Multiplicity theory and its implications in education

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ABSTRACT

The paper brings to life the Multiplicity Theory. It provides the genesis and the development of the theory. The development process involved observations, semi-structured interviews, and introspective inquiries. The observations at times resulted in documentary review for confirmation of what was observed. Three things were used to establish evidence in developing the theory. These were: concepts, actions and outcomes (products). The three things are meant for clarification purposes, but in essence the discussion is centred on the concept of product(s). The paper considers concepts, actions and outcomes as products. From the observations, semi-structured interviews, introspective inquiries, analysis, and explanations on products, the theory assumptions and explanations were established. The theory main assumption is that the universe is full of products which are out of numerous processes and ingredients (aspects). Further, the paper provides theory implications in education. To add, the paper renders a brief discussion indicating the difference between Multiplicity Theory and other similar theories, more specifically Complexity Theory. Indeed, the theory is different from Multiplicity Theory in Mathematics, abstract aljebra. Finally, the paper concludes that Multiplicity Theory governs creation of products in the universe and beyond it. In view of this, educational outcomes (products) are out of multiplicity of processes and resources.

Keywords: *Education, Educational outcomes, Multiplicity theory.*

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Highlights of this paper

- What principle dominates creation in the universe, and what are products?
- Multiplicity is a creation principle, and any event/action or physical object is a product.
- Multiplicity theory governs creation of products in the Universe including educational proceses and its outcomes (products).

1. INTRODUCTION

The doctorate studies triggered the idea of developing the Multiplicity Theory. In bid for looking into the efficacy of instruction models in developing lifelong learning in higher learning institutions in Tanzania between 2014 and 2020. The key finding was that to achieve the intended learning outcome (lifelong learning) through the instructional models in operation at the time of the study. The implementation process has to consider diverse aspects, which vary in in terms of their contribution in realising the educational outcome (Kinyaduka, 2020).

Based on the aforementioned observations from the doctorate studies process, it presupposes that effective implementation of a particular educational innovation multiplicity of considerations (aspects) is crucial. Indeed, the development of lifelong learning was not from mere choosing and adopting an appropriate educational philosophy, curriculum design, theories of learning, models of teaching, teaching approaches, teaching methods, teaching strategies, and teaching techniques. Instead, one has to consider multiple aspects (multiplicity) in its detailed and complex nature in each aspect in consideration. For clarification purposes, we use one of the listed aspects. We use the choice and adoption of educational philosophy.

In clarifying the concept of multiplicity using the choice and application of appropriate educational philosophy, it is obvious that the choice and adoption of appropriate of the same is not ultimate. This is because effective implementation of the chosen educational philosophy requires common understanding on the underlying principles of the philosophy among key educational stakeholders. These may include teachers, students, parents, educational administrators and politicians to mention but a few. This is to say for example teachers need to have common understanding and interpretation of the educational philosophy. Common understanding and interpreting the educational philosophy may result in similar practices in classes and school settings in general. Interestingly, having common understanding and interpretation of the educational philosophy does not guarantee achievement of the intended educational outcomes. This is because there are other forces such as adequate motivation among teachers. This means that without adequate motivation among teachers to implement the educational philosophy, the intended educational outcomes may not be achieved. This further implies that educational outcomes (products) come from a number of aggregated aspects (forces).

From the above understanding on the findings based on doctorate thesis, fueled curiosity and from the same further observations and inquiry were staged. The process reshaped the author's thinking about concepts, actions and outcomes (products)-homemade and "natural" products. The reshape of the thinking and understanding about the universe particularly from the said cases was out of observations and inquiry. The focus of the observations and inquiries was on concepts, actions and outcomes (products). Although, it does not mean that these were only aspects observed. The observations and inquiries brought to life the Multiplicity Theory. The theory underscores on consideration of multiple aspects in bid for understanding concepts, actions, and outcomes (products). In view of this, a product is any result out of any process, indeed including the process itself. In a nut shell, concepts, actions and outcomes are actually products, and are from an aggregate of sub-concepts, processes and ingredients (aspects). Further clarification is made in the remaining parts of this paper.

In educational processes, planning, implementation and evaluation of intended educational outcomes (products), it is important to consider the presence of critical aspects or all aspects to yield intended outcomes in education

(Kinyaduka, 2020). Indeed, the adoption of Multiplicity Theory in education settings could be a panacea of educational innovations inadequate implementation and/or substandard products (outcomes). Obviously, the Multiplicity Theory applies in the entire universe products, including the universe itself and beyond it, of course. This means that the universe is from an aggregation of products, and anything beyond it follows the same principle of multiplicity. This is to say multiplicity is a creation or existence principle. After this an eye opening introduction, the next section briefly covers on how the Multiplicity Theory was generated.

2. METHODOLOGY

In developing the Multiplicity Theory, the researcher used observational design. In this design, at times subjects were observed without their knowledge, and interpretation was made based on what was observed. The researcher used semi-structure interview to look into an understanding on common concepts among conveniently selected interviewees. The researcher asked interviewees to state the meaning of common objects or actions. At times, the researcher asked follow up questions for some of concepts. The meanings from the interviewees were compared against that from the literature. The study mainly used naturalistic observation. The researcher compared the interviewee understanding on concepts across subjects. In addition, on the aspect of actions, the researcher asked the interviewees to reflect and explain about the nature of an action by a human being. Further, the research observed outcomes (products) to see their ingredients. The observation of products involved those which were *abstract* (e.g. education) and physical products.

In view of the above articulation, the researcher examined the concepts and their parameters, genesis of actions, and outcomes. The study population was mainly biased. The study population included mainly *products*. Further, the observation was one occasion. The observation was sometimes accompanied with the use of *introspective inquiry work technique*. In *introspective inquiry work technique*, the researcher with impartiality tested his own understanding about common concepts, and made interpretation. The researcher further concluded that other people are likely to experience the same if subjected to the *introspective inquiry work technique* on the aspect under study. The research conformed the conclusion during interview with the subjects. Further, documentary review was conducted to support the results from observation, semi-structured interview, and *introspective inquiry work technique*. Common concepts (products) to everybody in the world were used in explaining multiplicity in concepts. Observation was made in homemade products, for example porridge. The ingredients (products) used to prepare stiff porridge were analysed. To add, concepts of capital and education were analysed to understand the concept of multiplicity in products. Further, observation was on the "natural" products (objects), namely soil, and the sun. The *introspective inquiry work technique* comprised reflection and questioning on the composition of the planning process, implementation and ingredients (production process) and outcome for homemade products. In contrast, for "natural" products *introspective inquiry work technique* was used, but it did not involve planning and implementation processes. The focus was on reflection about the composition (ingredients). After this reflection, the review of literature followed to understand the composition of a given "natural" product.

Although the review of literature did not involve homemade products, we are aware that ingredients used to make a homemade product had other ingredients made them. This fact can be easily proven through chemists and through decantation of stiff porridge. While decantation was not conducted in this study, it is obvious that there are other ingredients in maize flour as a product used to prepare another one, stiff porridge. In the same way, water as a product used to prepare stiff porridge has other ingredients, hydrogen, oxygen, minerals, to mention but a few. We will see the details of the assumption in the findings.

From the observations, introspective inquiry, interview, review of documents and analysis, explanations and assumptions on outcomes, it is obvious that products are from Multiplicity Theory main assumptions. The main assumptions are articulated in the remaining part of this paper. Before we delve into the main assumptions of the Multiplicity Theory, we look into multiplicity in concepts, actions and outcomes (products).

2.1. Multiplicity in Concepts

The concept of soil: soil is something common that no one can bother about understanding what exactly it is. However, soil is not as simple concept as commonality. It is common to us but if we asked ourselves to say what it is, and what it comprises. We may always conclude that soil is something complex, or we really do not know what it is! Now at this point be sincere to yourself say what soil is and what it comprises. Have you managed? Do you feel that you have satisfactory understanding about the common concept of soil? This experience may happen despite that we always see it (soil) and perhaps mention about it in our daily conversations.

From the above scenario, one learns that many times we talk about things we do not know well; consequently, we do not know what we communicate to our listeners. Interestingly, even our listeners may claim to understand us while they do not know the exact meanings of concepts used during our communication. As it is, individuals use certain concepts from the principles of hasty generalization, and '*take them for granted.*' The two principles are forms of fallacy. Therefore, if we use concepts from hasty generalization and/or from taking them for granted we are committing fallacies. That is to say we unintentionally deceive ourselves or others. Now that we have seen the difficultness in defining soil and the risk we are at when we take it for granted that we know, but in reality we do not. Let us see what soil is as far as literature is concerned.

According to scholars Dazzi and Papa (2022) soil is a thin layer on the planet earth containing living and mineral materials. The scholars seem to suggest that soil contains fauna, flora and different forms of minerals. This is what the scholars see as soil. Did you mention all the important components and where soil is found? How many components out of those found in the definition did you mention? You can see the concept of soil has its details which we ought to know and by the definition of these scholars Dazzi and Papa (2022) we can say it is still a generalization because it (the definition) does not list all the minerals found in soils. It does not list all types living materials, flora and fauna. As noted elsewhere in this paper, language or words/concepts are summaries of what we ought to know. As such, during conversations or reading the details are often withheld or ignored. In this situation, we do not have the proper details of important concepts; we commit fallacies as speakers, readers or listeners. The fallacies are committed because we lack details of a concept, action or object. Therefore, the details in concepts take us to multiplicity nature of the same, which results in fallacious conclusions, and interpretations.

2.2. Empirical and Analytical Conceptualization of Soil

The empirical conceptualisation of soil emanates from literature cited in this paper. Despite that different scholars may have different definition of soil, the understanding is twofold, one it supports the view that in every situation there is a state of multiplicity. Second, it is used to support that people do not have the same understanding about a common object, which is soil. Again, this corroborates the main assumption of Multiplicity Theory. Furthermore, the analytical conceptualisation emanates from the analysis of data from semi-structured interview of four interviewees (Is) herein referred to as I1, I2, I3 and I4. The interviewees' sub-concepts are shown to understand their conceptualisation of soil. Table 1 shows concept, and sub-concepts to indicate meaning perspectives from literature, and from interviewees.

Table 1. Multiplicity in concept of soil.

Literature/ Respondent	Concept	Sub concepts level 1	Sub concepts level 2	Sub concepts level 3…
Dazzi and Papa (2022)	Soil	Layer, earth, materials	Materials, covering, surface; planet, we live; matter, making things	This list of sub-concepts goes on
I1	Soil	Place, people, dig, grow, food	Indeterminable	
I2	Soil	Layer, earth, humus, sand, rocks, grow, plants	Indeterminable	Indeterminable
I3	Soil	Types, soil, human being, activities	Sand, loam, clay, agriculture, construction, animal husbandry	Indeterminable
I4	Soil	Piece, land, purposes	Faming, construction, etc.	Indeterminable

Table 1 shows the concept of soil has different related meanings from diverse individuals and the literature as well. The meaning of soil according to literature is not absolute. Different scholars may have different meanings of soil. The same applies to individuals; they have different related meanings from I1 to I4. See sub-concepts at level 1, and some of sub-concepts for words at level I, which are at level 2. In relation to indeterminable in the Table, it means the sub-concepts at level 2 or 3 cannot be identified through literature, but through interviewing subjects. It was not important to make further interview because the idea of multiplicity in concepts was revealed at level 1. In this way, we see the emerging sense of Multiplicity Theory in understanding the concept of soil. Individuals do not have same understanding about the concept, soil; consequently, they do not have same shared knowledge during communication. What happens during communication is taking for granted that interlocutors understand each other.

The concept of capital: as we did in the concept of soil. Figure out what capital means. Be sincere to yourself and say what it is. From your understanding, what components are in capital as a concept? Assuming that you have been sincere to yourself, and you have attempted to say what capital is. We assume that the concept is not new because it has ties with our daily life as human beings. Now that we have seen what capital is in our understanding, let us see what capital is from a perspective of literature. Indeed, there is no single definition of capital in the literature; however, there are a number of concepts dominating in its definition. The dominating concepts are: money, wealth, working capital, fixed capital, accumulated wealth, as means of production, growth of wealth, surplus value, element of wealth, and discounted income (Batkova, 2020). These concepts are from definitions in economic perspective. Thus, the concept of capital when used one has to be specific which sub-concept or sub-concepts out of those listed is/are in reference. Without such specification, communication process is at stake. It is at stake because of multiplicity in the concept. The multiplicity comes in because of sub-concepts and variation in perspectives about what capital is. During using the concept, capital one has to consider these differences, or he/she risks committing fallacies in communication.

To add salt, the sub-concepts such as money, wealth have other sub-concepts and the sub-concepts have their own sub-concepts which contribute to understanding of meaning and/or interpretation of what we tell or read. The begging question is; do we go to such detailed understanding during communication (speaking, reading or listening)? The answer is obvious big no.

From the above understanding and assuming that it is true, it follows that we have a serious concern with regards to communication because of multiplicity in concepts. We may cast doubt on credibility of most of communications we make. We cannot be sure whether or not we communicate when we speak, or write. In the same way, we cannot be sure whether or not we understand when we listen or read. This means that we might be misunderstood or we might be misunderstanding others as we communicate. Generally, this is a confusion that might be happening often,

and it has been for so long tolerated or simply ignored. This confusion often is subtle, and goes unnoticed. Rarely one can instantly realise that we are misunderstood, and take an initiative to clarify.

With regards to the above expected confusion, we conclude that misconceptions from speakers and listeners are by-and-large attributable to multiplicity in concepts. This is associated with omission of some sub-concepts or all sub-concepts of a main concept. Though out of scope, the concept of man its sub-concepts are "rational + being." This is to say the entity must be: a) a rational b) a being. Omission of one of the two sub-concepts makes the meaning of man a confusion between or among interlocutors. This implies that any attempt to understand the ingredients (sub-concepts) of every concept used in a text or speech makes communication a tedious and impracticable process. However, we cannot ignore the consequences out of lack of detailed understanding of concepts used in a text or speech. Again, we see how misconception or confusion may occur because of the problem of multiplicity in concepts in communication. Table 2 indicates multiplicity in concept of capital.

Table 2. Multiplicity in concept of capital.

Literature/ Respondent	Concept	Sub concepts level 1	Sub concepts level 2	Sub concepts level 3…
Batkova (2020)	Capital	Money, wealth, production, surplus, income	Medium, exchange, coin, bank, note; abundance, possessions, money; excess, production, supply; money, receive, regularly, work, investment;	This list of sub-concepts goes on
I1	Capital	Money, source, make, start, business	Indeterminable	
I2	Capital	Fund, invest, generate, profit	Indeterminable	Indeterminable
I3	Capital	Capital, start, business, construction, fishing	Indeterminable	Indeterminable
I4	Capital	Project, finance, asset, investment, idea, object, profit, loss	Indeterminable	Indeterminable

Table 2 shows in the literature five main concepts form the concept of capital. As for respondents, I1, I2, I3 and I4 have different number of concepts forming capital. The concept has a number of existing sub-concepts in their minds about capital. As we see, the variation in concepts forming capital across interviewees corroborates the concept of multiplicity in concepts. Further, indicates the variation in understanding across individuals on the same concept. This further means people do not have same understanding about concepts used in daily life.

The concept of education: this concept is common in the teaching profession and educational institutions. Indeed, it is common to every one of us. As we did in previous concepts, define education as you always understand it. Define it without reading anywhere. Now that you have your own understanding of the concept, let us take you to the meaning of the concept as understood in the field of education. According to scholars Verma, Doharey, and Verma (2023) education involves acquisition of knowledge, skills, values, beliefs and habits for personal or society gain. From these scholars understanding about the concept of education, we find five sub-concepts that one must have in mind when using the concept of education. In addition, each of the five sub-concepts has other sub-concepts that one must have a good understanding of the same for one to claim that he/she knows the concept of education. At this point, you can make a self-assessment to see your understanding of the concept, and to see whether or not you have been using the concept of education to mean the five sub-concepts and the sub-concepts of each of the five sub-concepts

under education. We will the sub-concepts of the five sub-concepts of education in the empirical model of the concept in this paper. The empirical model will help us understand better the concept of multiplicity in concepts.

Indeed, we have one concept, education, but it comprises a number of other sub-concepts forming a whole, education. The other sub-concepts forming it also have their own sub-concepts, and the sub-concept have their sub-concepts forming a particular pyramid of concepts creating meaning intended by an interlocutor. As it stands, it seems concepts have a pyramidal shape. From this way of understanding of concepts, it is not always easy to understand what we real communicate, and what we real claim to know from other authors or speakers.

In addition, at times the communication barrier does not come from our incomplete understanding of a concept, but it may happen because of cultural background differences. This misconception can be linked to perspective or experience differences between or among interlocutors. From the same reason, scholars may vary in the way they understand the concept of education. The variation in understanding results in unshared knowledge and interpretation among interlocutors. Despite the subtle differences in understanding the concept among scholars, often we claim to have same understanding of the concept, education among experts. You can only know this unshared understanding of the concept of education if you probe to understand their varied understanding in terms of their sub-concepts. Some scholars may have five sub-concepts, some may have three, and some may have four all these variations cannot make these scholars have shared understanding when they use the concept of education in their conversations. Therefore, what people have is not same understanding, but proximity in meaning of concepts. This problem of proximity of meaning shared among interlocutors is born out of multiplicity in concepts. Table 3 indicates multiplicity in the concept of education.

Table 3. Multiplicity in concept of education.

Literature/ Respondent	Concept	Sub concepts level 1	Sub concepts level 2	Sub concepts level 3…
Verma et al. (2023)	Education	Knowledge, skills, values, beliefs, habits	Facts, information, skills, experiences; ability, do, something, well; principles, behaviour, judgment, life; acceptance, exist, something, true, without, proof; regular, tendency, hard, give up.	This list of sub-concepts goes on
I1	Education	Sharing, ideas, group	Indeterminable	
I2	Education	Ability, fit, society, competencies, skills,	Indeterminable	Indeterminable
I3	Education	Knowledge, competencies, expertise, informal, formal	Indeterminable	Indeterminable
I4	Education	Sharing, knowledge, generation, schooling, experience, practices, online	Indeterminable	Indeterminable

Table 3 indicates that some of sub-concepts in education as understood in the literature and by the interviewees are the same, but some of them do not make common understanding of the concept. Indeed, the column comprising concepts at level one are the ones which make the concept education. This is to say, the cluster of concepts make meaning of a superordinate term, education. Again, the concept of multiplicity is revealing from the clusters of words forming one concept. Importantly, the sub-concepts at level 1 are not the same across interviewees, which mean the interviewees had varied understanding of the concept, education.

2.3. Multiplicity in Actions

Assuming that we have understood multiplicity in concepts, now we move on another discussion relating to actions and products. Actions and products are included in this paper for the purpose of clarification of the concept of multiplicity. As it is, these (actions and products) are mere realizations of concepts discussed earlier.

To begin with the actions, this involves voluntary physical movements of a person. The important feature of an action is its visibility. A person can see what another one does by his/her naked eyes or by a telescope. For instance, we always see people travelling from one point to another. The travelling of an individual from one point to another is an action. How do we see multiplicity in an action? Travelling, for example, as an action, it involves a number of mental processes and resources to achieve an intended action. For instance, one has to decide on why it is necessary to travel? What resources are needed to travel? Are resources adequate? If are not adequate, what alternatives are available to obtain more resources?

From the above questions, it means that when we see an individual in a flight or a bus or whatever means of transport. The questions inform us that an action is an outcome of aggregated forces. Such aggregated forces, may include reason(s) for travelling are strong and diverse enough to make him/her decide to travel; and one has enough resources (time and money) to facilitate him/her travel. Indeed, the health of an individual may determine one whether or not one has to travel. Therefore, the action of travelling is always preceded by other forces in aggregation. We may not see reasons for travelling with our naked eyes, but travelling as a product is from a number of forces (aspects). If one of pre-conditions for travelling is not adequately met; then, we cannot see one travelling. In the same way, when one is supposed to travel, and he/she does not travel; the action is from multiplicity of reasons or of unpopular effects from traveling. This means that actions are also born out of multiple aspects. The multiple aspects in their complete whole make events (actions). The actions we see people doing are from aggregated forces (aspects), which are sometimes invisible to observers, and possibly to the doers of the same. Similarly, Plato looks at the world in two divides, world of forms and world of materials (Yamada, 2020). However, this paper differs from Plato's view in a sense that ideas and the material world are both products. Ideas as products result in other products, which is the material world. This is to say the paper looks at ideas and material world as products from multiple processes and multi-products. Nevertheless, the paper agrees with Plato on the view that ideas precede the material world. To clarify, the idea comes first, and the real object (material world) comes next. He claimed that we have to trust the world of ideas rather than the world of forms. This is because the world of forms can be destroyed, but the world of ideas is immutable (Yamada, 2020).

In the same way, actions of individuals are realisations of well pre-wired, organised activities and resources in the minds of people. Before implementation or doing an action, through their minds, individuals organise activities and identify resources. This means that the actions by individuals we see are conditionally preceded by ideation on activities and resources. Therefore, an action is an outcome of mental processes at the time of planning and it is realized during implementation (doing it).

The mental processes before one does an action answer questions such as: when to do it? How to do it? Who to engage? What purpose(s)? What results? What effects from results? Where to do it? What resources are required? and what have you. This is to say there are considerations before one does an action. Impliedly, any action we see it is not a function of one force, but aggregated and coordinated mental processes. In this way, we see the concept of multiplicity in actions. Table 4 provides further clarification.

Table 4. Multiplicity in actions.

Literature/ Respondent	Concept	Sub concepts level 1	Sub concepts level 2	Sub concepts level 3…
I1	Standing up	Situation, moving, body, down up	Indeterminable	This list of sub-concepts goes on
I2	Standing up	Accept, order, respect, readiness	Indeterminable	
I3	Standing up	Speech, waiting, feet,	Indeterminable	Indeterminable
I4	Standing up	Act, rising, sit, place, chair,	Indeterminable	Indeterminable

Table 4 indicates sub-concept on the action of standing up. It indicates the varied understanding of the action standing up. While the action is attributable to a number of factors, namely receiving an order from a superior person, and good health of a person standing up, the respondents did not consider the issue of health and others such as context. In a situation whereby one is in the Intensive Care Unit (ICU) may not respond to order even if one has heard the order, respects the one who gives the order, indicating that one can respond to orders when the context and health are favorable. Furthermore, it means that standing up as an action is attributable to multiplicity of forces behind it. Importantly, the ways the interviewees understand the action of standing up also greatly vary from one individual to another. This means that different individuals may not have the same understanding about an action; they may have variations in their understanding. Indeed, the data from the action of standing up also indicate that the individuals do actions without their knowledge on the why they do certain actions. If asked, they are likely to give you answers that are not exhaustive. Therefore, we do not know that we do not know the reasons for our actions in life.

What is more, during observation, it was further revealed that interviewees took longer time to reflect about the concept which during its application it takes less than five seconds to use it in a sentence or conversations. Taking longer time to reflect on the meaning of a common concept, it may imply that the people tend to take meanings of concepts for granted. The situation was the same for all concepts across interviewees.

2.4. Multiplicity in Products

In this respect, using homemade products, the concept of multiplicity applies. This implies that products are made from a number of ingredients. Each product comprises a varied range of ingredients (aspects). In principle, some ingredients are in larger quantities than others. As it stands, a product maker must have a production blueprint in his/her mind. A production blueprint in mind precedes a real product. The product maker has to know ingredients their ratios to produce a quality product, and the value chain. For instance, for one to prepare stiff porridge needs stove, cooking pot, clean water, cereal crop flour, and any other ingredients at the taste and experience of a cook. From there, the cook must follow processes (the value chain) i.e. to prepare stiff porridge until it is ready for consumption.

From the above understanding, stiff porridge is a product with multiple aspect consideration. This means all the processes and the ingredients have to be in place for one to prepare a product. In a situation where one of main ingredients is scarce, then, one cannot prepare stiff porridge. All ingredients must be in a required ratio or balance. In this situation, stiff porridge as a homemade product has multiple aspects to consider during its preparation. One can think about many other homemade products; indeed, even industrial made ones. From the reflection of other products, one ends up concluding that there are multiple aspects to consider in making products.

Moreover, one can think about "natural" products like the sun, which is said to be made of continuous burning gases, and other non-gaseous elements (Januaries, 2022). The sun is from multiplicity of products. In the same way, other creatures we know are not from a single ingredient. They are complex in nature like concepts, actions, and

other manmade products. The foundation of 'natural' products can be better explained through metaphysics. From this observation and others which have not been explained in this short paper, we can confidently conclude that we live in the world that we can best explain it through Multiplicity Theory. The theory looks at the 'natural' products as emanating from omnipotent powers, which are also in multiplicity. This means this theory is against the view that the Universe is from the creation process of one God, but rather from a number of omnipotent powers. Of the omnipotent powers, one power takes the largest share of the contribution. A creation process operates under the principle of pluralism. The principle states that a product is an outcome of numerous processes and other multi-products, which are also complex in their own right. In this part on products we do not use Tables to present the findings because the preceding Tables are also about products. Therefore Tables for products amounts to repletion of a message i.e. findings are the same or very similar.

From the explanations above, we conclude that concepts or words are linguistic products. The products generated through morphological principles. During the generation of the concepts or words, there is a set of other sub-concepts behind the created concept or word. From this understanding, concepts are from aggregation of a number of other sub-concepts that together make up one interpretable superordinate term (concept). The conceptualisation of concepts using their sub-concepts to make one concept is the same as the creation process of actions and other products we see in our daily life. The "natural" products are not exclusive. The "natural" products we can bluntly list as flora, fauna, planet, and the list goes on. These "natural" entities follow suit. That is to say the products are not different from homemade ones. They can be explained along the same lines of Multiplicity Theory. The Multiplicity Theory in educational context can be explained as indicated under:

Multiplicity Theory in education manifests very well. Education as a product is out of numerous educational processes and other products. Graduates as products from any education system have defined qualities. The qualities are not arbitrary. They are from intentional educational processes coupled with the use of multi-products. This means that the qualities of the graduates reflect the kind of society a particular nation desires to create. To create the kind of society a nation wants which is a product from education system in a respective country, it is important to consider the main assumption of Multiplicity Theory. Again, we need to remember that multiplicity is influenced by the principle of prioritization i.e. some of aspects or factors in the production process are more important than others. Despite this understanding the general assumption is that all concepts, actions and outcomes (products) are from an aggregated forces, ingredients or aspects. Therefore, in order to create a kind of society a particular nation wants through education system it is essential to consider using the main assumption of Multiplicity Theory just mentioned.

From the main assumption of Multiplicity Theory, educationists need to consider all aspects required for successful implementation of curriculum or achievement of intended educational outcomes or projects. The critical aspects are considerations to be made during planning, implementation and evaluation of educational innovations, processes and/or projects. Through the considerations, one can attain the desired educational outcomes. From our experience, some of considerations (multiple aspects) in the education industry are indicate under:

a) Adequate and qualified teachers: this is to say the number of teachers has to align with the number of students in the educational institution. Proper alignment in terms of teacher-student ratio must be attained. When the set teacher-student ratio is attained, we consider that we have adequate teachers in our education system. In a situation where there is bigger number of students than the proposed teacher-student ratio, we consider that we have inadequate teachers in our education system or institution. Furthermore, we need qualified teachers. The issue of qualified teachers depends on the standard or minimum qualifications one has to possess to teach at a particular level of education. If we want all teachers who teach in class I to VI must hold a bachelor degree in education, and we have a substantial number of teachers teaching in primary schools who are holders of

Diploma in education; then, we may consider that these teachers are unqualified. Indeed, the question of quality depends upon what the stakeholders agree as quality in their context. Context may be technological, economic and even cultural context. This means that a number of forces influence the meaning of quality. Again, here we see the value of multiplicity in the conceptualization of quality.

Interestingly, having adequate and qualified teachers as clarified above, it is not the end of it all. To clarify, we cannot guarantee the realization of quality education because we have qualified teachers in an education system. It seems it does not work like that. This is because the qualified teacher has multiple forces that influence his/her efficiency and productivity. This implies that we still need a lot from teachers to operate optimally in the education system and yield desired outcomes. For example, we need teachers who are motivated enough to do their job properly. We need teachers who are committed to do their job. We cannot expect much from teachers who are less motivated and committed. Further, the teachers need relevant resources to facilitate them to do their job properly. Teachers need furnished offices for them to do their job properly. Teachers need housing close to school campus. They also need professional development. Teachers need quality social services such as health facilities, banks, passable roads, and markets to mention but a few.

In connection with the analogy of a teacher discussed above, it implies that having adequate and qualified teachers without consideration of other issues associated to him/her; we are in theory unlikely to attain the ideal performance of a teacher.

As it stands, and as has been noted, furnished offices and resources to enable them work properly; it cannot guarantee the achievement of intended educational outcomes. To add, teacher housing, it is important for teachers to have houses built in a school for them to work effectively, and think about the health of a teacher. Health services should be abundantly available within the school vicinity. A teacher requires professional development and orientations when there are curricula innovations. A teacher needs to be paid handsomely in order to cater for his/her daily basic needs. As a nation, it might be difficult to create a kind of society it intends if it does not consider all the teacher ingredients necessary for outstanding performance.

As education experts, when we think about a teacher as a concept, we need to go into the details (multiplicity) of the concept in its complete sense for a teacher to work optimally in his/her profession. In so doing, we will be applying the Multiplicity Theory in education so that we have it that work efficiently and productively in the education system. The same applies in other territories in the field for the education system to work optimally for intended outcomes.

b) Infrastructure: from the perspective of Multiplicity Theory in education we have to reflect about all important infrastructure required for optimal operation on the part of teachers and students. For example, a school needs adequate number of classrooms based on the standard number of students in a class. The classrooms that can accommodate all students based on the mode of learning. The classrooms should be furnished. The classrooms with everything to facilitate learning process, smart boards, movable chairs and tables, projectors, flipcharts, small library with key books, the list continues for some time. This means that education experts have to go into the details of the concept of a classroom and ensure that the actual classroom is realised. This is possible if the education experts are exposed to Multiplicity Theory, which acts as a compass to educational planning, implementation and evaluation processes. The theory enhances detailed analysis of an action (to know the ingredients) before embarking into educational activity implementation. When detailed analysis is done during planning, the likelihood is that there will be successful implementation of curriculum, educational innovation and/or any other task.

Apart from classrooms, schools need to have furnished laboratories for science and language subjects. The laboratories have to be equipped with all equipment. This enables conducting all forms of experiments. Related to

this, schools need furnished workshops for subjects that need the same, for example, carpentry or tailoring to mention, but a few. The workshops need to be equipped with all necessary equipment given the nature of a subject. With this practice, intended products (graduates with desired qualities) from education system are realisable.

In relation to infrastructure, students need dormitories. School must have dormitories to stay. This helps to alleviate the problem of distance from home. This is particularly true in developing countries like Tanzania. Many students still walk long distances to reach schools. This results in student fatigue. As a result, student learning is ineffective. Furthermore, students what they need is just like their teachers. They need health facilities, roads, shopping centres, passable roads, cafeterias, libraries, laboratories, toilets, teachers, current relevant books, the list continues for some time.

In addition, schools require special needs infrastructure. The infrastructure has to be well developed to accommodate all students. The infrastructure has to accommodate even those who challenged in some ways. This may include having a centre for providing services to students with disabilities. Indeed, there are other infrastructures needed in schools such as games and sports facilities, common rooms, reading rooms, offices, internet, housing and so on. However, the important concept in education is Multiplicity Theory, which requires for each case (infrastructure) to consider number of aspects to make it useful or complete. As you may remember, some of the aspects are mandatory whereas others sound subsidiary. As educationists, always we have to do our homework in order that we have on table mandatory and subsidiary aspects. This is a critical process for effective and efficient implementation of educational processes. This is useful to planners, implementers and evaluators of education processes or outcomes. Let us take an example of a cafeteria construction project in a school- perhaps one has to ask: what does it entail? Having understood what it entails, then you can construct it and forecast all other requirements related to it for its optimal functioning.

c) Teaching and learning materials: adequate and quality teaching and learning materials must be in place. Indeed, this can be done based on a subject and its topics. Detailed analysis has to be done at subject level to know all the teaching and learning materials necessary for each topic in a respective subject. In so doing, the teachers will do their job properly if all the teaching-learning materials are made available assuming that all other factors remain constant. Indeed, we can think about the student-book ratio, which could be the best i.e. the ratio of 1:1, which means one student one textbook. Laboratory equipment, carpentry equipment, and all other materials given the nature of the subject should be available in abundance.

Besides, it is obvious that there are fake product instances. Fake products can be intentional or unintentional. Intentional fake products are from fabrication in the production processes and ingredients. For example, when an individual disseminates false information to achieve a certain goal, with or without good will such act is regarded as fabrication of information (product). In this situation, the believers of information may face unprecedented adverse consequences. The same applies in other fabricated products. The creation of fake products follows the same principle of pluralism. However, the difference between fake and authentic products lies on usefulness on the part of consumers. If the consumers experience unpopular effects, the product is fake because it does not have a desired effect(s). If the product does not induce the desired effect(s) while it is not fabricated, this is a normal defect. As it stands, the concept of fake products applies for homemade and industrial products; it excludes 'natural' ones. The exclusion of 'natural' products is attributable to unembellished criteria for being fake or authentic. This is because they are from omnipotent powers; therefore, it is the powers which can know the authenticity of each product from their creation, and the purposes for the same.

Through observation and reflection, a number of assumptions of the Multiplicity Theory were generated. Equally important, from the analysis of concepts, actions and outcomes (products) in this paper, the Multiplicity Theory is generated. The Multiplicity Theory assumptions are indicated under:

2.5. Assumptions of Multiplicity Theory

The assumptions presented under are in two categories, namely main and specific assumptions.

2.6. General Assumptions

Multiplicity Theory governed or governs production or creation in the entire universe. Products are from aggregated processes and ingredients (aspects) or other products. Therefore, products are from a number of processes and ingredients (aspects/products).

Concepts are a result of theories, and products. Products are realisations of theories or concepts in practice. When theories or concepts are translated into actions (practice), they result in physical products. Therefore, concepts or theories precede products. Therefore, concepts are twofold, theories as well as products. Concepts are from theories. They are outcomes of theories i.e. they are products.

'Natural' products are from presumed omnipotent powers. The omnipotent powers are in multiplicity. The powers can be explained through metaphysics. Metaphysics is the locus of everything in the universe. Even manmade products have their foundation in metaphysics.

Products comprise ingredients at varied quantities. The ingredients taking the largest part of the whole product is assumed as having core contribution to a product. As such, a product cannot exist without the core contributor(s). The core and subsidiary contributors of a product have to be in place before commencing production processes for successful preparation and quality product.

2.7. Specific Assumptions

- Languages (words and/or concepts) are internal to individual summaries of thoughts, actions and outcomes ("natural" and manmade products). This implies brevity is a living principle of language. Words do not say it all. The details we know and those we do not are natural course of products (concepts, action and outcomes).
- Actions of a person are a resultant of aggregated exerting forces. The exerting forces we do not know directly, but we can only understand about their existence through the main assumption of Multiplicity Theory.
- Where there is only one exerting force for an action, then it (the force) results in Pandora's Box to an individual or the third party. To say it differently, it (the action) has positive or negative spillover effects. This means that the exerting force carries with it a number of presumed positive or negative effects.
- Misunderstanding during communication is at times a resultant of omission of sub-concepts of a main concept. We do not always share or embrace the same or all of sub-concepts forming a concept. From this situation, professionals and individuals do not implement theories in professions in the same way across field experts. This is because concepts used do not directly show their sub-concepts (details). Interestingly, the sub-concepts may not be clear even to the author of a respective theory. Concepts are summaries of other clustered concepts making a whole (main concept). This means that implementation of theories or models always vary across experts. This is because of variation in interpretations. Each practitioner ought to use other minor theories (own concepts) to implement a documented theory. In this situation, the practitioners may not use same minor theories (sub-concepts) during implementation of a theory. To clarify, five cooks with the same stove and same

materials for bread production may not bake a bread with the same quality. This means we do not know things in the same way others do; therefore, we vary in interpretation and in practice.

- Whatever product, "natural" or manmade, it is out of Multiplicity Theory main assumption. This means that products are a result of aggregation of processes, and ingredients (aspects). Of course, products we see are a resultant of other products; aggregated processes and products result in new products.
- Individuals do not have same but rather proximal understanding of concepts, actions and outcomes (products). This implies we do not always understand each other during interaction in the manner we expect. What we can achieve is closer meaning and interpretation of a phenomenon at our disposal.
- To understand people's thoughts and their life style, look into words they use, actions they do, and products they make or own. These provide a clue on what they think about a particular phenomenon or about what they value in life.

2.8. Implications of Multiplicity Theory in Education

Students and teachers have to be wary of key concepts used in a discipline or a topic to develop proper understanding of what they learn or teach in educational institutions. The teachers have to encourage learners to explore in detail sub-concepts of a concept to understand them well.

Teachers should make deliberate exploration on motives of actions by their students, workmates to make informed decisions when necessary do so. This practice makes educational institutions improve and operate seamlessly from authentic decision-making processes. This includes understanding core contributors of an action (behavior). This understanding of details of actions (behaviours) makes it effective strengthening or suppressing the same. The strengthening and suppression of behaviour depends on whether the behavior is wanted or unwanted, respectively.

To offer quality education in a nation, we have to know the core and subsidiary contributors to quality education. To achieve quality education, the core and subsidiary contributors to it should not be ignored. Therefore, the core and subsidiary contributors have to be in place before we embark into implementation of curriculum or educational activity. The core and subsidiary contributors have to balance in terms of quantity and quality. For example, the quality of graduates is mainly contributed by the quality of the teachers; consequently, planers in education need to think in a detailed manner about the requirements, basic needs and the teacher working environment altogether. This detailed consideration about a teacher as a core contributor to quality education is very important because the concept of a teacher and his or her effectiveness in facilitation does not only embody qualification, but also other ingredients or aspects. This implies that is inadequate to recruit enough and qualified teachers in the education system while ignoring other parameters related to a school teacher and other associate concepts.

Teachers, and administrators should be aware that successful implementation of curriculum, educational innovations and other projects are a resultant of multiplicity of contributors (aspects). Thus, successful implementation pre-condition is possessing knowledge on main and subsidiary contributors to implementation of educational activity; consequently, making them available in their complete set before implementation commences.

Educationists should know that the absence of a core contributor in the implementation of educational innovation, curriculum, or project culminates in inadequate implementation. As such, the intended educational outcomes may not be attained. Therefore, educators have to reflect about the critical and subsidiary contributors to implementation of educational activities. Normally, the exercise has to take place before embarking into implementation, or before scaling up an educational innovation, or project. Indeed, to know the core and subsidiary contributors for a successful implementation of an educational plan; it is important to undergo pilot implementation.

Educational outcomes (products) are a resultant of aggregated educational processes and aspects related to individual student, school settings and others. Therefore, educational outcomes are multifaceted.

Teachers, and administrators education does not render one purpose, employment for example. Therefore, teachers and administrators have to inform the learners the purpose of education in its aggregate form or sense.

Teachers, administrators and students should reflect and use the products in their environment to create new products for the betterment of life and learning. This means that teachers and students should use products in their environment creatively to solve society and school problems.

2.9. How Multiplicity Theory Differs from Other Theories

Multiplicity Theory sounds to be similar to Complexity Theory. However, Multiplicity Theory focuses on the diversity of products used to make new ones. In Multiplicity Theory, concepts, actions, and outcomes are all products in existence. This includes the universe. The universe is a product because it is an outcome of the omnipotent powers in their assumed aggregate. The main assumption in Multiplicity Theory is that a product is from an aggregation of processes and other products forming a new product. Notwithstanding, the products resulting in a new one are seen with our naked eyes, or they are not. Even the omnipotent powers, they are products in their own right. The begging questions are; where did the omnipotent powers which created the universe came from? If the omnipotent powers are in multiplicity, where did the products which created the omnipotent powers came from? These questions are not within the scope of this paper, and are not easy to answer. However, the assumption that products are from multi-products is indisputable.

In contrast, Complexity Theory focuses only on organizations and their functioning. The Complexity Theory looks at an organization as a corporate person with changing behvaiour to adapt new operational environment (Martin, McQuitty, & Morgan, 2019; Plessis, 2021). While the Complexity Theory Uses nature as an analogy to explain complexity in organisations, the Multiplicity Theory uses nature to explain that products comprise multiple ingredients with varied quantities. The ingredients (aspects) required in large amounts are core to product creation. Worth noting, in Multiplicity Theory products are not only physical objects, but even abstract concepts, such as values, God, the list goes on. Indeed, organisations in the context of Multiplicity Theory are perceived as products like concepts, actions, outcomes, vehicles, planes, the list may continue for some time. Multiplicity Theory explains about the nature of products and what considerations to give an upper hand to yield intended results (standard products). What forms a larger part of a product is a core ingredient to make sure it is in place before we embark in the implementation process in creating another product. The Theory looks at the universe as being embodied with products (physical and non-physical ones). As it is, whatever action of mankind, it is geared towards creation of a product. Products create other products, or influence the creation of the same. In the creation of products there is multiplicity of processes, and ingredients (aspects).

As it is, Multiplicity Theory is a grand theory because it can explain events in diverse domains of life and situations. Indeed, in the same way, Complexity theory explains phenomena in different fields; however, it focuses on change of behavior of individuals or organisations. From complexity theory, internal and external forces influencing the functioning of an individual or organisation. In contrast, in Multiplicity Theory considers the internal and external forces as ingredients (products) contributing to enhancing or to compromising quality of another product. The product is mainly considered as an outcome of a theory, which often has core ingredients contributing its existence. To ensure quality products, one has to focus on core ingredients and the subsidiary ones. For instance, one desires to stop unwanted behavior as a product one has to consider on eliminating the core ingredients (aspects) contributing to occurrence of a given behavior. In so doing, one can mitigate the behaviour tremendously. From this

short discussion, Multiplicity Theory and Complexity Theory are different. Multiplicity Theory has the same name as Multiplicity Theory in Mathematics, Algebra (Averson, 1976). However, the current theory is a grand theory that can be used to explain any event (phenomenon) in the universe.

2.10. Policy Implications

During education policy development, it is important for policy makers to consider areas of priority in a respective country. Furthermore, the policy makers may identify critical considerations in every key concept used in the policy. Identification of key considerations on key concepts in education policies makes implementers have more common understanding about the policy; consequently, translating the policy into action in more or less same way. The implementers may use the theory to identify ingredients of whatever activity they do in education settings to realise intended educational outcomes. Moreover, the theory is not only important to education policy makers and implementers, but also to education planners. As for educational planners, the theory is helpful in putting in place important considerations for successful educational plan implementation. As it stands, Multiplicity Theory is a grand theory, it is not only important to educationists, but also to other disciplines or life domains.

3. CONCLUSION

Products are a resultant of concepts or theories in application. The products are out of aggregation of other products. The products can be words, actions, outcomes, or even events. All these come from ideation and their realisation is in the form of concepts, actions, outcomes or events. The products are formed using multiple processes and ingredients. There is no single product with one process and ingredient. The same applies in the education system. Graduate attributes (qualities) are products from numerous educational processes and resources (ingredients/products). The processes and resources contribute to graduate attributes development during schooling or training. As such, the processes and resources have to be in place (known) before commencing implementation of an educational or curriculum innovation. Indeed, all planned activities in any education system are prospective products involving numerous others ingredients (products) to make them a reality. It is important to reflect about key and supplementary ingredients of planned activities before embarking into implementation. This understanding from the Multiplicity Theory has significant implication in educational planning, implementation, evaluation, and other sister processes in education systems.

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