

## Learning Styles: Imperatives for Effective Basic Science Instructional Delivery

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### **Abstract**

*Teaching basic science has evolved over the years as curricula, instructional methods and materials have continued to be developed to meet the changing needs of both society and learners. The curricular of most Basic Science Programmes in Nigeria, however, are still linear or systematic as they do not allow much room for individualisation of instruction. Research findings on learning styles have however provided teachers with varied opinions of learning and shown how to apply learning styles to instruction. This knowledge of individual differences in learning has made Basic Science educators and programme designers more sensitive to their roles in instruction and learning and has enabled them to synchronise instruction and learning styles so as to develop learner's potentials in Basic Science. This paper thus, focuses on ways to assist Basic Science educators and programme designers gain a better insight into human differences in learning and enhance their choice of instructional strategies when preparing curricular activities.*

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**Keywords:** Learning Styles, Basic Science, Instructional Delivery.

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### **Introduction**

Educators and learners have over the years struggled with how to teach and learn respectively. Just as each teacher has his/her particular style so also do learners. Issues emanate when there is a mis-match of teachers and learners. It is common place for parents to notice that their children learn differently from them as they (children) are not as interested or are not measuring up the same way that they (parents) did when they were younger.

In like manner, we may be perplexed over why some teachers are better than others or why some subjects are preferred to others. Scientific studies in educational technology have established that why some learners struggle with learning may entirely be attributed to how they are being taught.

### **Meaning of Learning Styles**

Learning styles have been described as internally-based characteristics of individuals for the intake or understanding of new information (Reid, 2005). It is explained that all learners have individual attributes relating to their learning processes. Some learners may rely heavily on visual presentation, others may prefer spoken word, still others may respond better to hands-on activities. It is evident that people learn differently and at different paces due to their biological and psychological differences (Reiff, 2002). Naturally, these differences abound in Basic Science settings where learners come from different cultural and educational backgrounds. Currently, there are seven learning styles that have been identified. These include:

- **Visual/spatial:** Learners here prefer using pictures, images and spatial understanding.
- **Aural/auditory or musical:** These are inclined to sound and music.

- **Verbal/linguistic:** Prefer using words both in speech and writing.
- **Physical/kinaesthetic:** Given to use of body, hands and sense of touch.
- **Logical/mathematical:** These are into logic, reasoning and systems.
- **Social/interpersonal:** Prefer to learn in groups or with other people.
- **Solitary/intrapersonal:** These are lone rangers who prefer to work alone and are used to self-study.

Assumption research on learning style is based on the assumption that learners receive information through their senses and prefer some senses to others in specific situations (Oxford and Ephraim, 2003; Kroonenberg, 2005). Usually learners learn more effectively when they learn through their own initiatives. When their learning styles are matched with appropriate approaches in instruction, their motivation, performances and achievements increase and are enhanced (Brown, 2004). Hence, researchers, educators and programme designers endeavour to establish optimal climates both psychologically and environmentally to foster learning by allowing learners to learn in accordance with their own preferred learning styles.

### **Research Development**

Educators and researchers have over the period developed instruments to assess learner's learning styles (Dunn, 2004; Hunt, 2009). Although these instruments differ in content they share the common goal of identifying the nature of human differences in learning and improving the effectiveness of instruction and learning by providing criteria for individualising instruction.

Also, learning style research has examined the effects of tailoring instruction to learners' learning styles (Hansen-Strain, 2009). It has been established that matching learning styles has a positive impact on learners' achievements, interests and motivation (Smith and Renzulli, 2004). Results of various investigations into the potential interaction between learning style and instructional approaches indicate that learners' performances can be enhanced by adapting the instructional strategies to individual differences in learning styles (Wesche, (2001); Sein and Robey, (2011).

Based on these, many educators including Gagne (2003) and Kinsella (2006) have concluded that some instructional principles may optimise learning as they argue that identifying a learner's learning style and providing appropriate instruction contribute to more effective learning (Sims and Sims, 2005).

### **Developing the Two Brain Hemispheres**

Brain Theory research shows that the two hemispheres of the human brain process information differently (Williams, 2003). Each hemisphere contributes its special function to cognitive activities. While the left has the verbal, sequential and analytical abilities, the global, holistic and visual-spatial functions are the concerns of the right hemisphere (Levy, 2003). Thus, learners who are geared towards left-hemisphere instructional approaches in information processing excel at analytical tasks and master abstract, factual and impersonal materials more easily. Conversely, learners who are right-hemisphere based prefer to work collaboratively to attain common objectives.

Kinsella (2006) holds that learners who have stronger verbal/analytical faculties may have easier access to the conventional instructional techniques of listening to lectures, reading textbooks and completing writing assignments while not developing the right-brain

strengths that are crucial for problem solving and creativity.

From the foregoing, the need to vary basic science instructional strategies so as to help learners develop the flexible use of the two hemispheres of the brain by perceiving information both analytically and relationally becomes imperative. In addition, educators should balance classroom opportunities for learners with different learning styles by wise choice and design of activities that imbue on a variety of sensory modalities and brain-hemispheres strengths.

### **Implications for Matching Instructional Strategies with Learning Styles**

A typical Basic Science learner will most likely not possess one style exclusively but a pattern of learning preferences. For instance, a learner who is visual may also be a very social and verbal learner and may prefer to learn especially difficult topics using his primary skills. Perhaps, the most important tasks of basic science educators are understanding how learners learn and providing opportunities for learning through the use of identified learning preferences.

Basic science educators need to understand these differences in order to maximise learners' learning potentials. This can be achieved through carefully watching, listening to their needs, wants and interests. Compare the difference between how they learn aurally, visually/spatially and other identified preferences earlier enumerated. Also, compare how they interact with others while learning in groups or by themselves. Each of these observations will bring the basic science educator closer to understanding their special gifts and will reveal more effective means to educate them using their preferred learning styles.

In addition, knowledge of one's learning style is essential in learning to learn (Smith, 2000). Teachers of basic science should help learners discover their own learning preferences and provide constructive feedback about the advantages and disadvantages of various styles. Again, teachers should respect the learners' present learning preferences and encourage their development, while at the same time, creating opportunities for learners to experiment with different ways of learning.

Basic science Instructors may use instruments and activities specially designed for basic science learners such as Kinsella's Classroom Work Style Survey (2006) to identify learners' learning styles. Although this type of assessment is not comprehensive, it does indicate learners' preferred general learning habits. It also helps learners understand their own learning styles so that they can capitalise on their strengths. As a result, learners can enhance their learning power by being aware of the style areas in which they feel less comfortable and by working on their development, thus, provide avenues to foster their intellectual growth.

Similarly, teachers can use the survey results to identify strong patterns of their classes, which they should consider when designing learning tasks. The teachers are also made more aware of their own strengths and weaknesses in learning so that they can effectively use their strengths to compensate their weaknesses.

### **Implementing Learning Styles preferences by Varying Class Presentations**

After identifying learners' learning strengths, teachers should provide learners with opportunities to learn through their modality strengths. Thus, diverse and high interest instructional materials and activities should be offered. These may include the creative use of

video and audio materials which should vary from heavy dependence on media for the structure and content of the lesson to only limited use of a chalkboard to illustrate concepts or process of science.

Lessons may be presented both visually and verbally and reinforced through various motivating science activities such as demonstration, reading and writing. In this way, learners can learn in ways that best will suit their styles and develop their modality strengths. Thus, the appropriate use of multimedia like video recording, slide presentation, overhead projection and realia, together with selective hands-on activities make basic science lessons interesting and motivating to learners.

### **Developing Self-Directed Learners with Learning Strategies**

Self-direction is essential in the active development of learners' abilities in learning (Smith, 2000). It is especially important for basic science learners to be self-directed since it is impossible to give them direct guidance or instruction when they engage in science activities outside the classroom. Basic science learners therefore need to be empowered with a wide range of learning strategies to achieve competence and autonomy in learning science. This requires teachers to expand their knowledge of basic science teaching and learning strategies and to gradually develop learners' flexibilities in learning.

Oxford (2010) posits that while presenting materials, teachers should provide colourful and motivating activities, personalised self-reflection tasks, some forms of cooperative learning and powerful learning strategies to encourage self-direction in learning. Teachers should consciously develop learners' learning strategies so as to assist learners approach challenging learning tasks with determination. For instance, teachers can let learners use cognitive strategies such as note-taking and summarising to sort and organise basic science information and prepare them for a science quiz and written production. Teachers can have students apply compensation strategies such as guessing to comprehend a science demonstration or experiment and using circulation to communicate their ideas despite their knowledge gaps of the actual results of the experiment.

Different learning strategies benefit learners differently. After a series of practice and use, learners will get to understand how and when to use learning strategies to deal with their basic science issues/problems. Consequently, they will become comfortable with the idea of assuming responsibility for their learning.

### **Computer-Assisted Instruction (CAI)**

Wrigley and Guth (2002) have established that it is difficult for teachers to keep all learners actively engaged in the learning process and learning at the same pace. Computer-assisted instruction can help teachers to solve this problem because of the flexibility and capability of CAI. Computer-assisted instruction makes it possible to teach virtually anything from problem-solving skills to relatively simple cognitive learning by offering text and graphs with animation and sound. CAI appeals to varied learning modalities and consequently meets the diverse needs of individual Basic Science learners. With CAI, Basic Science learners can learn at comfortable pace and interact directly and continually with computers that provide immediate feedback. Teachers can use CAI to supplement or enrich Basic Science instruction.

This requires that Basic Science programmes built social hardware and software resources to create optimal learning environments. The provision of Basic Science software

packages such as Drill and Practice and Tutorials would facilitate Basic Science learners' diverse needs as they would be opportuned to choose what they want or need and work at convenient times at their pace.

## CONCLUSION

Learners vary not only in terms of their objectives for learning Basic Science but also in terms of their individual differences in learning due to their educational, ethnic and cultural diversities. To make basic science learning and teaching successful, educators must understand and respect individuals' diverse learning styles and make concerted efforts to create optimal learning environments for learners.

Educators should employ instruments to identify learners' learning styles and provide instructional alternatives to address their differences. Lessons should also be planned to match learners' learning styles while at the same time encourage learners to diversify their learning style preferences. As professional teachers, we need to deepen our understanding of the nature of human differences in learning so that we can maximise the potential of our flexible, open-minded curricula and individualised instruction.

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