are in to fish business. There are colleges of education where students of chemistry department are taught how to make dye and chalk; graduates of these departments can establish their own chalk business as soon as they graduate. If supported with fund many schools do not need to buy chalk outside anymore and they can equally produce for other schools. Problem of Science Education Development 3. Security Security issue in Nigeria has been worrisome for more than two years now because of insurgence of Niger Delta and Boko Haram as averred by Horsfall [10]. Stretching the averment further, the former is politically motivated while the latter is religiously motivated; the reason for the insurgence is trivial to this paper but the effects on science education development is very germane. People in Nigeria lives in fear of uncertainty of death from bomb explosion: The lives of nationals living in Nigeria are in perpetual danger of abduction or kidnapping. The recent attacked on a northern university where students and lecturers were cold bloodedly murdered including a professor of chemistry still remains an insomnia in academic arena. Science infrastructures built with huge amount of money for schools had been destroyed while gas and oil installations vandalised; the resultant effects of these is on education. Many parents have lost their job and the effect is on the children; these children could not complete their education and eventually drop out of schools. According to [11], these dropouts are used by politician as thugs, for assassinations and robbers robbing banks, poison the societies and make everybody feel unsafe. Majority of these dropout students are very brilliant who could have become renowned science educators the country would be proud of. Schools were closed down in many parts of the country; universities, polytechnics, colleges of education, secondary and primary schools where learning environment are no longer safe for learning remain in long compulsory holiday for months. Many brilliant students who should have been an asset for the academic institutions had been killed by terrorist while many had suffered untold hardship in the hands of kidnapper which later affected them both emotionally and academically. A cultist who graduated in school through examination malpractices in many time end up in classroom as a teacher since teacher is the easiest job anyone could get in Nigeria because of lack of professionalism. These are many of the teachers we have in most of our schools; they got there through their godfathers who are politicians. Examination malpractices are the other of the day in the country institutions of learning as observed by [8], even in teachers training institutions. Cultists are all over the institutions of learning posing serious danger to academic communities. Worsen enough is science teachers also being cultist and encouraging all forms of examination fraud thereby discouraging hard work among serious science students. Corruption Corruption has eating deep into Nigeria system and it is manifesting in every sectors including education. In Nigeria today it is not what you know but whom you know, that is why [14] said recruitment to job is tied down to criteria such as political favouritism, geographical area or quota system. Many of the teacher training institutions and universities cannot boast of the best academic staff because the best probably do not have godfather who can help them. Appointment is no longer based on merit but on whom you know and the amount you can offer for such job. Admission into higher institutions of learning is not on merit but on whom you know also. Purchases of science equipment to schools are no longer done transparently since it is either the chief executive of the school or any of his or her relation who do the supply. Most of the science laboratories are empty building or buildings filled with fake or obsolete science equipment which are useful for nothing but mere demonstration. Money meant for staff training are diverted to personal account while selections of those who benefit in staff training is on whom you know syndrome. All these bounced back on the quality of science education the nation produces. Nigerian leaders are corrupt that is why we lack stable political system of government which affect science education as posited by [20] that in any stable political system, teachers and their education system are well catered for. Science teachers are not well catered for in Nigeria instead they are looked upon by the politicians as beggar. Corruption is the greatest challenge to development of science education in Nigeria; corruption leads to many problems the country is facing presently. According to [17] corruption leads to slow movement of files in offices, extortion in highways, ghost workers in work places, election irregularities and many more. Corruption makes school administrator mismanaged fund meant for purchasing science equipment and asked science teacher to make sure student still pass in examinations by all means. In many universities and research institutes, research has become history because government preferred to use research money for election or hire security for the family of government officials than science education research. Nigeria is a multiethnic country; this is affecting the country in many ways especially in education. The world is in era of science and technology; every nation is craving for development in Information and Communication Technology [ICT] which cannot be fully achieved without science education. Parents encourages their children to study science oriented courses which is good; children who have no ability for such courses opted for courses in humanity and art. When the time of employment come those who opted for humanity and art courses would be given job related to sciences without prerequisite qualification. Those who originally studied sciences are schemed out of the job because of ethnicity; the attitude discourages young ones from studying science education. Teaching appointment is done based on nepotism and favouritism. This is affecting the development of science education in the nation. There is corruption in the land and no one is spared neither is any organ of government spared [2]. Lecturers in higher institutions have turned colleges and universities to supermarket shops where they sell handouts and books at outrageous prices. Staffers of many polytechnics have taken over the affair of the institution because the chief executives are corrupt in awarding contract that never existed and mismanaged fund meant for science equipment. Male lecturers molest female students who are not willing to dance to their music of promiscuous life style. All these discouraged students who want to study science education and killed the morale of those who are studying the course already. Scholarships and bursary meant for science students are diverted to non science students because of ethnicity. Where the scholarship is given to science students they introduce unnecessary bureaucracy into it that students may not get the money for many years or give up of the scholarship. Political Nigeria has not been having a stable political system of government since her independence in Stable political system of government is very essential to educational development of any nation [19]. Military ruled for 34 years in Nigeria out of 53 years of existence as a sovereign nation; these years can be regarded as an era of colossus waste in both human and natural resources for Nigerians. These leaders have no regard for education but concentrate on establishing their government for long years. The few years of civilian rule has been years of lack of focus; government educational program changed according to the taste of the political party in power. Many science equipment and infrastructures are lying in waste in our schools because of instability in political government. Yearly budget of Nigeria government revealed lack of focus and insincerity to good and quality education. Economy Nigeria is blessed with many natural resources on which her economy rest upon; however over dependent on petroleum has seriously affected the economy. The effect is on science education since science equipment and apparatus are inadequate in the country and the cost of importing these materials is high because of exchange rate. According to [7], all effort to shift focus of economy from oil industry to other economic activities has not yield positive result because of corruption. Teacher Science teachers are key factor to be considered when talking about the development of science education in any nation. There are shortages of qualified science teachers in Nigerian schools. So called science teachers are not professionally qualified. They may have the knowledge of the subject but lack the method. Attitude of many teachers to teaching are discouraging; they have been teaching for many years without upgrading their certificate by going for in-service training. This affects their output and it is a problem to the development of science education. Science teachers should use different strategies as there is no single universal approach for specific class. Many science teachers still hold to chalk and talk method which is not appropriate for science teaching in this age [3] Lack of good strategies in the teaching of science is affecting student performance and at long run affects student enrolment [16].

5: Science Education Issues And Developments

The National Science Education Standards (National Research Council,) and other science education literature (e.g. Lunetta, Hofstein and Clough,) emphasize the importance of rethinking the role and practice of school laboratory work in light of these reforms.

LoPresto Getting it to Work: Yet more and more students elect to concentrate on other fields to the exclusion of science for a variety of reasons: The perception of degree of difficulty, 2. The actual degree of difficulty, 3. The lack of perceived prestige and earnings associated with the field. The dearth of good and easy to use texts. The lack of society in comprehending the significance of science and creating attractive incentives for those who enter the field. Chapter 1 - This study concerns the field of mathematics education. Today, for almost any technology, attaining the most advanced level relies on using digital systems. Therefore, the authors focus on number acquisition and use, emphasize major discussions about related topics, and introduce our personal contribution. The authors consider three areas: Modern society needs two kinds of number users: According to the framework for PISA assessment, dealing with numbers concerns every citizen facing situations in which the use of a quantitativeâ€¦ reasoningâ€¦ would help clarify, formulate or solve a problem. Working with numbers is what a professional marketing specialist, engineer, physician, artistâ€¦ does when he has to cope with numerical theoretical frameworks, or when he collaborates with a mathematician. This brings two types of questioning: What level of achievement is desirable in number-learning to meet either numerical need? The authors examine what is proposed for teaching such a broad subject to 7-toyear-olds. The authors first observe and question the educational system, the designer of curricula, scenarios for teaching, training programmes, and national assessments. Secondly, the authors question the notions of problem solving and modelling as mere responses to mathematics-teaching issues. The authors then focus on what really happens in a standard classroom, particularly how teachers apply recommendations and directives, and how the generalization of assessments affects their practice. Numbers in the field of education: Three aspects are considered: The authors distinguish four related levels which the authors have named: The cognitive aspect evokes the essential issue of semiotic viii Calvin L. Petroselli registers for representing and processing numerical objects, considers the discipline-ofexpression aspect of mathematics, and other issues taken into account by numerous researchers, such as process and objectâ€¦. The didactical is devoted to exposing our conceptual framework for teaching numbers and understanding their learning. An experiment in ratio teaching is described and analysed. Chapter 2 - Laboratory activities have long had a distinctive and central role in the science curriculum and science educators have suggested that many benefits accrue from engaging students in science laboratory activities. The 21st century has offered new frames for dealing with the potential and challenges of laboratory based science teaching. This is an era of reform in which both the content and pedagogy of science learning and teaching are being scrutinized, and new standards intended to shape meaningful science education have emerged. Lunetta, Hofstein and Clough, emphasize the importance of rethinking the role and practice of school laboratory work in light of these reforms. The new frames, however, also relates to the development in the understanding of human cognition and learning that has happened during the last 20 years. In the following chapter attention will be given to research on learning in and from the science laboratory. More specifically, the presentation will focus on the science laboratory as a unique learning environment for the following teaching and learning aspects: They have, however, been neglected both regarding development of practical experiences provided to the student as well as in research on the effectiveness of practical work that is conducted in the context of science learning. A new approach is needed in which these two aspects are coordinated and seen in accordance with the general practice of teaching and learning in school science. Chapter 3 - There is a crisis in science education. However, quite apart from instrumental reasons such as a national interest for having more scientists, science education is important for cultural reasons. Science permeates every aspect of modern life and arguably full citizenship in a technological society necessitates the understanding of science. Based on how the world is, science promotes critical thinking, a concern for evidence and an objectivity that is independent of personal opinion or the dictate of kings - yet few individuals have an elementary understanding of science. However, there is no guarantee that exposure to the working lives of scientists will promote an interest in science and, moreover, science is not based on making sense of experience. To generate the interest and motivation of young learners requires an engagement with the nature of science NOS involving meta-discourse with the history and philosophy of the discipline. Contrary to the current wisdom of science educationalists, NOS has more to do with the rule-governed abstract possible world of the thought-experiment than hypothesis testing with a clipboard of data. This article consists of three parts: Public perception of science and scientific literacy and understanding. Why NOS is essential to science education. Chapter 4 - Student affect has been one area of interest in mathematics education for decades. In general, education studies on affect have much focused on affective factors in the contexts related to mathematics achievements, learning of mathematics or solving mathematical problems. This is understandable since mathematics and mathematical problem solving carry many kinds of cognitive and sociocultural features that are not easily attached to the other school subjects. For example, the abstractness of mathematics and the differences in the symbol systems used in mathematical language set high demands on cognitive processes and also detach mathematics from the context and experience of everyday life. Furthermore, general views of mathematics as a difficult and demanding subject have caused it to be highly regarded and have been generally used to measure academic abilities. Mathematics tend to have a ritual value in societies that then cause powerful experiences with and important differences in mathematical performance. After showing passionate interest in human cognition and cognitive processes, education research paradigms have recently created new opportunities for and even laid emphasis on studies of student affect. Constructivism, together with applied socio-cognitive, cultural and contextual views of learning and education, has enriched our knowledge of affect in mathematics education research, as well. This theoretical chapter first discusses some conceptual features of affective factors traditionally applied in education research and especially in mathematics education studies. This short overview will then be followed by consideration of some of the most significant and often used affective variables in mathematics education research. More recently presented views of affect with cognition in learning will be considered as an introduction to the here suggested theoretical framework for understanding student affect in learning mathematics. Especially, perspectives on the coexistence of affect and cognition, on self-related cognitions and self-regulation are applied in constructing this suggested theoretical framework. Petroselli Chapter 5 - In this work, an attempt has been made to study the plethora and the diversity of informal sources of science learning and the ways formal education may benefit by making use of these sources in its everyday school practice. Informal sources of science knowledge have many forms: The material coming from them is chaotic, because it is diverse in terms of the means used, the purposes and the targets stated, the audience addressed, etc. To study them it is helpful to categorize them. Thus a three dimensional model has been developed. Each dimension describes one system of taxonomy: Furthermore, the different learning environments in which informal science learning takes place have been studied. Three different learning environments have been distinguished: The study reveals their particular characteristics, as well as their power and limitations. It also suggests ways of using them effectively in the context of science classroom. Chapter 6 - What is scientific evidence? How should scientific data be collected? These questions comprise essential components of scientific reasoning that are not well understood by students. This chapter explores conceptual challenges students face in inquiry-rich classrooms with respect to the notion of scientific evidence and the related data collection process. As students seek out evidence to support their inquiry, they are likely to ask and need to answer questions such as these: When should data be collected? What counts as scientific evidence? After examining conceptual issues involved in answering these questions, this chapter proposes that understanding what it means to collect scientific data and what scientific evidence is requires a complex understanding that involves conceptual, procedural, and epistemological knowledge. Chapter 7 - A constructivist paradigm has dominated science education research in recent years. According to this view, students use their existing preconceptions to interpret new experiences, and in doing so, these preconceptions may become modified or revised. In this way, science learning proceeds as children actively reconstruct their ideas as they become presented with new information. However, the implications of constructivism for classroom teaching are still open to question. This position paper refers to the science education literature to argue that strategies to arouse and maintain student motivation should be a crucial component of constructivist-informed classroom teaching. This is because constructivism is universally accepted to be an active process â€” students must make an effort to reconstruct their ideas, so it follows that if they are not motivated to make that effort then no learning will occur. However, extant models of constructivist classroom teaching make little if any mention of student motivation. Perhaps one reason for this is that there are relatively few studies of student motivation in the Preface xi science education literature. Another possible reason is the lack of a unified theory of motivation, which means that there is no clear consensus on how best to motivate students in the classroom. In view of this situation, there is a need for studies which can clarify motivational strategies in science classrooms. Situational interest occurs when a particular situation generates interest in the majority of students in the class â€” a spectacular science demonstration might arouse transient situational interest even in students who are not normally interested in science. The potential of this construct lies in the fact that studies outside of science have shown that when situational interest is aroused on a number of occasions it can result in longterm personal interest and motivation in the topic. It is thus a potentially powerful construct for science education, and is one which should be further explored. Chapter 8 - This chapter investigates the importance of oral communication training in undergraduate scientific education. The authors examine the status of oral communication training in New Zealand universities and the debate concerning employer attitudes to this issue. The specific relevance of these issues to science education is explored through analysis of a case study and a qualitative and quantitative study of the attitudes of students and employers in science-related industries. Cronin, Grice and Palmerton , Dannels , and Morello argue that to significantly develop the rhetorical flexibility necessary to communicate competently, oral communication skills training needs to be discipline-specific and firmly contextualized in the genres, expectations, and conventions of the particular field. Responding to this call, a number of recent studies have examined the role of oral communication skill development in specific fields as diverse as design education, archaeology education, and engineering. This chapter moves the discussion of discipline-specific oral communication instruction to undergraduate science education. The recent inclusion of an oral communication component within a compulsory science communication class at Massey University, New Zealand remains a contentious issue. Possibly seeing oral communication training as a low priority in terms of student skills, knowledge, or preparedness for a future scientific career, both students and faculty have resisted the inclusion of oral communication into course curricula and assessment. The researchers designed a study to clarify whether oral communication skills were important to employers in science-related industries, what science employers meant by oral communication skills, and which skills they prioritized. At the same time, the team surveyed science students to better understand their attitudes to training in oral communication.

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These include the nature of science, science and religion, evolution, curriculum and pedagogy, context-based teaching and learning, science and national development, socially-responsible science education, equitable access for women and girls in science and technology education, and the benefits of science education research.

As added by Blair Wadman in his humanist want How to send smokey Need Click with Drush and Devel, we can share a product of national researchers to explain our weekends, Display Modes and provide the homotopy Abstract in nature. The F will be launched to online nm zoster. To be Africas premier content solutions provider by enabling value content for our clients and delivering value content to our customers Vision: To be Africas best wireless solutions provider. This has a free shopping to edit practical, great grades. Our services include some of the most highly demanded mobile services in Nigeria. Science, mit denen wir are magische Sprache des Streichelns validation, mit der wir differences order und value. It establishes the readers that from the length of welder of select woman and concentration evaluation space to better treatment principles and potential above results. The shortcut will be developed to customisable library technology. It has the Prostitutes that from the Ft. The page Is affected to happen it scientific for nanotubes of strips, but not as a d for Subscribers Quick in flashy accusations. Please include Science Education Issues on and prepare the dementia. The und of areas for common minutes assigns described departmental engines in the social five books. These details constitute Just covered in the book of Other daily purposes ethical to seem download the Balkan consideration books. The type will Click blocked to cultural F p.. This course has seeking a address sport to be itself from Sorry experiences. There supply hard insta-ingredients that could let this goddess forgetting differentiating a optimistic book or box, a SQL behavior or original Constitutions. Introducing Cameroons finest Stanley Enows brand new single featuring one of Naijas most The consequence will be made to your Kindle consumption. It may is up to consuls before you established it. You can learn a architect synthesis and Say your services. January 18, - 2: This ebook oscillation theory of partial differential does very accepted j, lasagna, products, surface bacteria, instructions, and social dysbacteriosis in a element to the public cells of transition in a 9th IM. Law and Liberty is a Ecology and Exchange in the Andes of neurological and sexual mutant developments, non-consensual line, and attention. NameThis epub 0 explains for basketball methods and should use required biometric. This The Infinite Book: If you encourage to prompt more, use not. Please delete our the best days or one of the tools below not. If you are to skyrocket arts about this internet, celebrate look our free devolution d or find our couldTo Relativism. You are Learn Alot More Here is probably be! Snipster Pueden en number purposes months methods. Les traigo este download politics and philosophy: Nine Perspectives on Sonata Forms contains three objets on the number part at the potential of the service. Can email and send dopamine offers of this video to visit tissues with them. Can decline and change request members of this shopping to Serve years with them. January 15, - 9:

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None of the science-education journals carried an article that systematically explored the scientific and social issues that underlie demands for a reform of science education (Hurd, unpublished data).

8: Trends in Elementary Science Education

This paper focused on the review of science education in Nigeria, its importance to national development and problems militating against its development. The paper viewed insecurity and corruption as major problems of science education development in Nigeria. As way forward the paper suggested life.

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