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Motivation as a driving tool for curriculum implementation in Nigerian science classrooms

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Abstract

This paper critically examines the motivational position as a foundational element in science curriculum delivery. It situates the discussion within classical and contemporary philosophical perspectives, contrasting intrinsic motivation, characterized by interest, mastery, autonomy, and self-actualization, with extrinsic motivation, which relies on external rewards, sanctions, and validation. The study identifies a conceptual gap in existing motivational theories, arguing that prevailing behavioristic and cognitivistic frameworks remain fragmented in their explanations of complex classroom learning dynamics. Through a philosophical analysis, behavioristic theories are found to reduce motivation to mechanistic stimulus–response patterns, offering limited insight into the intellectual and affective dimensions of science learning. Cognitivistic approaches emphasize internal cognitivistic processes but risk detachment from the sociocultural realities of classroom practice. The paper proposes an integrative perspective that reconciles behavioral reinforcement with cognitive sense-making. Such synthesis highlights the necessity of perceiving learners as active agents in constructing meaning and sustaining engagement. The study's implication lies in reorienting curriculum design toward fostering transformative learning environments that balance external structure with internal motivation.

***Keywords**:* Behaviorism; cognition; curriculum; motivation; philosophy.

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1. INTRODUCTION

The concept of motivation originates from the Latin word “movere,” which means “to move”. It can be understood as a combination of two words, motive and action. A motive is a driving force within an individual that stimulates, energizes, and guides behavior towards achieving specific goals. Motivation is that driving force which propels individuals in a specific direction, thus directing them to behave in achieving the set goals and objectives. In Education, motivation can be recognized to be the driving force, requisite for processes of learning. Motivation has been one of the most powerful predictors of human learning and behavior for decades, and in science education, motivation not only determines whether or not students engage with the curriculum, but also to what extent they sustain interest, develop critical thinking, and transfer knowledge to their daily lives. Science curricula, as usually perceived to be difficult, abstract, and demanding, require deliberate motivational strategies to move students' engagement beyond sheer rote learning and towards inquiry, creativity, and application.

Philosophical inquiry offers a unique window through which to interrogate motivation (Li et al., 2025). Unlike empirical studies that more or less quantify outcomes and variables, a philosophical research agenda interrogates the assumptions, meanings, and implications of motivation theories. This avenue of inquiry examines whether theoretical notions of motivation adequately capture the complex reality of teaching and learning in science classrooms. Such reflection is justified at a time when global reforms prioritize learner-centered pedagogy, problem-solving, and scientific literacy.

1.1. Purpose of study

This paper argues that while motivation theories provide us with significant understanding of human behavior, their application in science classrooms must be carefully examined. Classifying them as intrinsic and extrinsic, and scrutinizing them on their behavioristic versus cognitivistic orientations. This position paper takes a philosophical stand on how science curriculum implementation can be enhanced through motivational strategies.

2. METHOD AND MATERIALS

This study adopted a qualitative philosophical research design grounded in conceptual analysis. The inquiry relied on secondary data sources, including classical and contemporary literature on motivation theories, philosophical writings on behaviorism and cognitivism, and policy documents on science curriculum design. Using analytical and comparative methods, the study examined intrinsic and extrinsic motivational frameworks within the context of science education, identifying areas of theoretical convergence and divergence. The analysis involved interpreting key philosophical arguments, evaluating their assumptions about human learning, and synthesizing insights into an integrative model that bridges behavioral reinforcement with cognitive sense-making. No empirical data were collected, as the study’s materials consisted primarily of scholarly texts and conceptual frameworks, which served as the foundation for developing the proposed integrative perspective on motivation in science curriculum delivery.

3. RESULTS

3.1. Conceptual clarification: The nature of motivation

The term motivation comes from the Latin term 'movere' and signifies ‘to move’. In psychology and education, it has been applied to define the inner and outer forces that create, guide, and sustain behavior. Motivation is not merely the creation of behavior, but the sustenance towards a goal. Another earlier way of thinking about motivation is the intrinsic–extrinsic distinction. One is intrinsically motivated when one does something for its own reason, i.e., curiosity, mastery, or enjoyment. This happens in science class when students experiment based on curiosity. This refers to behavior that is provoked by external incentives or pressures, for example, grades, rewards, or praise from the teacher. For example, a student might study physics diligently not out of love for the subject but to obtain a scholarship. This dichotomy is not absolute; rather, intrinsic and extrinsic forms of motivation interact dynamically. Though intrinsic motivation is better as more long-lasting, extrinsic motivation does have its place in institutional learning environments. The

problem of philosophy, therefore, is in striking a balance without suppressing autonomy but recognizing the utilitarian role of outside incentives.

3.2. Theories of motivation: Intrinsic–Extrinsic classification

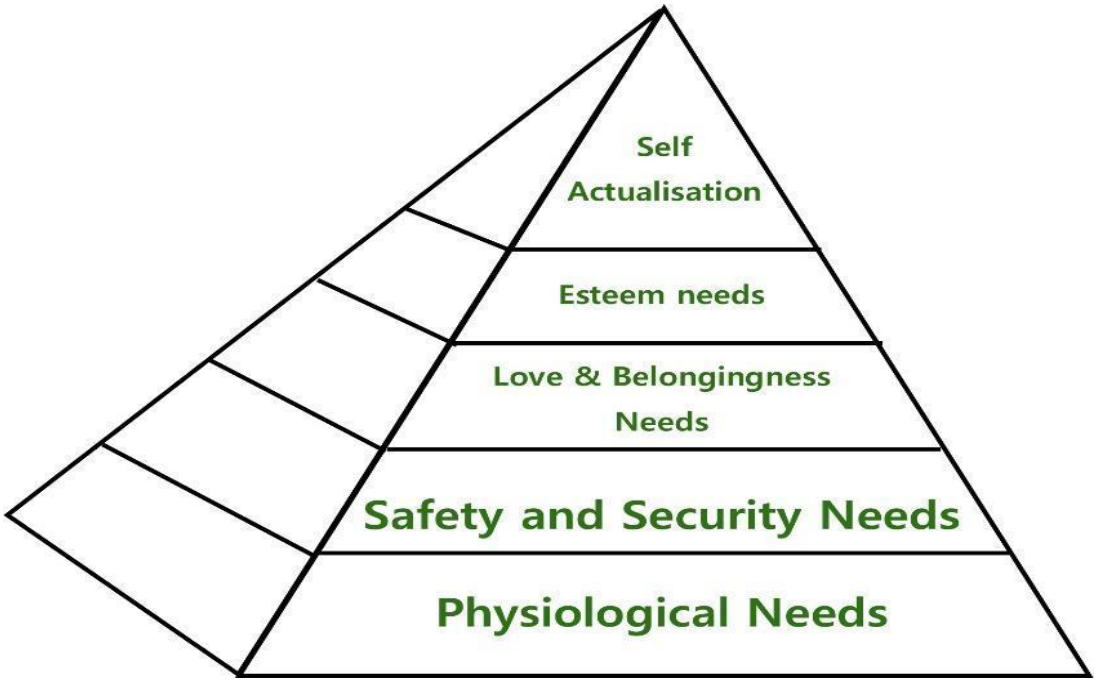
Several major theories of motivation have shaped education and psychology. For this discussion, they are classified into intrinsic and extrinsic categories, with an additional philosophical critique of whether they represent behavioristic or cognitivist traditions. Drive Reduction Theory (Hull, 1943) is a behavioristic theory that posits that motivation arises from biological drives seeking homeostasis. It expresses that learning occurs when behavior reduces physiological needs. This is extrinsic and behavioristic, as motivation is tied to external tension reduction.

In the same vein, Incentive Theory explains motivation as a response to external rewards and punishments. Students may study hard for high grades or to avoid failure. This is extrinsic and behavioristic, as it depends on environmental reinforcements. Optimal Arousal Theory, on the other hand, proposes that individuals seek an optimal level of arousal. Learners in science classrooms may pursue challenging tasks to maintain engagement. This is intrinsic and cognitivistic, as it emphasizes self-regulation and curiosity. The cognitivist approach states that “motivation is a result of people’s thoughts, beliefs, expectations, and goals’ (Feldman, 2015). A student's expectation of achieving good grades motivates them to study for an examination. If they believe that studying will lead to success, they are more likely to be motivated to put in the effort. This theory also helps differentiate between the intrinsic and extrinsic. Intrinsic motivation ignites people to enthusiastically engage with a task or strive for a goal, unlike external drivers like rewards, which can give less enthusiasm. And it may so happen that attempts to increase extrinsic motivation may lead to a decrease in intrinsic motivation (Feldman, 2015).

Maslow’s Hierarchy of Needs (Maslow, 1943; Maslow & Hoffman, 1996), in the same vein, argued that motivation follows a hierarchy from physiological needs to self-actualization. In classrooms, students cannot engage in higher-order problem solving if basic needs are unmet. This theory is partly extrinsic at the lower levels and intrinsic at the higher levels, but overall it aligns with a cognitivist orientation.

The pyramidal Maslow's Hierarchy of Needs (figure 1) places needs in descending order of importance. It suggests starting with the most fundamental needs and working up to the more complex ones. Before meeting the wants of higher order, the basic needs must be satisfied.

Figure 1
Maslow’s hierarchy of needs (1954)



As illustrated in Figure 1 above, the foundational level of human needs is comprised of physiological necessities, also referred to as 'deficiency needs' or 'D-needs'. These fundamental needs are the fundamental drives for sustenance (food and water), rest (sleep), and reproduction (sex), and these are essential to human existence and are the central concern of the hierarchy's base level. Safety needs, concerns with a secure environment come after physiological needs. These two necessities can be described as lower-order necessities, and with their satisfaction, individuals are inclined to pursue their 'growth needs', or 'higher-order needs'. This shift to the second tier of demands is marked by desires to self-actualize, self-enhance, and grow.

Then, once physiological and safety needs are satisfied, human beings seek to satisfy social needs such as the need for love, a sense of belonging, and attachment. Individuals actively seek emotional intimacy, affection, and a sense of belonging, characterizing this level of needs as a pursuit of meaningful relationships. As individuals satisfy their social needs, they progress to esteem needs, which focus on the development of self-worth, self-respect, and recognition. This tier of needs is essential for building confidence, self-esteem, and a positive self-image. The highest need is that of self-actualization, which is related to the need for realization of one's full potential (Feist & Rosenberg, 2012) or can also be termed as a state of self-fulfillment (Feldman, 2015). Maslow, later on, added a new level of needs higher than self-actualization, that is, transcendence needs, which refers to finding spiritual meaning in life (Maslow, 1996). The classroom implications of cognitive approaches to motivation, as typified by Maslow's, include setting clear goals to help students set specific, achievable goals, and providing feedback on progress, encouraging self-reflection in thoughts, feelings, and behaviors in students, and using intrinsic motivation strategies that promote intrinsic motivation, such as interest, enjoyment, and personal satisfaction.

Alderfer's (1969) ERG Theory refined Maslow's into Existence, Relatedness, and Growth needs. The flexibility of the ERG model better accounts for the overlap between intrinsic and extrinsic motivations. Philosophically, it is a cognitivist model since it emphasizes internal goal regulation.

3.3. Philosophical critique

Behavioristic theories such as Drive Reduction and Incentive Theory reduce human behavior to stimulus–response relations. Although they explain simple learning behaviors, they fail to understand the depth of intellectual curiosity and critical thinking required in learning science. Their reliance on external regulation is able to incite compliance rather than actual comprehension.

Cognitivist models such as Maslow, ERG, and Optimal Arousal emphasize the internal process of the learners and emphasize autonomy, goal-directed behavior, and meaning. These are congruent with the constructivist epistemology typical of new science education. They turn into abstractions when used in contexts other than socio-cultural and economic ones, particularly in low-resource classrooms.

Philosophically, the challenge is to integrate behavioristic pragmatism and cognitivist ideals. Both have an element of the truth: behaviorism, the reinforcing function in habit formation, and cognitivism, the reflective goal-directed aspect of motivation. Both must have a synthesis from which to better inform curriculum practice.

3.4. Implications for curriculum implementation in science classrooms

Motivation theories provide a realization of how science teachers can establish quality learning environments. Behavioristic approaches such as reinforcement, immediate feedback, and programmed rewards remain powerful in evoking engagement (Uzunboylu et al., 2025). In response, cognitivist approaches such as inquiry learning, independent projects, and fostering curiosity are paramount in propagating long-term curiosity (Yespolova et al., 2025).

Teachers must design curricula that integrate external incentives with avenues for internal exploration (Gechere et al., 2025). Lab experiments, for example, can be stamped for documentation (external) and as a path of discovery (internal). It is a philosophical stance that this two-way approach respects both quantifiable behavioral outcomes of motivation and internal meaning-making processes. Lastly, the development of science curricula should not only consider what motivates students but also how motivational strategies sit within broader educational goals, such as scientific literacy, critical thinking, and innovation

4. CONCLUSION

Motivation remains a central determinant of effective curriculum implementation and learner engagement in science education. While behavioristic theories have contributed valuable insights into how external reinforcement can shape behavior, their mechanistic interpretation of learning limits their explanatory power in addressing the intellectual and affective dimensions of scientific inquiry. Conversely, cognitivist perspectives illuminate the internal cognitive processes that underlie learning, such as perception, memory, and reasoning, but risk abstraction from the sociocultural realities that influence classroom interactions. A critical philosophical examination reveals that neither approach, in isolation, provides a holistic understanding of the dynamic and multifaceted nature of student motivation in science classrooms.

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An integrative and balanced framework, therefore, becomes imperative. Such an approach recognizes the importance of reinforcement and structure, central to behaviorism, while emphasizing autonomy, curiosity, self-efficacy, and meaning making, which are foundational to intrinsic motivation and cognitive engagement. By blending external incentives with internal drives, science curriculum design can move beyond compliance-based learning toward transformative learning experiences that foster sustained interest, creativity, and critical thinking. Ultimately, this synthesis not only deepens theoretical understanding of motivation but also offers practical implications for teachers, curriculum planners, and policymakers seeking to cultivate empowered, lifelong learners in the sciences.

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