Conceptualizing the Place of Technology in Curriculum Formation: A View of the Four Pillars of Curriculum Foundations

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Abstract:

This is a phenomenological study that calls for the re-visitation of curriculum body of knowledge which dwells on the four major pillars namely; philosophical, historical, sociological and psychological foundations. This library study endeavored to investigate the contribution of technological innovation in the process of enriching knowledge. The place of 'machine' currently plays a role of a facilitator and not as a core foundation from which knowledge can be inferred. As we face the hilltops of the 21st century, educationists and curriculum developers have no other option except to admit to redefine the concept of technological function as one of the core foundations of education and not just a mere tool to aid learning and teaching transaction. The fact of the matter is that learners need not only to know information; they need to know how information is gathered, identified, transformed and used. To expound this study the following questions benchmarked the exploration: Is there any knowledge in technology or is it simply a machine to facilitate work? How long will it remain to be technology in education and not technology of education? When will the evergreen generation be groomed into a meaningful use of technology? Isn't it high time that we begin thinking of qualifying the technological aspect and give a value it deserves in the constitution of knowledge? In this study I have argued that technology has transcended the role of facilitating knowledge and has indeed become a body of knowledge from which curriculum ought to be anchored.

Keywords: henomenological, curriculum, technological, machine, debate, Evergreen generation.

1. Introduction

The challenge of incorporating technology in curriculum cannot be overemphasized. It has become a challenge because of three major reasons: the conceptualization of technology

(how do we understand it), the operationalization of technology (how do we apply it) and how it informs the curriculum (Alavi, 1994). The challenge becomes even more confusing when technology is only used as a vehicle to carry the package of curriculum to its purposeful destination. The challenge becomes obvious because technology does not seem to get along with curriculum in isolation. Learners have been trying to catch up with overwhelming technological advancement of no avail because the more one tries to apply it in managing curriculum the more it demands its workability and usage. Several studies (such as Tomei, 2003; Frey, Grammill, & Iron, 2007; Kinnaman & Dyrli, 1995; Thorsen, 2009 &Woodward, 2001) have shown the importance of technology in aiding curriculum development. The later puts it simply, "teacher as coach, technology as the tool" p.2. However, with the good intention of integrating technology as a tool to curriculum, I argue that technology will continue to get out of hand unless it becomes a source of knowledge: a core foundation of curriculum.

Most learners and even professors are less conversant with technological advancements owing to the notion that technologies are simply machines to aid work. Another narrow view is when technology is equaled to the use of computers while on the bigger picture technology is a vast and unexhausted body of knowledge we ought to infer. When developing curriculum, experts dwell and draw much of the knowledge and principles on the existing pillars: the ***philosophical***, ***historical***, ***sociological*** and ***psychological*** foundations. On one hand, it is true that the four foundations of curriculum have stood the test of time and therefore knowledge must emanate from them, while on the other hand, the unshaken argument over qualifying technology as a foundation of knowledge cannot escape that same status due to its longevity, capacity, borderless, inclusivity and the influence it has over people and events across the globe.

The era of the 21st century observes evergreen students who are technologically savvy threatening the status quo of professors in their teaching and learning transaction. What makes it even worse is the misuse of such technologies which ultimately does not appear transforming or informing the curriculum in the educational settings. Woodward (2001, 13) observes further that, "technology is particularly problematic in this regard because it is so compelling and has advanced so dramatically and has become such an essential component of modern life one cannot do without" and sometimes do it in a wrong way." In order to bridge the existing gap whether technology is a tool or a set of knowledge, we need to redefine the concept of technology and how it relates to curriculum.

The sense that technology may be out of control is also influenced by the way in which technical developments can lead to unforeseen 'side-effects'. Clarke (2005) exposes his worries that unless technology is tamed and a well- structured frame work is agreed upon in redefining the concept to fit the educational and societal demands, technology will continue becoming a harmful material to mankind. The most famous theorist adopting this perspective is the sociologist Jacques Ellul in his book *The Technological Society.* Ellul declares that, "Technique has become autonomous; it has fashioned an omnivorous world which obeys its own laws and which has renounced all tradition" (Ellul 1964 p. 14). He presents complex interdependent technological systems as being shaped by technology itself rather than by society.

1.1 Statement of the problem

Technology is on its toes almost in every sphere of man's life. The transactions made by technology are enormous and everyone out there consciously or unconsciously speaks of technology in the abstract. The concept of technology as tools to aid work does not hold any more because technology is not limited to 'machines' alone. Must human beings submit to the harsh logic of machinery, or can technology be fundamentally redesigned to better serve its creators? This is the ultimate question on which the future of human civilization depends. It is not primarily a technical question but concerns a fundamental issue in social philosophy. Technology has over the years been perceived as a neutral mechanism to improve services and lessen the burden man has been subjected to. The neutrality of technology in this sense cripples the whole meaning of its existence and functionality. If technology is neutral, then its immense and often disturbing social and environmental impacts are accidental side effects of progress. Much current debate polarizes around the question of whether these side effects outweigh the benefits. The advocates of further progress claim 'reason' as their ally while the adversaries defend 'humanity' against machines and mechanistic social organizations. The stage is set for a struggle for and against technology (Clarke, 2005; Frey, Grammil & Iron, 2007).This study goes further to establish the reasons for conceptualizing technology in view of curriculum formation.

1.2 Purpose of the study

Following the major contribution of technology in our daily lives, it has reached a stage of revisiting its existence and usability. The purpose of this study therefore, is to show the gap that exists and question the factors that underpin the constitution of knowledge. This is because technology has not undergone the elegant simplification that marks the development of most fields of knowledge as they grow to maturity. The study further explores the authenticity of the major pillars of curriculum foundation namely; philosophical, historical, sociological and psychological orientations as sources of knowledge.

1.3 Scope of the study

There are many issues surrounding the use of technology in learning including but not limited to the volatile nature of most technologies, dealing with evergreen students who are technologically savvy, the growing complexity of technological concepts which can make learning difficult, the lack of effective communication and collaborative behavior among technologists (Weert & Tatnall, 2005). While resolving such issues is important in promoting the use of technology in schools, this paper discusses the role of technology as a fundamental source of knowledge apart from playing another significant role as medium of instruction.

2. Theoretical framework of the study

This study is guided by three theories of technology namely; the instrumental theory, the substantive theory and the critical theory of technology. Basing on these three theories, a clear understanding of this study can be realized.

2.1 The Instrumental theory of Technology

The instrumental theory states that technologies are purely machines aiding man to accomplish tasks that would never be done or done little in their absence. This view according to Feenberg (2002) limits our thinking within the box to believe that technologies are only instruments such as computers, telephones, TVs, etc. and they must be commanded, directed and decided by their creator. Though such a view might have some truth in it there is still more to ask; For example, why is it that when computers fail to function or in case of internet disconnection 'the creator' has no choice except to bow and obey? Instrumental theory in this regard, offers the most widely accepted view of technology. It is based on the common sense idea that technologies are "tools" standing ready to serve the purposes of their users (p. 5). Therefore it is deemed "neutral," without evaluative content of its own.

2.2 Substantive theory of technology

Substantive theory, unlike instrumental theory believes on the view that technology is not simply a means but has become an environment and a way of life. This is its 'substantive' impact (Heidegger, 1977). Despite the commonsense appeal of instrumental theory, a minority view denies the neutrality of technology. Substantive theory argues that technology constitutes a new cultural system that restructures the entire social world as an object of control. Therefore this theory leads us to another level of understanding what technology has to offer in addition to the instrumental theory.

2.3 Critical theory of technology

Critical theory advocates that technology must cross the enormous cultural barrier that separate the heritage of the radical intelligentsia from the contemporary world of technical expertise. It must explain how modern technology can be redesigned to adapt it to the needs of a freer society (Feenberg, 2002). Further, critical theory of technology is not a thing in the ordinary sense of the term, but an "ambivalent" process of development suspended between different possibilities. This "ambivalence" of technology is distinguished from neutrality by the role it attributes to social values in the design, and not merely the use of technical systems. On this view, Feenberg advocates that, "technology is not a destiny but a scene of struggle. It is a social battlefield, or perhaps a better metaphor would be a *parliament of things* on which civilization alternatives are debated and decided". (p. 11)

In his discussion of how critical theory of technology is to be realized in a re-written "technical code," Feenberg highlights two additional features of his critical theory that are particularly helpful. The first is the need for the theory to inspire action that changes technology for the better, hence the need to rewrite the technical code, to make social objectives such as justice "engineering objectives". And the second is the need to stop seeing technology as separate from people, to view the human subject, instead, "as bodily subject and member of the community in the life of the objects [technologies.]" These two tenets of the critical position are important distinguishing features of arguments in computers and social work, which take a substantive position and those that take a critical position.

Much has been said about how technologies are used for supervision of instruction. Several studies such as Kofi (2012), Osakwe (2012), Kpakiko (2012), Frey, Grammil, & Iron (2007) admit and appreciate the enormous contribution of technology especially in the area of

education. But what seems to be lacking in these arguments is whether technology can be rethought as another source of knowledge creation. Clarke (2005) puts it clearly that;

> A fascinating quest of the past few years has been the search for a fundamental theoretical structure and philosophical argument that underpin all of technology. This search could possibly yield one of the most significant conceptual foundations for the twenty –first century. Such a fundamental structures would materially improve our understanding of technology, enhance our ability to manage it better and increase our effectiveness in formulating public policy in this area. (p. 2)

Unless a way forward about the understanding and position of technology in the contribution of knowledge is clearly stated, there will always be a knowledge gap and hence, users of technology will find themselves lost without having a road map to guide the process. The genuine remark by Clerk (2005) seems to revolve around the concern raised in this study.

3. Related Literature Review

One's approach to curriculum reflects one's perception, values and knowledge. A curriculum approach reflects a holistic position encompassing curriculum foundations: a person's view of philosophy, view of history, view of psychology and view of social issues (Ornestein and Hunkins (2009).The word "curriculum" comes from the Latin word "currere" which means "a course to be run". By this definition, curriculum signifies a course of studies followed by students in a teaching institution. It refers to a course or courses through which learning takes place. In formal education, a curriculum is the set of courses, course work, and content offered at an educational establishment. A curriculum is a "plan or program of all experiences which the learner encounters under the direction of a school" (Tanner & Tanner, 1995, 158).

The curriculum is a tool that describes the teaching, learning, and assessment materials available for each specific course of study. It also specifies the main teaching, learning and assessment methods and provides an indication of the learning resources required to support the effective implementation of the course. This implies that one of the functions of a curriculum is to provide a design which enables learning to take place. The curriculum generally delineates what educational objectives, content, learning experiences and outcomes of learning involve (Sowell, 2000). Through the curriculum, the citizens of a nation are made to ultimately develop an understanding and appreciation of knowledge, learning and interaction with education. The curriculum thus affects, effects and is affected somehow by the purposes, structures and contents of the wider society. It provides the education system with an opportunity to respond to the contextual requirements of the times, to address a number of major problems in the present education system, and to ensure that current conceptions of learning, progression and knowledge are built into education.

The place of curriculum in education makes it axiomatic that concerted efforts be made at all times to implement a curriculum that meets the needs of the society. Ornstein and Hunkins (1998) note that curriculum formation focuses on the processes and practices through which a curriculum is developed. Therefore curriculum can be broadly defined as a

plan for achieving goals and that plan has to reflect the pillars of curriculum foundations. Fig.1 represents a world view of the model used for curriculum generation.
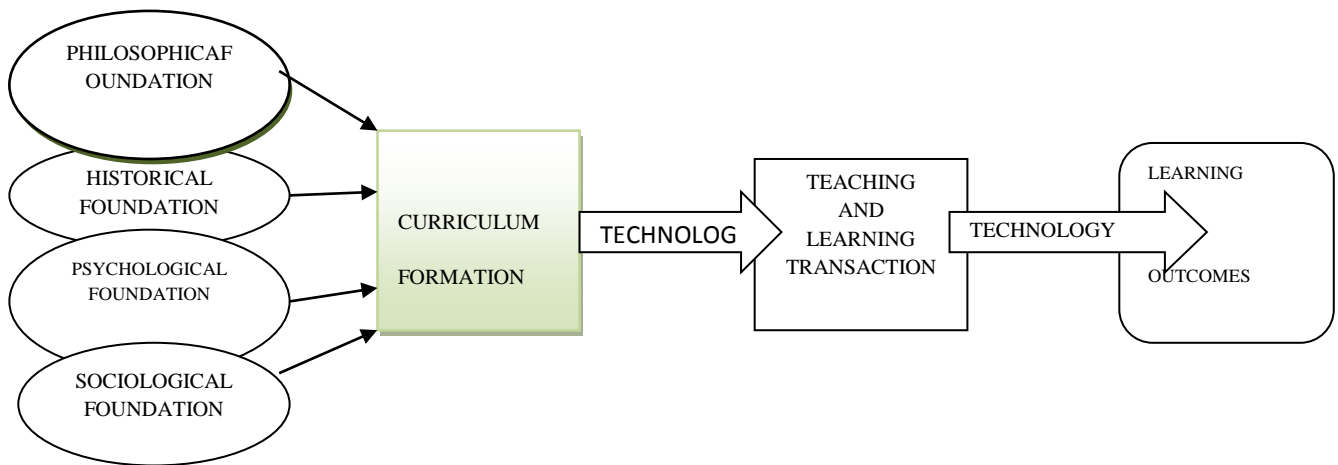

*Fig 1.*World view of curriculum formation*.*

3.1 Philosophical foundation

Curriculum decisions involve a wide range of considerations that anchor on several issues in education. These issues include the purpose of learning, sources of the subject matter, the nature of teaching/learning process, characteristics of the leaner, among others (Ekanem, & Ekefre, 2014). These decisions are based or anchored on certain fundamental beliefs that spring from one's philosophy of education. This is what made it possible for philosophy to be viewed or taken as one of the foundations of curriculum. The various philosophical thoughts that influence curriculum are Idealism, Realism, Existentialism, Pragmatism, Essentialism, perennialism and Deconstructionism. Alistair (2000) argues that there is no curriculum that does not draw inspiration from these philosophical schools of thoughts. Philosophy helps us to handle our own personal system of beliefs and values, that is, the way and manner that we perceive the world around us and how we actually define what is important to us. Since philosophical issues have always influenced society and our institutions of learning, the study and understanding of philosophy of education in relation to curriculum development becomes vital and imperative.

Basically, philosophy of education does influence, and to a greater extent determines our educational decisions and alternatives. This is because; those that are responsible for curricular decisions need be clear about what the belief or their belief system is. This is based on the fact that unclear or confused beliefs will definitely lead to unclear and confusing curricular (Ekanem, 2013).One vital step in developing a personal philosophy of education is to understand the several alternatives that others have developed over the years.

The function of philosophy can be seen or taken as the tap root or the starting point in curriculum development. Apart from philosophy being the source of curriculum, it plays other functions in curriculum development. This can be seen in the view of Dewey (1916), when he contends that "philosophy may… be defined as the general theory of education". He further stated that "the business of philosophy is to provide the framework for the aims and method of schools. From the

Deweyian perspective, philosophy provides a form of generalized meaning and understanding of our lives (as cited in Ekanem, &Ekefre, 2014). In a similar argument Tyler (1949)asserts that "The educational and social philosophy to which the school is committed can serve as the first screen for developing the social program… philosophy attempts to define the nature of the good life and a good society… educational philosophies in democratic society are likely to emphasize strongly democratic values in schools." Despite the fact that philosophy is not the beginning or starting point of Tyler's curriculum, there exists a strong interaction on an equal basis with other criteria, but he seems to have given prominence to philosophy in the development of educational purposes. Thus, according to such views, philosophy throws a light and shows a way on what destiny our education should inspire to achieve.

3.2 Historical foundation
History is the creation resulting from human activities through participating in different events. In order to be certain with what will happen in the future, one has to trace back of what transpired in the past. Hence, historical foundation of curriculum addresses different phases of human development. Students recognize that events in culture and personal issues take place continually. The number of events and issues we face is so overwhelming at times that we often don't know how to make sense out of what is taking place. The study of history can help students gain perspective on events and issues they face. The ability to break down and analyze events is an important step in critical thinking. From historical foundation of curriculum therefore, a study on politics, economics, geography, agriculture, religion and sociocultural practices are expounded to be certain with
the past and predetermine the future for the well- being of the society. Curriculum developers always ensure the historical perspective is well reflected when designing curriculum in order to capture not only the local flavor but also global historical views.

3.3 Psychological foundation
Learning theories have much to offer on the psychological aspect as a crucial discipline of curriculum formation. It is the work of psychology to determine what age a child is ready to learn and under what conditions. The study by Syomwene, Kitainge, and Mwaka, (2013) concluded psychology as the study of human development physically and intellectually right from conception to adulthood. Educational Psychology as a discipline is concerned with the question of how people learn (Ornstein and Hunkins, 1998). Psychologists are concerned with establishing patterns in human life so as to be able to understand and predict behavior (Shiundu and Omulando, 1992). Educational Psychology as a discipline advances principles of teaching and learning that influence teacher-student behavior within the context of the curriculum. This is because psychology is the unifying element in the learning process. For example John Dewey, a renowned educationist acknowledges that psychology is the understanding of how the individual learner interacts with objects and persons in the environment. The quality of this interaction determines the amount and type of learning.

On the other hand, Tyler's model of curriculum which was developed in 1949 has provided a basis for curriculum decision making process in many parts of the world. In this model, Tyler advances four fundamental questions which have to be answered if the process of curriculum planning is to proceed and these are:
    (i) What educational purposes should the school seek to attain?

(ii) What educational experiences can be provided that are likely to attain these purposes?

(iii) How can these educational experiences be effectively organized?

(iv) How can we determine whether these purposes are being attained? (Tyler, 1949:1; Parkay & Hass, 2000:277 as cited in Syomwene, Kitainge, and Mwaka, (2013).

Shiundu and Omulando (1992) translate the four questions into a four-step process by which a curriculum is planned and developed as follows: stating the educational objectives, selection of learning experiences, organization of learning experiences and selecting the evaluation measures to be adopted. Ornstein and Hunkins (1998) comment on Tyler's model and state that it gives a series of concise steps through which to plan a curriculum. That it depicts a rational, logical, systematic and sequential approach to curriculum making. It is important to note that the four steps cannot be undertaken effectively without psychological considerations. In fact, Tyler observes that psychology be considered as a screen for refining the curriculum objectives obtained in the first step. The influences of psychology in the curriculum decision making process should therefore not be underscored.

Psychology in general and educational psychology in particular contributes to appropriate decision making in curriculum regarding selection and organization of appropriate objectives, learning experiences and methods of evaluation as well as decisions regarding the scope of the curriculum. According to Ornstein and Hunkins (1998) psychology serves as the impetus for many curriculum decisions. Psychological influences of curriculum can best be understood through theories of learning. These theories of learning are classified into three broad categories as follows: Behavioral learning, cognitive and developmental learning and humanistic learning theories.

3.4 Sociological foundation

Schools are part and parcel of society and exist for society. Society influences society through its curriculum. Schools, through their teaching of the curriculum, can shape and mould society and society in turn can impact the curriculum. There is rarely a curriculum that is developed without reflecting society. People today are vocal in expressing their views and are eager in seeing their opinions influence what is going on in school. With advancements in information and communication technology, people are talking and sharing views across the globe. They are seeing things happening in other school systems and would like to see some of these practices in their own schools.

Education systems are closely tied to the institutional network of society. Thus, to understand how the content of schooling is shaped in any society, we must understand the relationship between education and other institutions in society. In other words, to understand what is taught, how it is taught and why it is taught, we need to look at the social forces that shape the curriculum. When designing curriculum, the following questions must be addressed:

- To what extent should curriculum consider the world outside of school?
- How do changes in society affect curriculum?

Knowing the social foundations of curriculum is crucial in making decisions about what should be included in the curriculum and eventually what happens in the classroom. A curriculum should be able to prepare students for the present and the future. In other words, a curriculum should address the wants and needs of learners by responding to social conditions locally, nationally and globally (McNeil, 1995). Students might ask, "Why do I need to study algebra? I do not intend to be a mathematician, computer scientist or engineer". The utility of certain subjects in a curriculum may not be obvious to learners but teachers know that solving problems in algebra involve thinking skills which may not seem immediately relevant but will serve students indirectly in many professions and jobs later in their lives, Burks (1998).

4. The concept of Technological foundation

Technology has become a defining force in our lives and its relevance is spreading to virtually every field in one way or another. While some people may go their entire lives never needing to recall the knowledge they gained in various classes throughout their educational career, their experiences with technology will most certainly come into play very early during their adulthood (Jenkins, 2000). Earlier, technology in education was a debatable topic amongst the society. Kress (2003) admits that, everyone had their own views on modernizing education and making it technology aided. There were a huge number of positives and negatives to education technology. But gradually as technology was embraced by the educational institutes they realized the importance of technology in education. Its positives outnumbered the negatives and now, with technology, education has taken a whole new meaning that it leaves us with no doubt that our educational system has been transformed owing to the ever-advancing technology. Technology and education are a great combination if used together with a right reason and vision.

Technology can have a reciprocal relationship with teaching and learning. The emergence of new technologies pushes educators to understanding and leveraging these technologies for classroom use; at the same time, the on-the-ground implementation of these technologies in the classroom can (and does) directly impact how these technologies continue to take shape(Groff & Mouza2008). While many new technologies have emerged throughout history, so has the cry for educators to find meaningful ways to incorporate these technologies into the classroom –be it the typewriter, the television, the calculator, or the computer. And while some professional educators may have become numb to this unwavering 'call' –and for good reason –it is crucial to consider that the excitement over games and social networking isn't just business and industry "crying wolf". With these more recent technologies, as observed by Prensky, (2001) educators should take the call, even if only on a trial basis to see to it that technology is given the weight it deserves in promoting education. Undoubtedly, without these recent technologies in education lessons can still be achieved, but there's a sharp disconnect between the way students are taught in school and the way the outside world approaches socialization, meaning -making, and accomplishment. It is critical that education not only seek to mitigate this disconnect in order to make these two "worlds" more seamless, but of course also to leverage the power of these emerging technologies for instructional gain.

The argument why technology should be rethought as a core foundation of curriculum formation may trigger attention among curriculum scholars across the globe! Firstly, the concept is a new phenomenon which threatens the traditional status quo of curriculum foundations, secondly, the complexity of incorporating technology as a core foundation of curriculum due to its volatile nature as it changes from time to time and thirdly, the misconception of associating educational technology to Information technology (IT). The reasons may sound valid but still do not suffice turning down the concept of qualifying technology in constituting curriculum. The reason for this is because technology has captured the lives of people in every transaction they make and for the sake of harmonizing the applicability of technology in our schools as a source of knowledge, I argue that the concept has to emanate right from the inception of curriculum formation. Technology has proved beyond reasonable doubt that it has stood the test of time, it has become societies' "business as usual', it has scientific backing, it has transcended the role of 'machine' and it has indeed become a body of knowledge for everyone to participate. Thus, a proposed curriculum view is on fig. 2.
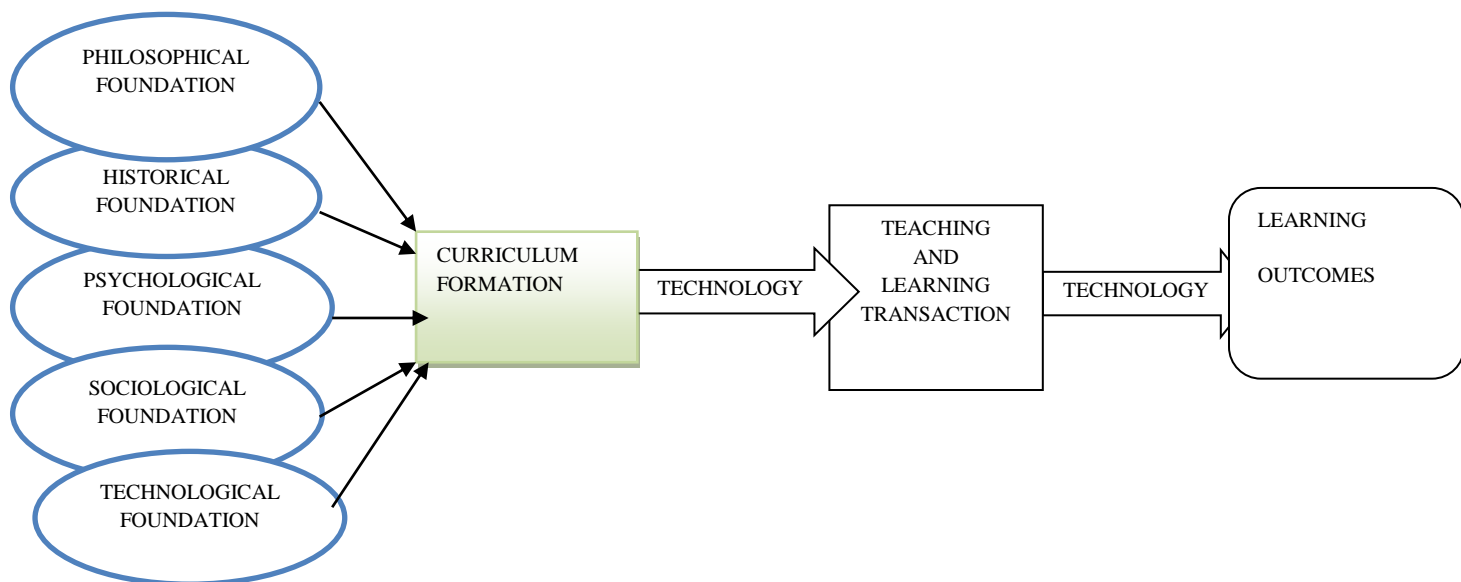

*Fig 2.*An improved frame-work for sources of curriculum formation*.*

5.   Conclusion and Recommendation

Gone are the days when we all seemed to think alike on matters pertaining to nature and nobody bothered to inquire any further of the complexity scenarios that invaded our way. Here are days where Socrates questioning reigns. Why- this is happening and how is it happening. This study has endeavored to set the ground for more debate over the place of technology in the making of curriculum. Literature has shown an enormous contribution technology has in different disciplines such as medicine, education, businesses, economy, industry etc. However, very scant is said about qualifying technology as one of the basic fundamentals of knowledge creation.

The study has challenged and shown the position of technology today and how scholars view it as a tool to aid instruction in our classroom settings. The idea of looking at it beyond

the usual academic horizons calls for researchers to brainstorm and later inform the curriculum developers of a new innovation. I therefore challenge others to examine this phenomenon and test it in their own understanding in order to enrich the existing knowledge about technology into a meaningful whole. Whether this is the time to begin conceptualizing technology as tool and at the same time as body of knowledge becomes a matter of engaging into more research and let the educational world know what it is out there that needs our further exploration. Thus, a mixed research design on the same topic is recommended for further justification of the arguments raised in this study.

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