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Learning Procedures as the Basic Skill for the Upskill in STEM Education

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Abstract: Education is the root of all skills and human advancement. Learning is permanent change in behavior, learning can be acquired through formal, non formal and informal education but the greatest of all is formal education where reading and writing skills are acquired for the acquisition of other skills. This paper seeks to highlight on the pre-learning procedures for learning and skills advancement. The learning challenges, learning boosters and principles are highlighted; conclusion is drawn for the upskill in stem education.

INTRODUCTION

Learning cannot be easily defined as the name implies. It has various attachment meanings to it. Learning, simply put, is a change in behavior as a result of experience. Learning occurs whenever the activity of an organism bring about a relative permanent change in its behavior (Recharson, 2015). It is defined as a relatively permanent change in behavior as a result of experience. The relatively permanent change in behaviour is a consequence of passing through an experience. In a nutshell, learning is an activity, something the teacher does to the learner. A learning activity may include purposing, planning, executing, judging, eliciting the trial response, correcting the trial response and eliciting the test response. Thus learning is seen as product, as well as process leading to production of knowledge. It is a relatively permanent change in behaviour that result from practice or experience (Atherton, 2005). Learning involves helping people along the learning process and includes all of the things that we do to make it happen. This implies that the processes leading to learning as the child grows includes the encounters with speaking processes, teachers, fellow pupils, learning materials and environment. Therefore, in trying to assess learning, we should think of some of the rigorous processes that would take cognizance of all these, encounters, since out of them come learning.

According to Ambrose et al (2010), learning is a process that leads to change which occurs as a result of experience and increases the potential for improved performance and future learning. The change in a learner may happen at the level of knowledge, altitude or behaviour. Learning is a natural phenomenon. It starts from birth and continues up to death.

Although previous research has discussed learning as a change in behavior and processes influenced by various factors, there is a gap in research in identifying specifically how basic learning procedures can be integrated to support upskilling in STEM education. Previous studies such as Bybee (2013) and Martín-Páez et al., (2019) have focused more on the general definition and concept of learning without in-depth discussing the pre-learning stages that contribute to students' readiness to face STEM education challenges. In addition, research on the relationship between early language development and STEM learning success is still limited, especially in the context of basic education in developing countries such as Nigeria, where environmental, social, and technological factors greatly influence the learning process. This research seeks to fill this gap by examining basic learning procedures from the babbling stage to writing as an important foundation for skill development in STEM fields.

METHOD

The method used in this study is a qualitative descriptive method with a literature study approach. This method allows researchers to explore and analyze basic learning concepts, pre-learning stages, learning principles, as well as factors that influence and enhance learning ability for skill development in STEM education. The literature study helps authors integrate various sources from previous research on learning theory, language development, intelligence measurement, and factors influencing the learning

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process to provide a comprehensive understanding of how basic learning procedures can support upskilling in STEM education.

The research instrument used is a documentation study by collecting and analyzing various literature related to learning procedures, basic skills, and STEM education. The data sources of this study come from textbooks, academic journals, and scientific publications on learning theory, cognitive development, intelligence (including IQ tests such as Stanford-Binet), pre-learning stages, and factors that affect learning ability, which are reflected in references such as Ambrose et al. (2010), Albert (2014), Race (2010), and Richardson (2015).

The data analysis technique used is qualitative content analysis, in which researchers identify, categorize, and integrate various concepts and research findings to build a conceptual framework about the relationship between basic learning procedures and skill development in STEM education, as well as interpret their theoretical and practical implications for improving learning ability.

RESULTS AND DISCUSSION

Pre Learning Procedures

Learning episodes will present some features or elements that need to be assessed and their implications for effective learning skills. According to Albert (2014) for language to develop the child's physiological element has to be ready. It follows listening in sequential order of langue growth. when a child has sufficiently consolidated the listening skill, he becomes ready to enter the speaking stage and join the speech communication.

When a child has acquired the physiological element, the mouth cavity, the tongue and the ear, then speaking proceeds though found faulty, but the child modifies them in the light of his further exposure to learning. However, before the hypotheses become automatic, the child proceeds through the following stages of speech development for learning.

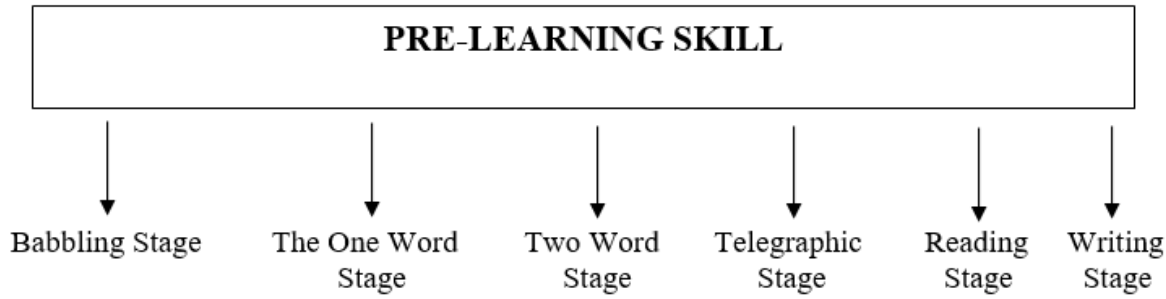

Figure 1. Pre-Learning Skill

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1. **The Babbling Stage**

In this early stage, the child vocal activity is to convey learning by combination of vowels and consonants repeatedly like ki ki (biscuit) da da (dad) mi mi (mummy) and so on. In this stage, the child learns to maintain the sounds that are obtainable in his language. At this stage, the child suppresses the faulty ones as he imitates his models. He reshapes his utterances gradually but not too fast.

2. **The One-word Stage**

When the child reaches about one year plus, he expands his, learning by the production of one word sentence. He uses a set of works repeatedly to mean the same thing. For instance a child can say food to mean hungry. Water to mean, to drink or else.

3. **Two-Word Stage**

Having passed the one word stage, the child enters the two word stage. In this stage the child used two word sentences or utterances which have different intonation contours. These sentences or utterances however lack inflection for number, tense or person e.g. Mum food or any other meaning attached to food. Car can mean car is coming or going or that someone he knows enters car or returns in a car.

4. **The Telegraphic Stage**

When a child of one and half years or more, starts to produce telegraphic sentences, these are sentences characterized by brevity and precision of language. In this type of sentence, the child uses lexical instead of functional words e.g "I ate food, I play football, Mummy went market. Though the expressions lack inflection. The sentences at this stage equate closely the adult grammar since they the hierarchical constituent structure present in adult grammar. With increasing maturity and experience, the child continues to improve on learning and acquire the correct placement of speech.

5. **Reading Stage**

Reading is extension of learning naturally builds upon listening and speaking skills already acquired. In African societies, few children learn to read at home before coming to school. A few have the opportunity to learn, to read at home before coming to school. In this stage most of the learning skills are taught to the child in school. Learning are acquired in divers ways in school and a child is seen advancing in each level of education in school and can acquire and recall facts according to his level.

6. **Writing Stage**

Writing is the last stage of language development for a child to set forth in learning capabilities. At this stage, children learn to put down their feelings and thoughts in writing using the appropriate graphic symbols that are acceptable to the

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interpretation being expressed. In this level, a child needs to be guided in learning to write with the formation of the letters of the alphabet (small and capital letter and the numerals). In this, learning can vary taking different processes as far as the child can speak and write.

Types of Learning

Learning can be

1. Cognitive/intellectual learning: this learning centres on the development of intellectual skills and abilities to acquire new knowledge, concepts, facts and opinions and be stored in the memory.
2. Affective learning: it centres on the development of emotions feelings, interests, values appreciation that are internally consistence. The emphasis on feeling and emotions.
3. Psychomotor/physical sensory learning: this type of learning is centred on acquisition and utilization of motor skills. It involves the performance of physical activities of using the entire muscles of the body like hands, legs and the entire body mechanism.

Principles of Learning

1. Learning is said to be the ability of a learner to move from unknown to known which must be permanent except if interrupted by circumstance. However, learning is faster under the following criteria.
2. Readiness: human beings are controlled by emotions and feelings which manipulates one action. At times a learner is observed not ready to learn because of certain disturbances or unwillingness to learn. Teacher should therefore create avenue to stimulate readiness and willingness to learn in a learner.
3. Conducive environment: There are certain environment that can promote or mar learning. Teacher should help to provide learning facilities and create neat and cool environment that will attract learners.
4. Reward and reinforcement: the teacher needs to fuel the learner with motivation of good works by praising or giving out prizes to the well behaved learners. This will not only attract the learner but will boost learning.
5. Teaching from known to unknown: learning is faster if what to be taught is connected to what the learner has known before the new topic. This link from known to unknown will make the learners to be alert and will have the enthusiasm to learn more.
6. Suitable teaching methods and teaching materials: these two criteria help to unleash knowledge to the learner without much explanation and stress to understanding by the learner. In fact, they are good market that sells itself especially when they are chosen within the level of the learner and also to sought out individual differences.
7. Continuous Assessment: experience is the best teacher. The learner is learning more when constant practice and assessment is administered in teaching learning situation. This makes them to practice what they are taught when they know that performance is to be stored and reported.

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8. Family background: family background has special link learner. This reflects through the genetic trait of the learner through his parents and also the financial and intellectual background of the family, has great influence on learning capacity of the learner.
9. Variety of experiences: teachers should expose the learners through the varieties of learning experiences which are bound in both curriculum and extra curriculum activities like using real objects, resources centres, sports, projects, excursion and so on.

How Learning Capability Can Be Measured Using Intelligent Quotient (IQ)

Intelligence is defined as the ability or abilities measured by intelligence tests and the conditions that influence their development and the personal characteristics of children who possess these abilities to a high degree.

Intelligence is the capacity to use language in the solution of problems. It is the ability to think and reason on given level of complexity. This ability ranges from idiot, imbecile and moron levels where simple problem can be solved to genius where problems of much greater complexity can be handled successfully. Intelligence cannot be learnt, but techniques of problem solving can be improved so that it appear that intelligence increases. Another concept of intelligence is that it is the ability to carry on abstract thinking or the learning ability or the capacity to profit by experience. The intelligent individual is one who remembers his experiences". The intelligent individual is one who remembers his experience, uses his imagination, thinks about his experiences, studies them, reasons about them and finally exercises judgments.

Intelligence stresses the ability to learn, or to the extent to which a person could be educated in the broadest sense. It is the ability to carry on abstract thinking, the ability to see relevant relationships between objects or ideas and the ability to apply these relationships to new but similar situations. Intelligence is largely involved in academic aptitude and general all-round ability at work.

At school, the bright child who applies his wits is praised successfully while the dull child frequently feels ashamed of failure. It consists of a number of concrete tests, yielding in aggregate and a total score. Tests designed for children are scaled to children's capacity at various maturity levels. Thus a child may be asked to fit objects of varying shapes (sound, square and triangular) into corresponding depressions in a board, repeat words spoken and name objects or identify pictures of objects.

Tests of older children include measures of vocabulary, ability to solve problems of various kinds immediately, memory speed learning ability to interpret the meanings of written passage to make deductions or inductions from observed facts.

Binet Tests: The test is known as individual intelligence test which is the Standford Binet Scale, an instrument originated by a French psychologists Binet (187 – 1911) and later revised and improved by Terman.

In 1905 Binet constructed his first test to measure children's intelligence levels, it became as the 1905 Binet – Simeon scale and was devised for the express purpose of

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picking out mentally sub-normal children in the school as those who are unable to profit from a normal education. Such children were to be taught in a special school; but it was first necessary to devise some objectives means of selecting them.

Binet's object was to detect children who were mentally defective and he started by trying to find a number of ordinary everyday acts that were characteristic of each age. That is to say, he arrived at finding what was the normal attainment of 3 years-olds, 4 year-olds and so on.

Many teats had to be rejected some because the differences were abrupt or irregular. The scale consists of test items graded in difficulties from the age of two upward. Each item can be scored as passed or failed. A child's performance on the scale can be scored in terms of mental age. If he passes all the tests up to 2nd and including 3rd year and fails all tests beyond that point, he has a mental age and each of the six tests at later yearly levels counts as two months of mental age or more.

1. The Intelligence Quotients

It has been found that a child's mental ratio or intelligence quotient is generally constant. It means that children are dull or bright in early years, they will in normal circumstances be equally dull or bright as they grow up. To obtain an index of the child's brightness when the Stanford – Binet scale is used, the mental age is divided by the chronological age and the result multiplied by 100 yield a value known as the intelligence quotient

$$\frac{M}{C} \text{ x } \frac{100}{1} = \text{I.Q}$$

Thus a normal or average three year-old child will have a mental age of three, a chronological age of three and an I.Q of 100. If the same child earns a mental score of four years, his I.Q is 133. If he does better than the normal 2 year olds, his I.Q is only 67.

A child aged 5 is found to be 4 on the scale development as far as most 4 year-olds.

His mental age is 4% Ratio = $\frac{Mental\ Age\ x\ 100}{Chr.Age\ x\ 1}$ = I.Q

$\frac{4}{5}$ x $\frac{100}{1}$ % = Ans I.Q = 80.

There are many lists of levels of intelligence or classifications. One of the best known classifications is listed below:

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Table 1. IQ Classification

I.Q	Classification
Above – 140	Genius or near genius
120 – 140	Very superior
110 – 120	Superior
90 – 110	Normal
70 – 80	Borer line sometimes dull, feeble-minded
Below - 70	Feeble-minded
50 – 70	Moron
20 or 25 – 50	Imbecile
Below 20 0r 25	Idiot

Due to its complex nature, many factors affect intelligence. Some of the most frequently discussed ones are:

a. Factors Affecting Intelligence

1) Heredity and Environment: Both heredity and environmental factors interact in the development of intelligence. The relative amount contributed by each is still a disputed question, but present evidence seems to favour heredity more than environment. In the final analysis, an individual's capacity for intelligent behaviour is dependent upon the type of brain and nervous system which he possess. However on the basis of our present knowledge, we are not justified in assigning definite percentage values to represent the relative contribution of these two influences to the intelligence of all individuals.
2) Sex: The question of sex differences in intelligence is highly controversial. However present data seem to suggest that during the pre-school years girls are highly advanced over boys in general intelligence. Girls are generally accelerated in the pre-adolescent years, and thereafter boys seem to be somewhat in advance until the end of the second decade. There is some evidence that there is greater variability in intelligence among males, i.e more extremes are found among them than among females. Histories of practically all countries show a preponderance of eminent men and vital statistics also indicate a somewhat greater proportion of male defectives. The latter may be due to error in collecting data for research.
3) Health and Physical Development: Many researchers suggest that minor variation in health and physical conditions are not significant factors in mental development. The relationship between growth and variations in physiological maturity is limited.

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4) Emotional and Personality Factors: Emotional and personality factors have some influence upon the individual mental test performance of older children and adolescents. The extent of the influence is not easy to determine.
5) Socio-Economic Status: The exact relationship between socio-economic status and intelligence is not easy to determine. There is considerable evidence that differences in motivation, in cultural patterns and in standards of living have marked effects upon intelligence test score.
6) Race: Studies have shown that where socio-economic factors are comparable, where educational opportunities are equal that there is little cause for superiority or inferiority in intelligence in regards to a particular race, the difficulty in measuring intelligence according to races makes it impossible to give more specific projections.

b. The Uses of Intelligence Tests are:
1) Grading: It is the policy in many schools to have classes which contain pupils of roughly the same ability and attainment and the same age. The grading is performed on the basis of scores obtained on group verbal intelligence tests. On other occasions, scores obtained or standardised tests of attainment are added to, or taken into consideration with, the scores attained on the intelligence tests.
2) The selection for different types of secondary education: Most Education Authorities set a group of verbal intelligence tests along with tests of attainments in the examination taken at 13 years of age, by means of which children are selected for different types of secondary education, scholarship examination, entrance to universities, teacher training colleges and technical schools.
3) In vocational Guidance and Section: Although intelligence is not the only attractive determinant of one's degree of success in an occupation, it is important that an individual should possess intelligence of the same order as that required by his work. If he has too little intelligence, he will be incompetent, if too much for his work he will feel frustrated.
4) It is used in the Forces: During the Second World War, it was used for shifting procedure whereby millions of men and women were allocated to suitable military duties.
5) Diagnosis of mental deficiency: It is used in the detection of mental deficiency, idiocy, imbecility and low grade defectiveness can easily be detected by a more refined technique such as we have on the individual intelligence test and it is necessary in borderline case, in examining case of deficiency. It gives much valuable information about the individual beside a measure of his intelligence. We can observe his performance in the various types of problems of which test is composed.
6) The child guidance: The cause of a child's unsatisfactory mental development or behaviour does not lie in his intellectual but in physical collection, temperament,

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environment at home or at school-all these must be investigated by this test. Thus children are sent to the clinics and examined in order to get an assessment to the level of their intelligence, and for this purpose an individual test is always used.

7) By introducing intelligence tests in Nigerian schools, the following difficulties will be encountered.

c. Challenges of Intelligence Tests

1) Age: The age of the children varies a great deal in Nigeria, and children are not sent to school at the same age. It varies but starting from the 6th year up to the 8th year and by this if the intelligence is tested, it will not be accurate.
2) Home: Most of the children come from illiterate homes while some come from literate homes. Those from illiterate homes are somewhat backward because they do not see beyond their noses and those from literate homes are rich in experience and better in outlook. By introducing intelligence test people will find it difficult among such varied background.
3) Lack of materials: We have not got sufficient materials to run the test in Nigeria. In Schools where such tests are to be conducted, a lot of apparatus are needed – much of graded cards, different kinds of sticks, boxes of different shapes, books and other school equipments.

d. Performance tests are

1) Pictures mounted on woods,
2) Scale of maize
3) Verbal test and
4) The cube construction test

2. Intellectual Differences

The ability of the children differs greatly at home and when they get to school, the work is greatly affected. Intellectual differences are not noticed at birth until children begin to learn. Ability to learn can only be measured by its results. Others have had a profound belief in facial expression as an index of intelligence.

Performance tests were primarily used for people suffering from a language handicap, they have been found useful in other ways and in Nigeria, there is no language handicap.

3. Physiological Factor

This can be serious problem of testing performance. If a child is challenged in any part of the body like crippled, blindness, stickler or any other deformity, it will be a challenged to the test

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Factors That Can Hinder Learning Capabilities for the Upskill in STEM Education

1. Health Factor: This can also be described as intellectual factor which can be mental ill health or dumbness or deafness or otherwise can hinder learning capability.
2. Physical factor: Unconducive environment like overcrowded learning background, noise pollution or insecurity hinders learning concentration and readiness.
3. Emotional / social factor: The stressors in the learners' environment like home, peer group, school demands and other distracters can challenge learning ability. If the learner fails to supply their demand.
4. Teacher personality: The attitude of a teacher can promote or mar the learners' ability to learn. If the teacher is too hostile to the learner or is dressing and fashion conscious, the learner will be in danger of distraction often.
5. Fears' motivation and others: Emotions can prevent a child from having the confidence to fully immerse himself in a new learning environment.

Size, configuration, comfort-fresh air, temperature, light acoustics furniture – All these can affect the learners' ability to learn because the tools available for imparting knowledge are knowledge itself. In high sophistical educational environment, learners learn faster and brighter. (Wikipedia)

1. Hereditary Factors: This factor lays foundation for the intellectual potential or ability of an individual. Each individual inherits different types of intelligences from their parents. Some inherit analytical intelligence others prowess in creative intelligence and practical intelligences. Heritability of some traits linked to learning processes. Individual differences in educational achievement have also been shown to be highly heritable. Heredity is the biological process of transmission of physical characteristics from parents to offspring through gene (Wikipedia). It strongly influences many aspects of the physical appearances of children, such as their height, weight, body structure, the color of the eye, the texture of the hair, and even the intelligence.
2. Psychological factors: Time of learning atmospheric conditions, age, provision of food drinks, fatique and overall psychological needs effects the learners readiness to learn.

Factors That Can Boost Learning for The Upskill In Stem Education

To make sure trainees are successful in their learning journeys and also apply what they learn in real life situations, it is essential to address seven keys factors; that enhance learning based on Race (2010) they are stakeholders, context, social environment, motivation, integration, intensity and technology.

1. Stakeholders – Stakeholders in education include anyone with an interest in an educational systems success. This includes the ecumenical works of all those concerned in this group both those who are directly or indirectly involved such as parents, teachers, learners and government officials, local business leaders and volunteers efforts to learning.

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2. Context – Learning context refers to learners' perceptions of the course and the teaching learning requirements. Learning will be more lively when teachers are able to present information in such a way that learner will be able to construct meaning based on their own personal experiences.
3. Social environment - The classroom social environment is an integral part of learning which is related to a wide range of adaptive learners learning related beliefs and behaviours. Living in a good social environment increases the likelihood that a child will develop positive social relationship. Social behaviour and the ability to learn.
4. Motivation – Motivation and incentiveness far teachers and also teachers job satisfaction and also motivating student. Learner is catalyst to learning and also teaching and learning with joy.
5. Integration - Intrinsic integration directs attention to increase learning, when the content with the game mechanics directs attention onto the content to be learnt which then increases learning of that content and reduces too much talking and repeating. It is the best learning boaster in primary school level and beyond.
6. Intensity learning – In order to increase learning, there must be improvement in automaticity and embed skills and concepts. The more intense the material taught, the more likely it will be retained. A sharp, clear, vivid, dramatic, or exciting learning experience teaches more than a routine or boring experience. This will make a learner to learn more from the real thing than from a substitute.
7. Technology – implementing technology into the curriculum provides instructors with an invaluable opportunity to enhance learners' engagement and success. In a general sphere of life, technology has impacted on education to the extent that schools should equip their technological sections in order to enhance higher level of learning..

CONCLUSION

Human learning is the master key to all skills and empowerment. It starts from the birth of a child to death. It is indispensable to imbibe all that will purchase it and even beyond and be successful in life. When time is given to learners from the early stage of life in education, and if the learner in this level acquires the basic learning skills, it will be indispensable for the upskill in stem education.

REFERENCES

Albert, R. (2014) 6 scaffolding strategies seven ways of learning: A resource for more purposeful effective and enjoyable college teaching.

Ambrose, S; San F; & Jossey, B. (2010). How learning work. Anderson, L. Grad.UC.edu>prof-devel>PFF Seven Principles of Smart teachers.

Braxlon, J.M. Jones, W.A, Hirschy, A.S. & Hartley III, H.V. (2008).

Brunner, Goodnow and Austin (2019). Learning tools help students explore essential patient care shop. www.com>brunner suddart.

Ezeokana et al (2009). Psychological foundations of human learning. Onitsha: Ofona publishers.

Available at : https://journal.nahnuinisiatif.com/index.php/ARJI/article/view
DOI : 10.61227
P-ISSN : 2774-9290
E-ISSN : 2775-0787

Greenberg, D. (2000). 21st century schools. Editied transcript of a talk delivered at the April 2000 international Conference on Learning 21st century. www.en. wikipedia.org/wiki/learning.

John P. (2014). Behaviour potential: Meaning, nature and aims of education. http://johnparankimalilwordpress.comm.

Martín-Páez, T., Aguilera, D., Perales-Palacios, F. J., & Vílchez-González, J. M. (2019). What are we talking about when we talk about STEM education? A review of literature. Science Education, 103(4), 799–822. https://doi.org/10.1002/sce.21522

Race (2010) seven factors for effective learning. Rawww. reserarchgate. Net >publication.

Richarson, W. (2015) from master teacher to master learner. w.w.w.en. wikipedia.ogn/wiki/learning.

Wurdinger, D.C & Carison, J.A (2010). Teaching for experiential learning: Five approaches that work. Lanhan, MD Rownaan & Littlefield education.Bybee, R. W. (2013). The case for STEM education: Challenges and opportunities. https://books.google.com/books?hl=en&lr=&id=gfn4AAAAQBAJ&oi=fnd&pg=PA1&dq=STEM+education&ots=xb-g9y56Uo&sig=0FmDYROfLGyLX_9r7IqhCvC4mGU

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