

Curriculum Designing: The Future of Smart Cities for Sustainable Development in Nigeria

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Abstract

The aim of the study was to review curriculum designing: The future of smart cities for sustainable development in Nigeria. The concept of curriculum designing, sustainable development, and smart cities were extensively discussed. The factors to consider in curriculum designing for future smart cities in Nigeria were described thoroughly. Moreso, the intellectual benefits of curriculum designing for future smart cities in Nigeria were highlighted and how to improve Nigerian cities to become smart cities as well as the curriculum designing approach to be adopted was discussed. It was then concluded that curriculum designing would be relevant to serve as a guide to the populace in Nigeria who desire smart cities. The recommendations below were made in support of the study that, curriculum designers should use technologically contextualized ideas in the process of curriculum designing to avoid the challenge of foreign exchange at the point of constructing the city, the government and citizens should be involved in the curriculum designing process in order to ensure participatory process, higher institutions, secondary and primary school representatives and where possible students should be invited to contribute ideas before the final draft of the curriculum designed is released etc.

Keywords: Curriculum designing, sustainable development, smart cities

Introduction

Curriculum is a guideline of what learners are meant to experience while going through school. Esu (2010) describes the curriculum as a bridge that connects the school and the society together. It may mean that the concept of curriculum is what reveals what is expected in the society for the learner in order for such a person to go ahead and carry it out. Amadioha and Akor (2018) see the curriculum as a tool used in facilitating the relative permanent change in the behaviour of the

learner aimed at personal and societal development. The picture painted by the statement above seems to present the curriculum as an instrument for carrying out for the learner what the society wants him to be in order for the individual to be of benefit to self and to the society. Akor and Akajiri (2022) viewed the curriculum as a tool used in helping people to discover themselves and to develop themselves as they take advantage of the curriculum which offers training opportunities in order to become better and useful to the society. This particular definition presents the curriculum as a refining aid used in turning on the potentials in a person to make such become useful to self and invariably create a favourable society comfortable for himself and others to live in.

It does mean to the researchers that curriculum as a tool helps in positioning the features of a person through learning to get the best out of such an individual. This idea above conveys that curriculum can only be effective in achieving its intents when a determined design is followed to the later, thus, each curriculum is done based on specific design meant for specific objectives. Curriculum does seem to mean a document that contains the contract between the school and the learner and it determines what each of the partners should do in order to achieve the actual desired objectives. Perhaps the reason (Akor, 2024) describes the curriculum as an object applied for the production of desired personalities, value system, attitudes and skills in the learner which meets the yearning and aspiration of the society with regards to usefulness. This information presented here could be inferred as saying that curriculum possess technical ideology to make; as there are factors that make it up which were highlighted above, thus, it has to be adequately designed or constructed by experts in order to attain desired aim.

Some of the intents a curriculum serve among others are:

1. Conduct and coordinate teacher's work.
2. Make available shared language to teachers.
3. Promote continuous and multidimensional education.
4. Promote instructional delivery and integral learning.
5. Increase teachers' sensitivity, accuracy, flexibility to improvise as needed within the lesson.
6. It is adaptable to different needs.
7. Prepare students for the future.

These and many other purposes are what the curriculum strives to serve man with. However, as earlier stated above such service would require proper designing in order to fulfill its numerous mandates, especially, the intent of being adaptable to different needs and in preparing students for the future.

Curriculum designing can be construed therefore, as an act aiming to frame, construct or shape a document meant to be used to achieve set goals. Amadioha and Akor (2019) say that curriculum designing is a systematic arrangement of the content of the curriculum. Thus, curriculum designing is the very act of patterning or structuring of the contents of the curriculum in an acceptable manner which would allow for learners to be exposed to it. Akor and Okonny (2023) perceive curriculum designing to mean a presentation in the order needed for an educational pursuit in such a deliberate manner that it is meant to serve the need for which it was constructed. What is portrayed here is the representation of a document that carries the expectations of its designers on what it is aimed to achieve. For instance, every building that an architect designs is meant for a specific purpose, in the same way and manner every curriculum a designer drafts is meant to achieve a determined

goal. Hence,, Akor, Pepple and Uriri (2020) asserted that curriculum when designed serves the purpose a nation wants, particularly, at facilitating change in the society either among the people or the way in which they order their lives and the use of facility. Thus, the design a curriculum carries is dependent on what it is expected to achieve for the people, especially, with the idea of sustainability in mind, the future becomes a concern to curriculum designing process. Also, it has to be clear that there can never be a society that would enjoy developmental strides whether now or in the future without an adequately thought out and designed curriculum for advancement, and if there is going to be a future for smart cities, then, the curriculum for it, that is, on how they are made, the designers must bear its future advantages and challenges in its content.

The age we are in is that which is predominantly service oriented in nature and whatever products that would be made available must be such which can improve the lot of the society and help the providers of the service to earn better living. Thus, change in the behaviour of both the providers and consumers of the said service would be required in order for it to represent what the future demands as well as follow in line with the need in mind especially, as situationally analyzed during situational analysis and that the demands are met. So, the content of the curriculum must be change adherent, making the curriculum to pursue what to do differently. According to Akubailo (2013) the future is unstable and the reason is because it is not a linear expression of a graph in terms of happenings in the world. This then means that whatsoever is done with regards to the future is just a projection, on the condition that all things would be equal (*Ceteris paribus*). This is because unpredictable occurrences happen every now and then, thus, life is unpredictable. Therefore, the explosion and implosion in knowledge must be considered in every effort at designing curriculum on future smart cities. Again, learning has changed from being sequential and logical to being multidimensional. So, in designing curriculum for future smart cities, educational operations inclusive of variables like the school, teachers, students and the parents must be factored in, especially, as they make up the society and each is daily undergoing its own changes at its own pace which is displayed in dimensions and designs. Hence, some factors must be considered in designing future smart cities as:

- a. Demographic and geographic factors.
- b. Technological innovations.
- c. Social innovations.
- d. Cultural value shifts and diffusion.
- e. Information idea shifts; and the other changes the curriculum designing process should consider are:
 - i. Change from centralized to decentralized ideation on life and living.
 - ii. Change from self-help to institutionalized help.
 - iii. Change from representation living to participatory living.
 - iv. Change form hierarchical organizational life to flat structural perception of organizational life.

So, the curriculum designer in this case should use the hour glass in predicting what is expected of the future (Akor, Ekele & Njoku, 2014). Moreoso, pursuant to actualizing an educational system that would serve all people, some of the goals in the national policy of education in Nigeria alluded to the above and they include (FRN, 2016):

1. That education in Nigeria shall build a united, strong and self-reliant nation.

2. Create a land full of bright opportunities for all citizens.

This is an indication that Nigeria as a nation already had a plan for her citizenry in preparation for such smart cities to come in the future, so, all that the curriculum designers should do would be to fall in line with what the national goals says as indicated above and delineate it to be in line with school infrastructural development for sustainable development in a smart city. So that in building a future smart city, it would be important that a new generation of young people who can think for themselves respect others and display dignity of labour as they participate in the construction of smart city be borne in mind by the curriculum designers. It should be clearly stated here that young people to be exposed to the curriculum must possess innovative and creative minds towards creating novel things out of nowhere through the application of their technological skills (Wordu & Akor, 2019).

A smart city is an area with networks and services made efficient with the help of digital devices to benefit man for habitation and business. Smart cities usually encourage partnership between government and citizens working together to produce the most desired outcome. Gomstyn (2023) defined smart cities as urban locations where technology and data collection is used to improve the quality of life with efficiency and sustainability as the watch word. Here, ICT and internet of things (IOT) play roles for improved transportation, energy and infrastructure. It therefore means, that this kind of locations are designed with a close structure, an automated and knowledge driven economy in mind with a hope for sustainable development which when not in place the aim of the conception of a smart city would be defeated. However, it is vital to state, that a smart city is aimed towards achieving optimized functionality, to drive economic growth and improve the quality of life of the populace in the environment. Thus, it tends to pursue technology-based infrastructure, environmental initiatives for advancement, high functioning systems, sense of urban development and high powered life and work, and the utilization of its resources (Wright, 2024). This conveys that this kind of environment is interconnected such that would require those who live in it and maintain it to be discerning with the concept of sustainability in mind always. This information would make one deduce that adequate learning is required for the students to be properly trained with the designed curriculum, being open to changes and to embrace each of it comes. Again, this represents a drive towards sustainable development of any society that would keep making progress into the future.

Sustainable development is an off-shoot of a call to action to transform the world such that no one should be left behind. It is a United Nation pursuit which is among the 17 goals aimed to be achieved by 2030 which encourage balance in social, economic and environmental sustainability. Number 4 of the 17 goals is about quality education; an idea that is interwoven with the other goals in other to achieve a society that is balance for all to live in. Sustainable development cannot be attained if the environment does not support educational pursuits; this is because education is the only foundation that every other thing can be built, thus, there must be an inter-link between both goals to succeed when it comes to smart cities which is the reason a curriculum for educating the people that would live in a smart city is required in the first instance

Again, if there would be smart cities produced, then quality education of the populace would have to be behind that as received by the people and that cannot be attained except the curriculum is well designed and implemented accordingly. The 2030 deadline for sustainable development agenda though have some years more for the world to evaluate it and tell whether the aim of the

agenda was attained or not but current studies have found that not too many countries of the world were able to go above average in the achievement of the goals (UN, n.d.).

This situation above the researchers perceived may be the product of inadequate education which may have resulted from an improperly drafted curriculum or that there was no curriculum at all to attune people towards what was desired to be achieved. Sustainable development drives for the management and utilization of resources available today and tomorrow. Here, it is ensuring that limited resources that are available today are managed and that the future has some conserved for it (Akor, Okonny & Pepple, 2023). It is meant to utilize what is available today in pursuit of the problems to be solved now and even that to be solved in the future being borne in mind too (Akor & Ochijenu, 2024).

The above descriptions of sustainable development could be viewed as aiming to ensure that ecological resources and the practices of man bring balance into what is done in order to ensure a future rich with maintenance and replenishment culture, and the only way to achieve this would be through an adequately designed curriculum to guide the adherents and projectors of future smart cities. This is coming on the ground that what one does not know is bigger than such a person and could even destroy the person. Hence, in order to be able to design a smart city, the knowledge and skills required for it should first be made available to such persons who would construct it those to live in it. In this way, there would be guarantee for all round security. But the question is how can this be achieved? Especially, because in Nigeria, smart cities are nowhere around now due to a lot of limitations, reason that necessitated the advocate for first designing curriculum to guide the steps towards the construction of future smart cities. Therefore, this study, curriculum designing: The future of smart cities for sustainable development in Nigeria.

Concept of Curriculum Designing

Curriculum design is a concept used in representing the intentional, focused and systematic arrangement of the curriculum content. This seems to mean the patterning of the instructional units that make up the content of a programme of study, a field of study or even a lesson. Usually, the shaping or construction of a curriculum puts into consideration what is to be done, who will do it and at what time or even which should follow the other in the sequence of operation; a perception for curriculum designing. Again, according to (Amadhioha & Akor, 2018), curriculum design is an art put into the pattern, the structuring of a programme of study and the arrangement of instructional materials for schools, organization or any other institution. It is here put as the sum total of the effort of a professional curriculum designer in producing a programme of study for eventual learners or an official document for learning purposes. Designing curriculum therefore is the act and art of producing a program of study for learners or what could be seen as a process of purposely, deliberately and systematically putting together every unit of learning content that would facilitate the learning in a course or a field of study, content of learning towards an intention, this time with regards to future smart cities.

Designing curriculum is an art and act of bringing into existence a curriculum that fits for any particular need or purpose aimed at encouraging the needed and unequivocal response that would enhance teaching and learning environment whether for the teacher or for the student (NWC, 2013). This definition brings to light the fact that in designing a curriculum certain factors must be considered which may include what the society needs, what purpose the curriculum would serve and the environment that it would serve and even the environment that would accommodate the teacher and the students in order to ensure for an effective learning process. This is the reason

Azikiwe (2002) had said that curriculum designing is done to serve the same purpose a building design serves, so that the type of design a plan for a building has determines the type of house to be built based on the need that it will serving for the owner. In other words, the objective that a curriculum would serve to a people and the society is what would determine how that curriculum is constructed. But to simplify the meaning of curriculum design, Offorma (2006) has defined it as the pattern used in arranging the curriculum in order to suit the function it is aimed to serve. This framework of shaping that the curriculum is given to at the time of mapping out for use is what is called curriculum designing process. Nonetheless, this process of patterning will be incomplete a process if the teacher who is to execute or implement the curriculum is not considered, more so, the learner should be at the centre of the entire process of designing such a curriculum since he/she will be the end receiver of the entire process and practice put in place for use. Therefore, curriculum designing for future smart cities could now be described as an activity of unfolding events on the construction of an acceptable plan for future life and living with sustainability as watch word.

Concept of Sustainable Development

Sustainable development is that development which can stand the test of time without degeneration quickly. According to Shah (2008), it is that type of development that does not just considers today's situation but also concerned of how future generations could stand on existing development to advance the future development process they may desire This means that issues of depletion is one of the difficulties that sustainable development war against. Hence, sustainable development could now be conceived as the development of a nation that is progressive and does not mortgage the future for the sake of the present state of affairs. Munassinghe (2004) sees it as a process that allows for people and societies to seize available resources and opportunities to better themselves over a period of time, yet, ensuring situations that would permit for resilience and tenacity for further development in the future. The inference that could be drawn from here is that while it is important to enjoy development for today, attention is also being called to create allowance that even in the future the generation that would be on earth could still enjoy the earth. Boyi (2013) added that sustainability calls for equity for the utility of resources of all forms both now and in the future, and in fact, of human life. Right now, considering Nigeria as a nation that is blessed with so much resources ought to be careful in the way she makes development plans in a manner that would also permit future benefits as dreamed by the founding fathers.

Concept of Smart Cities

Smart cities are by-products of network and data collection for improving city management processes. Swapan & Sharifi (2022) defined the concept of smart cities as an urban location where electronic arrangement for data to be obtained is in place and where its utilization is effected in order to enhance urban management, optimization of resources, order and economic growth. European Commission (EU, 2022) says it is the application of technology in improving the management and efficiency of the urban area. It was added that this city brings together cities, industries, entrepreneurs, banks, investors, researchers, schools etc with the intent of improving quality of life, competitiveness etc. The pursuit is to achieve other things like sustainable urbanization, mobility, sustainable districts and built up areas, infrastructures in communication and transportation, citizens focus, policy regulation, integrated planning and management, knowledge sharing, open data governance, standards, business models, procurement and funding.

It developmental strides include to explore, shape, create relations and opportunities. However, it was clearly stated in (EU, 2022) that technology alone cannot develop a smart city unless the people in it are smart, thus, the emphasis, is on the need to develop persons who live or would live in a smart city and the only and quickest means towards making the people smart is by the use of an adequately designed curriculum which would facilitate their ability to stay and maintain where they stay. Helmbold (2024) agrees that the interconnectedness and networking in a smart city must be sustained by individuals whose minds are illuminated with ideas and conceptions in that light. Thus, quality of such living and life would be determined by the quality of education or simply put the quality of the curriculum to which they were exposed or are being exposed, therefore, it becomes imperative that the curriculum to be experienced by people who live or would live in smart cities should be that designed to make them smart in the management and maintenance of their cities for sustainability or sustainable development both for the now and for the future.

Factors to Consider in Curriculum Designing for Future Smart Cities in Nigeria

Every curriculum design is done with an aim in mind, therefore, in designing curriculum for persons and for future smart cities, certain basic characteristics of such should be in the thought of the designers among which may include:

1. **Need Analysis:** Society exists for some reasons. In this light then the reason for the design of smart cities should be put into perspective before embarking on the construction of one of such cities (Amadioha & Akor, 2020). This analysis will need to account for the present challenges, envisaged difficulties, available resources, predicted problems and provision for unforeseen circumstances. This will result in the prioritization of matters based on data obtained and the statistical result arising therefrom as well as the determination of the where and how to manage the resources at hand with regards to process and practice.
2. **Life Experience of the Supposed Inhabitants:** Experience has a lot to contribute to how a people manage their affairs. Hence, it is very important that the exposure of those to live in the smart cities be put into account by determining their level of education and how open their minds are to learning in order to innovate and sustain where necessary available resources. Otherwise, the reverse would be the case either of infrastructure or utilities put in place which may begin to get damaged or that it begins to annihilate its inhabitants.
3. **Activeness of the Inhabitants:** The inhabitants of a smart city must be participatory in the activities of the environment if its growth and development will be noticeable and to support what goes on and ensure sustainability of the location. Thus, there must be an all hands on deck approach towards the daily transactions that go on in the place and of course these persons must be knowledgeable on what it means to live in a smart city and be able to share such knowledge for a sustainable future. Other features to consider include: development of meaningful goals for the area, encouragement of ideas that would outlive them into the future, encouragement of ideas for continuity, encouraging maintenance culture etc.

Intellectual Benefits of Curriculum Designing for Future Smart Cities in Nigeria

The following may be some of the intellectual benefits accruable from curriculum designing for future smart cities:

- a. Development of new knowledge and skills.
- b. Value reorientation on societal life.

- c. It challenges the intellectual competence of people in the environment.
- d. It enhances the technology and livelihood integration of people in the community.
- e. It creates avenues for further wealth creation and economic empowerment; and other benefits which are not directly intellectual in nature but are derivatives.
- i. Improvement in data decision-making.
- ii. Enhanced governance engagement system.
- iii. Safety in the community life.
- v. Reduction in negative environmental impact.
- vi. Enhanced transportation system.
- vii. Efficient public utilities.
- viii. Better infrastructure (Warner & Mansker-Young, 2023; Amadioha & Akor, 2022).

How to Improve Nigerian Cities to Become Smart Cities Through Curriculum Designing Approach

Alot needs to be done in Nigeria for most of the cities and megacities to take the form of smart cities and even in the development of new areas as smart cities. Some of the steps that could be taken may include:

1. Curriculum designers should think futuristically and encourage curriculum implementation to bear semblance with futuristic ideas
2. Curriculum designers should imbibe the Delphi forecasting approach to curriculum designing in order to borrow leaves from what obtains in other parts of the world.
3. Curriculum designers should think global and not nationally as smart cities usually attract people from all over the global as inhabitants.
4. Curriculum designers should include some indigenous technological contents such that can strengthen the development and sustainability of smart cities.
5. Every curriculum designed should first be tested out with a smaller community just like trial testing in curriculum development.
6. Students of designed curriculum must be made to remain or return to their society to ensure the knowledge gained counts before leaving for greener pastures after training.
7. Curriculum designed on how to develop and sustain the city should have the characteristics to mitigate long term negative effect that may arise from cities built (Akubuilu, 2013; Akor, Ekele and Njoku, 2014).

Conclusion

Based on the review done so far, it could be concluded that curriculum designing remains the first step at designing a smart city whether for the now or for the future. In other words the place of an adequately designed curriculum should not be overlooked as this is what would make or mar the smartness thereof if ever it is construct. The most important fact to note is that without a curriculum to serve as a guide the populace who would live in the city may abuse the city or that the city becomes a terror to them, hence, the curriculum on how to build, manage, maintain and sustain the city becomes a sine qua non which is why beginning with the training of their minds becomes an imperative.

Recommendations

The following were the suggestions given to support this study:

1. The curriculum designers should use technologically contextualized ideas in the process of curriculum designing to avoid the challenge of foreign exchange that may arise at the point of construction of the city.
2. The government and citizens should be involved in the curriculum designing process in order to ensure that everyone who is to enjoy the city participates from the on-set.
3. Higher institutions, secondary and primary school representatives and where possible the students should be invited to contribute before the final draft of the curriculum designed comes out.
4. Telecommunication and transport companies who would participate should look beyond profit making in business to seeing the process as a developmental stride that would herald the world to Nigeria.
5. The government must ensure that alternative energy sources are made available to power the smart city considering the epileptic nature of the current supply of electricity to Nigerians.

References

- Akor, V.O. & Akajiri, L.C. (2022). Re-engineering curriculum studies towards lifelong learning and lifelong skills for national development in Nigeria. *International Journal of Educational Benchmark* 22 (2):97-107
- Akor, V.O. & Ochijenu, M.A. (2024). Review of senior secondary school Agricultural Science curriculum for sustainable peace in Africa: Nigerian Animal farmers' view. *Knowledge Review* 40 (35-41
- Akor, V.O. (2024). Monograph on curriculum, teaching methods and strategy (EDU 201). Unpublished
- Akor, V.O. , Okonny, U.A. & Pepple, E.O. (2023). Reengineering teacher education for sustainable knowledge economy through adequate curriculum practice in Nigeria. *Nigerian Journal of Resourcesfulness and Distinction* 19(1):36-48
- Akor, V.O., Ekele, V. & Njoku, S. (2014). Designing curriculum for the future: Cognitive theories approach. Assignment on EDC 524, University of Nigeria Nsukka. Unpublished
- Akor, V.O., Ofor, M. & Ojonugwa, D.S. (2024). Assessment of hidden curriculum and personality development among university teacher education students. *Research Journal of Humanities and Cultural Studies* 10 (4): 108-117
- Akor, V.O., Pepple and Uriri, C. (2020). Basic education curriculum: A tool for redesigning corruption free Rivers State in the Nigerian society. *Nigerian Journal of Curriculum Studies* (27(4):198-207
- Akubuilu, F. (2013). Monograph on curriculum design (EDC 524). Unpublished
- National curriculum (NC, 2018). what is e-learning. www.elearningnc.gov/about-elearning/what-is-learning.
- Azikiwe, U. (2002). Curriculum Design. In G.C. Offorma (ed), *Curriculum Theory and Planning*. Enugu: Family Circle Publications.
- Offorma, G. C. (2006). Curriculum designing. In G.C. Offorma (ed), *Curriculum Theory and Planning*. Enugu: Family Circle Publications.
- Amadioha, S.W. & Akor, V.O. (2018). Commercialization of curriculum design and development in a dwindling economy: The place of Literature. *New Era Research Journal of Humanities, Educational and Sustainable Development* 4 (3): 29-35
- Amadioha, S.W. & Akor, V.O. (2019). Designing curriculum for e-learning and education in the 21st century Nigeria: Challenges and prospects. *World Educators Forum: International Journal* 11(1): 102-109
- Amadioha, S.W. & Akor, V.O.(2020). Innovations in agricultural education curriculum for producing competent graduates for economic recovery in Nigeria. *Journal of Agricultural Education Teachers Association of Nigeria* 4 (2):143-149
- Esu, A.E.O. (2010). Functionality of curriculum in Nigeria. WCC seminar series. 5.
- European Commission (EU, 2022). What are smart cities? www.commission.europa.eu.
- Helmbold, A. (2024). What is a smart city? www.sendtech.com
- Federal Republic of Nigeria (2016). National policy on education. Yaba: NERDC Press.
- Gomstyn, A. (2023). What is smart city? Retrieved 13th March, 2025.
- Swapan, A.Y. & Sharifi, A. (2023). The fundamentals of smart city assessment. www.sciencedirect.com
- United Nation (UN, n.d.). Sustainable development goals: The 17 goals. www.sdg.un.org.

- Warner, M. & Mansker-Young, S. (2023). Thinking about becoming a smart city? 10 benefits of smart cities. Retrieved 13th March, 2025.
- Wright, C. (2024). What is smart city? www.techtarget.com