CHAPTER 46

ASSISTIVE TECHNOLOGY AND PEDAGOGY FOR INCLUSIVE TEACHING OF AGRICULTURAL ECONOMICS TO STUDENTS WITH DISABILITIES IN NIGERIA

Innocent-Ene, Eunice Oluchi Ph.D
Department of Agricultural Education,
Federal College of Education, Okene,
PMB 1026 Kogi State, Nigeria

Introduction

Students come to the school with diverse sets of experiences, challenges, strengths, abilities, disabilities and backgrounds; and these experiences and challenges affect them in one way or the other. Also, teachers are faced with challenges on how to incorporate the different learners' capabilities for inclusive learning. Federal Republic of Nigeria (2004) states that learners in an inclusive education are those with different intellectual and physical difficulties such as not being able to walk, manipulate objects, use one or both arms and legs, run or maintain balance. Inclusive education as opined by Nwahunanya, Abiamuwe, Attah &Asogwa (2020) means more educational funds, improved educational facilities, and different teaching approaches to address challenges of students with disabilities. At its basis, inclusive teaching refers to any pedagogy of teaching that addresses the needs of learners with different abilities, backgrounds and capabilities. Teaching of this kind entails that respect is accorded to diversity of students so as to enhance their full and active participation in learning irrespective of their abilities and disabilities. Inclusive teaching is important because it removes barriers to learning and gives the learner a positive self-image; it puts into consideration how teaching methods and technologies can encourage full participation of all types of learners. Creating an inclusive classroom includes course designs, teaching strategies and special needs technologies. Some of the components that can aid inclusive teaching are; teachers, teaching pedagogy, students, the school, supportive special education services and instructional aids.

Pedagogy of inclusive teaching becomes important at this point as it explains the interactions that exist between teachers, students and the learning environment. It comprises how teachers and students interact or relate as well as the instructional approaches used in teaching. Simply put that; Pedagogy in education is the study of optimal frameworks and techniques in teaching as well as learning and their execution, thus teaching pedagogy is synonymous with teaching methods. The pedagogy of inclusive teaching should create space for special teachers as allies and not as competitors in the classroom. People learn in a variety of ways; a good

teacher has to find out which approaches and focus help his/her learners most effectively.

Teaching students with disabilities is a different ball game altogether, hence, it is essential to include them in the educational developmental programmes. Umeh and Adeola (2013) observes that there are no forms of social protection for people with disabilities in Nigeria, a situation which has kept them in poverty. Parents are left to fend and cater for their children with disabilities within the educational system. Since the Sustainable Development Goals of 2030 agenda for sustainable development aims to end all forms of poverty and inequality, there is a needto involve people with disabilities in every sphere of development. The WorldHealth Organization (2011) views individuals who have physical limitations, restriction or lack of specific abilities necessary for them to participate effectively in economic activities in the society as People with Disabilities (PWDs). Furthermore, Suvi (2019) explains persons with disabilities as having long term physical, mental, intellectual or sensory impairment which may hinder their full and effective participation in the society on an equal basis with others. A person with disability(ies) is a person with special needs; this may be because of a kind of impairment or disability that eventually leads to a form of handicap. The totality of these difficulties, inconveniences, and circumstances, therefore, prevent him/her from living a normal life. Persons with special needs include persons with mental retardation, persons with visual impairments, persons with hearing impairments, persons with physical bodily impairments, and persons with multiple impairments (Okoro, 2022). Oftentimes, students with disabilities (SWDs) require technologies, special needs education, assistance or services, special teachers, training equipment and facilities to be fully rehabilitated and functionally integrated into the society, hence the pedagogical approaches used in teaching them have to put this into consideration. Meijer (1999) views special needs education as education meant for students because of their pedagogical needs and requirements; assistive technologies therefore, are used to bridge the gap between ability and disability. It is any device that helps the learner compensate for his/her learning disabilities. The technologies involved can be of the low-tech or the high-tech for teaching and learning; and the level of technology use is heavily dependent on the economic capacity of the society (government, private organizations and the learner).

Agricultural Economics as a branch of agriculture deals with the maximization of outputs at minimal cost. It is concerned with farming as a business and agriculture as an industry; whose sole aim is to make profits at the barest minimum. A student offering agricultural economics is expected to go through the rigors of elementary agricultural science which comprises crop production, animal husbandry, fishery and wildlife, horticulture etc. Training in agriculture focuses on practical demonstration which involves the use of hands, legs and other manipulative capacities and these practical orientations and exposure make it difficult for SWDs to fit into the course of study. But the good news is, there are several educational facilities in place to aid students with disabilities in an inclusive

learning system. Therefore, SWDs can participate fully in agricultural economics activities given the enabling environment, both in the classroom and on the farm. Soetan, Apantaku, Abdulsalam-Saghir, &Ayinde, (2019) note that people with disabilities (PWDs) are very productive but they experience a higher unemployment rate than people living without disabilities. WHO (2011) inSoetanEt,al(2019) lists reasons for their low employability status as, the high cost of training and accommodating PWDs at the workplace and records of low productivity when compared with other abled bodied employees, lack of social welfare packages such as educational opportunities and social security.

The aim of inclusive teaching would be defeated if assistive technologies are not available to the learners. This paper focuses on how assistive technologies and teaching methods can aid students who have either of or the three physical impairments: visual impairment or total blindness, hearing impairment or deafness, and mobility impairment; to learn agricultural economics effectively.

Inclusive Pedagogy for Agricultural Economics

The UNESCO recommended teaching strategies for the 21st century is experimental learning, story-telling, community problem solving, outside classroom teaching, enquiry learning, creativity, communication, cooperation etc. For instance, the innovative teaching of the 21st century is built on a personal-orientatedapproach which is called the student-centered approach. Whichever way, the teachers and learners are important factors in learning. In this paper, priority is given to the learner-centered and the teacher-centered approach in teaching agricultural economics to students with disabilities. The two pedagogical focuses or approaches complement each other and are needed for inclusiveness. For instance, a teacher-centered method may be useful when a new theme or topic is being introduced whereas a learner-centered method may be helpful to allow students explore new ideas and develop deeper understanding of the ideas. Hence, the effectiveness of any teaching method depends on the appropriateness of the method. Also, some learner-centered approach effective in classrooms with fewer students may not be realistic in classrooms with larger numbers of students. Instructive teacher-centered method is the traditional classroom method where students are expected to learn through direct teacher's instruction in the form of lectures, assessments, etc. In view of Edward (2004), the instructional methods that promote focus on the teacher are frequently used in the teacher-centered method such as lectures, guided discussions and demonstration. Garrett (2008) maintains that in teacher-centered classrooms, control is of primary importance and authority is transmitted hierarchically, which implies that the teacher exerts control over the students. Some of the major setbacks of this method is that; it forces the students to limit themselves within the bounds of the teacher, it does not encourage the development of the learner's critical thinking and communication skills.

Construct learner- centered method encourages the interaction between the teachers and the students. It is a collaborative method where the students are

allowed the freedom to explore alternatives. Brophy and Good (2003) in Garett (2008) identifies, learner-centered approach as a means whereby teachers are encouraged to use strategies for enhancing students' intrinsic motivation including adapting activities to students' interest and providing opportunities to exercise autonomy and make choices. However, all forms of pedagogies are effective in learning and should be used alternatively. For Learnovation (2009), pedagogies that understand deeper learning include; personalized learning strategies, informal and collaborative learning; these are important when teaching a student(s) with one form of disability or the other. Although teacher-centered and learner-centered approaches can be seen as opposite ends of a continuum, it is highly unlikely that any teacher can implement the two approaches in its purest form. All the teacher needs, is adopting an adequate plan or approach which can be physical, psychological and methodological. Nwachukwu (2014) observed that disabilities make education more challenging for teachers and students hence the need to use the best teaching method so as to achieve the set goals. Whether learner-centered or teacher-centered pedagogies, the student with disability needs support and special attention more than those without disabilities. This support can come in the form of assistive technologies, finance, special attention, personalized teaching and other special cares. The effective use of different teaching methods and technologies will make persons with disabilities feel inclusive in the system. For an inclusive atmosphere, the teacher has to use a language that prioritizes the students over his or her disability.

Designing an inclusive Agricultural Economics Class:

1. The teacher should create a sense of belonging by making everyone feel at home. This will allow the students to see the teacher as approachable and knowledgeable. This can be done by the teacher sharing his/her decent personal experiences to encourage the students.
2. Individual contact especially for small size classes will create rapport and get the students acquainted with the teacher and the classroom. This can be done by personalized teaching e.g. calling the students by their names.
3. Consistent and regular communication between the students and the teacher.

Teaching Strategies for inclusiveness

1. The teacher should be intentional in the choice of language and materials used during the course of content presentation.
2. Use active learning where the lesson is made interactive and dynamic. Here, the lessons are segmented into concepts or ideas; and activity (where students interact with content and with each other).
3. Implementation of group work thereby helping to create a sense of group identity and belonging.

4. Encourage equitable participation by sharing discussion questions ahead of time for the students to brainstorm, taking turns and allow others to speak.
5. Evaluation and student feedback

Assistive Technologies for Students with Disabilities

Persons with disabilities most often have difficulties in performing their daily activities, therefore, assistive technologies are devices to aid them in their everyday life activities. Assistive technologies can be seen as any equipment that is used to increase or improve functional capabilities of a person with disability. These technologies help to break the barriers and provide access to the most relevant educational programs. There are relatively low-tech assistive devices like reading glasses, magnifiers, crutches, hearing aids, braille etc. while others are more advanced using cutting-edge science and technologies. Boucher (2018) notes that each of these disabilities can present barriers to individual's participation in society, education and employment.

In agricultural economics class, crop production, animal husbandry, wild life, horticulture etc. are taught, here skills and practical are emphasized, students with disabilities may find learning difficult if physical infrastructures like elevators, automatic doors, ramp, wheel chairs, braille signage and other AT are not in place in schools. Some of these ATs are common to all operations while others are specific to the type of operations. For instance, a wheelchair used by a disabled student for mobility is a common AT, just like an AT used on a tractor to meet the special needs of a disabled operator. Similarly, a remotely operated gate for guiding animals is a good example of an AT in the second category because it is specific to animal production.

Visual impairment: is any kind of vision loss which can be partial or total, for instance; albinism, night blindness, blurred vision, blindness etc. Boucher (2018) explained that there are several types of assistive technologies available to assist the blind and the visually impaired, many are designed to convey information via touch or sound that would be more often received visually. For instance, BeMyEyes, colorID, Camfind, screen reader, magnifying glasses, a long cane, large print books, audio books, talk back, KNFB reader, braille touch, enlarged keyboard, etc. Most of these technologies are haptic aids based on the sensation of touch. E.g., advanced braille applications, advanced cane and haptic computer devices, travel and navigation, bionic eyes etc.

Hearing impairment: This is the inability of a person to hear sound very well or at all occasioned by congenital defect, injury, medication etc. Alade&Abosi (1991) found out that hearing impairment has adverse effects on academic achievement but the magnitude of such adverse effects depends on the degree of the hearing loss; and the degree of hearing loss determines the type of hearing aids to be used. Hearing aids, bone anchored hearing aids, cochlear implants, listening devices and sound amplification products are some of the assistive technologies that can help this class of persons with disabilities. In educating the hearing impaired, sign

language interpreters in the classroom are essential, using the teacher-centered pedagogical approach, sign language interpreters, development of listening skills (auditory), and use of hearing aids are imperative. Also, the teacher can make use of the learner-centered approach to allow the students to study on their own.

Mobility impairment: is the inability of an individual to walk, lift or grasp objects. It is a disability that affects movement which can be gross motor skill e.g., walking; or fine motor skill e.g. manipulation of objects by hand. It includes but not limited to paralysis, cerebral palsy, amputation, muscular dystrophy, spinal cord injury, knee and ankle injuries etc. The use of wheelchair, crutches, or walker, artificial limb, hoist, access ramps, railing around the room/house can aid mobility. The learning experience of students with mobility disability can be enhanced by using any of these assistive technologies; and making the classroom accessible to the student, bringing equipment close to the student, choosing field trips and excursions that the students can access, ensuring a barrier-free environment for the student.

Boucher (2018) emphasized that technologies alone are not enough in the teaching of persons with disabilities, hence, all these assistive technologies would be most effective to the students when the teachers know the right methodologies to use.

Implications of Assistive Technologies and Pedagogies to SWDs

Effective pedagogies take into consideration the components that make up the class, the techniques involved include guided learning, individual activities, whole class and group work. Innocent-Ene (2018) remarks that learner-centered pedagogical approach is the most effective teaching method as it encourages active participation of the learner, through quality questioning and assignments, demonstration, experiment, and supervision. This approach fosters understanding, allows the learner greater involvement and participation, and to learn at his/her pace. Using the learner-centered pedagogy for SWDs personalizes learning and makes the learner more active and involved. Teixeira and Edwards (2020) observe that teachers rated the use and effectiveness of recommended practices applied to students with disabilities and found the most effective strategy emphasized on hands-on learning and skills development. Hence, students with learning disabilities are likely to benefit from enrollment in an agricultural course that focuses on providing concrete experiences for grasping abstract concepts. Whether learner-centered or teacher-centered, with effective pedagogies and assistive technologies, any student with disabilities can break the barriers limiting him/her in education and in the field of work.

Scott (2015) opines that technology can be used to support efforts to transform pedagogy but the 21st century learning experiences must incorporate more than just technology. Technology when appropriately used, can offer multiple forms of learning, it can ensure successful learning experience but cannot replace teachers. The teachers need to be trained professionally to handle the

learners in finding solutions to their situations. Part of the training is the mastery of the subject area and right methods to impact this knowledge to the learners. All students irrespective of abilities and disabilities are entitled to the best instruction pertaining to agricultural economics. Accommodating students with disabilities in the classroom using assistive technologies including the provision of ramp access to agricultural laboratories, farms and workshops and power equipment is one sure way of inclusive learning of agricultural economics. The implication of teaching agricultural economics to SWDs cannot be over emphasized.

- Teixeira and Edwards (2020) are of the opinion that when accommodation of SWDs into vocational agriculturalprogrammes is successful, education and career building experiences are possible.
- Agricultural education's variety of teaching methods, authentic instruction, active student response, and hands-on approach have the potential to benefit students with disabilities.
- The inclusion of students with disabilities can as well benefit other learners if the teacher is committed to instructional practices that invite all learners to participate.
- Teaching SWDs agricultural economics will allow them to be self-reliant and exit from begging on the streets, earn respect as employers of labour or even be employed to work.

Boucher (2018) explains that most developed economies do not marginalize or discriminate against persons with disabilities anymore because they have matured into fully inclusive societies that accept differences and similarities. In these developed environments, medical advances and technological advancements have reduced the incidence of disabilities; the difference between the disabled and non-disabled has disappeared because these low and high technologies with professionals are widely used to enable this inclusion. This can only be obtainable where education is highly funded with adequate infrastructural development. Because of the importance of education, Ajeyalemi (2009) notes that the Federal Government of Nigeria adopted education as the instrument par excellence for national development. But Nwachukwu (2014) opines that the funding of education in Nigeria is one of the major crises in education, noting that funding is primarily the responsibility of the government and there are so many irregularities affecting government and its agencies notably among them are; corruptionand embezzlement of public funds. The funding of special needs education is enormous and requires heavy as well as comprehensive planning. According to the Federal Ministry of Education (2015), Nigeria is involved in Special Education but the practices are not fully consistent with the existing global best practices, because the country is yet to be fully technologically driven. There are some deficiencies in classroom activities and rehabilitation, in the sense that the facilities and equipment that are needed in the classroom to enhance learning are either lacking, inadequate or obsolete, and there is no emphasis on rehabilitation.

Conclusion

Access to appropriate education for persons with disabilities is the main thrust of inclusive teaching and learning. In some countries, people living with disabilities are educated in mainstreameducation while some countries treat them as Special Educational systems. Whichever form it takes, inclusive teaching occurs when every student irrespective of abilities, disabilities and capabilities are taken care of and attains the desired educational achievement through assistive technologies and good teaching techniques, hence; there is need for adequate funding.

Government alone cannot do justice to the funding of Special Education, there is the need to incorporate the private sectors in the educational system for maximum output. The Federal Ministry of Education in collaboration with other appropriate bodies like the NGOs, Philanthropists, etc. have roles to play. The Federal and State Government also need to ensure that all the necessary facilities and technologies needed by the students are in place. For instance, providing assistive devices for mobility impaired students- prostheses, crutches, wheel chairs, physiotherapy materials. For the hearing impaired- training in sign language interpretation, and for the visual impaired-training in braille reading and writing, etc.

Summary

The paper discussed how assistive technology and pedagogy can help in the inclusive teaching of agricultural economics in Nigerian schools. Students with diverse needs make up the school and for inclusiveness such students need to be carried along. To bridge this gap, there is need for support to the students which can come in the form of; assistive technologies, personalized care and attention from the teachers, methodology of teaching etc. Agricultural Economics as a field of study that needs practical orientation and exposure can be studied by this class of students when they have devices that can help them in movement within the classrooms, laboratories and the farms. Other impairments discussed in this paper like hearing and visual impairment would not pose a problem when the assistive devices to help the learners are functional and available. Inclusiveness is established therefore when these technologies are in place and the teacher also has the most effective method of lecture delivery. As it stands, the two pedagogical approaches are effective and useful; and should be used alternatively together with the assistance of a Special Education teacher. Be that as it may, the major problem bedeviling the full inclusive teaching of agricultural economics is inadequate funding of education. Most of these assistive devices are either lacking, obsolete or inadequate. Since the government alone cannot comprehensively meet the needs, it is important to incorporate the private sector, international development partners, philanthropists, and other key players.

Suggestions

1. Funding in the form of providing assistive devices for mobility impaired students- prostheses, crutches, wheel chairs, physiotherapy materials; for the hearing impaired- training in sign language interpretation, and for the visual impaired-training in braille reading and writing, etc. by either the government, philanthropists, NGOs, private establishments should be encouraged.
2. Some assistive technologies are available but not functional, there is a need to provide more functional assistive technologies in the schools.
3. Capacity building and development for teachers on the relevant teaching techniques for the various categories of students with disabilities. Teachers ought to alternate their teaching techniques and give more support to the learner.
4. The teacher should personalize the instruction and prioritize the student over his/her disability; avoid any form of discrimination against the student.

References

Ajeyalemi D. A. (2009). Issues, problems and prospects in Nigerian education. Lagos: Josa Press Ltd.

Alade E.B &Abosi C.O. (1991). The effect of degree of hearing impairment on the academic achievement of the deaf in E.D Ozoji, J.U. Umuolu, S.O Olaniyan (eds). Contemporary issues in mainstreaming the exceptional child in Nigeria's 6-3-3-4 system of education. Jos: Ehindero Press.

Boucher, P. (2018). Assistive technologies for people with disabilities. Science and Technology Options Assessment. http://www.ep.europa.eu/stoa/

Brophy, J. & Good, T. (2003). Looking in classrooms *(*9th edition.). New York: Pearson Education, Inc.

Edwards, C. (2004). Classroom management and discipline (4th Ed.). New York: John Wiley & Sons.

Federal Republic of Nigeria (2004). National Policy on Education (4th Edition). Lagos: NERDC Press.

Federal Ministry of Education (2015). National policy on special needs education in Nigeria. Abuja: FME

Garrett, T. (2008). Student-centered and teacher-centered classroom management: A case study of the three elementary teachers. *Journal of Classroom Interaction 43 (1),* 34-47.

Innocent-Ene, E.O. (2018). Effective pedagogies for active learning of agriculture in higher education. A paper presented at the 1st International Conference of the Faculty of Education, Federal University Ndufu-Alike, Ikwo, Ebonyi State, Nigeria.

Learnovation. (2009). Inspiring Young People to Become Lifelong Learners in 2025.Vision Paper

Brussels, MENON,1-12. www.menon.org.gr/wp-content/uploads/2012/10/Learnovation-Vision-Paper-1_Learning-at-School-Ages1.pdf (Accessed 10 March 2014).

Meijer, C.J.W. (1999). Financing of special needs education. A seventeen-country study of the relationship between financing of special needs education and inclusion. Denmark: European Agency for Development in Special Needs Education.

Okoro, O. (2022). Imperatives for assimilating persons with special needs in museum experiences.

New National Star, Friday July 15, 2022, Pg 6.

Nwachukwu, P.O. (2014). Funding education for sustainable development in Nigeria: Challenges and the way forward. *Journal of Education and Practice 5(20),* 51-58.

Nwahunanya, I., Ede, E.O., Abiamuwe, N.O., Attah, K.O. &Asogwa, U.U. (2020). Assistive technology for inclusive education among vocational education students with physical disabilities in Colleges of Education in South West Nigeria. *International Journal of Innovative Science and Research Technology 5(6),* 522-526.

Scott, C.L. (2015) The futures of learning 3: What kind of pedagogies for the 21st century?

UNESCO Education Research and Foresight, Paris (ERF working papers series No. 15)

Soetan, A.A., Apantaku, O.S., Abdulsalam-Saghir, P.B. &Ayinde, A.F. (2019). Participation of people with disabilities in agricultural activities in Ogun State, Nigeria. *Journal of Humanities, Social Science and Creative Arts 14(1)*, 63-77.

Suvi, T.K. (2019). Improving the livelihoods of persons with disabilities through income generating activities: towards more effective and sustainable development projects in Sierra Leone. An unpublished Master's thesis submitted to the Faculty of Arts, University of Helsinki.

Teixeira, K.L. & Edwards, M.C. (2020). Teaching students with special needs in school-based agricultural education. A Historical Inquiry. *Journal of Research in Technical Careers 4(1), 75-95.*

Umeh, C. N., & Adeola, R. **(**2013). Africa Disability Rights Yearbook. Nigeria. ADRY 1: 277-290.

World Health Organization (2011). World report on disability. World Health