NIU Journal of Educational Research Copyright©2024
Nexus International University ISSN: *3007-1844;* 10(2): 81-89

Enhancing Student Engagement through Practical Production and Utilization of Instructional Materials in an Educational Technology Class: A Multifaceted Approach

JEFFREY IFEANYICHUKWU CHISUNUM, CHRISTIANA N. NWADIOKWU
University of Delta, Agbor, Delta State, Nigeria.

Abstract. This comprehensive examination delves into the significance of instructional materials in fostering student engagement, exploring the practical production and utilization of innovative materials to enhance learning experiences. By integrating theoretical foundations with hands-on applications, this approach aims to revitalize the educational landscape. Through the creation and implementation of interactive materials such as 3D models, cut-out displays, and tactile aids, educators can cater to diverse learning styles, promote active participation, and facilitate deeper understanding. This study highlights the importance of visual aids for conceptual clarity, interactive elements for experiential learning, multisensory experiences for retention and recall, collaborative opportunities for social learning, real-world connections for contextual relevance, By embracing the practical production and utilization of instructional materials, educators can, boost student motivation and enthusiasm, develop critical thinking and problem-solving skills, encourage creativity and innovation, foster inclusive learning environments, enhance academic achievement and retention. It underscores the transformative potential of instructional materials in modern education, emphasizing the need for educators to harness their creative potential to craft engaging, effective, and student-centered learning experiences. The paper concludes that instructional materials play a crucial role in supporting teaching and learning and recommends that teachers should conduct needs assessments to determine learning objectives and material requirements.

Keywords: Instructional material, hands-on applications, learning experiences, interactive material and needs assessment.

1. Introduction

Instructional materials play a vital role in facilitating learning and enhancing student engagement in the classroom. They are resources used to support teaching and learning, helping to convey information, concepts and skills to students. These materials can take various forms, including:

- Textbooks and workbooks
- Online resources and educational websites.
- Multimedia content like videos, podcasts and interactive simulations
- Visual aids such as diagrams, charts and infographics.
- Hands-on materials like manipulatives, kits and equipment for experiments
- Assessments and quizzes to measure student understanding
- Educational games and activities

Instructional materials are a vital component of the educational process, serving as a catalyst for effective teaching and learning. These materials play a crucial role in facilitating the conveyance of knowledge, skills and values from instructors to learners, thereby enhancing the overall learning experience. The strategic use of instructional materials can significantly impart students' engagement, motivation and academic achievement.

The effective use of instructional materials is a cornerstone of successful teaching and learning (Okebukola, 2006). These materials serve as a bridge between the teacher's instruction and the student's learning, facilitating the acquisition of knowledge, skills and attitudes (Bower 2007). Producing instructional materials is a critical skill in educational technology. The use of instructional material in the

class is followed by a well prepared and produced instructional material. By involving students in the production process, we can enhance their engagement, creativity and technical skills. The importance of the production of instructional materials cannot be over-emphasized. Smith, P.L, and Ragan, T.J (2005) in their books, instructional Design, provides a comprehensive guide to the production of instructional materials and emphasized the importance of the production and the usage of instructional material in the classroom. As a means of equipping my students with the knowledge of the production of instructional design and utmostly to improvise where it becomes difficult to produce, I have decided to involve them in this onerous task in design so as to enable them have knowledge of the production as students of educational technology and as would be teachers.

2. Steps in the production of instructional materials.

The following practical production steps are involved in the production of instructional materials:

- Define learning objectives
- Choose appropriate material types
- Design and create content
- Review and Revise
- Implement and Evaluate
- Production and use of instructional materials

The production and use of Instructional materials is crucial aspect of teaching and learning (Smith and Ragan 2005). Effective instructional materials can enhance student engagement, motivation and learning outcomes (Hativa, 2013). However, the production of instructional materials requires careful consideration of several factors including learning objectives, content and media (Dick and Carey, 2004). Research has shown that instructional materials can be designed to support diverse learning styles and abilities (Tomlinson, 2003). Multimedia materials, such as videos and interactive simulations can be particularly effective in promoting deeper understanding and retention of subject matter (Mayer, 2009).

The use of instructional materials requires teachers to have adequate training and support (Olivia, 2009). In recent years, there has been a shift towards digital instructional materials, which offer greater flexibility and accessibility (Bower, 2007). However, the production and use of digital materials require careful consideration of issues such as copyright, accessibility and technical support (Morrison et al, 2004).

Generally, instructional materials also called instructional resources are indispensable in the teaching and learning process for they are tools employed to reach the goals and objectives at various level. Thus, anything that stimulates a learner and results in the understanding of the curriculum content maybe classified as a learning resource. According to Ughamadu (2006) anything which the teacher and in fact the entire class utilize for the purpose of making teaching-learning process more effective could be classified as a resource. Teaching and learning resources according to Ofoegbu (2009) are those resources that facilitate the achievement of the goals of education.

Instructional resources/materials are those devices or instruments which are employed by the teacher in a teaching-learning process to convey meaning and facilitate effective teaching and proper understanding. Thus, instructional materials are those things that are employed to facilitate inculcation of learning experience to the learner to ensure the achievement of the nation's educational objective. Instructional material when appropriately utilized during the teaching and learning enhance learning and improve the teaching competence of teachers. In fact, they make learning more meaningful to learners. They have been classified as printed materials (examples textbooks, journals, posters) and non-printed materials (examples: chalkboard, flannel board, models, 16mm film projectors) they have also been classified as audio material or aids (examples: radio, audio-tapes record players): visual materials or aids example: pictures, charts, maps, real things, models, mock-ups) and audio-visual materials examples: instructional or instructional television.

Most people often ask if teaching materials are important in the teaching/learning situation. This question can be answered when we take the roles teaching materials play in the education of the student. In teaching languages, English language in particular, and other subjects teaching aids/materials production in the form of improvisation and usage are important because every individual has the tendency to forget but proper use of these materials help the students to remember lessons permanently. All teaching aids can be effectively used and produced in class to motivate the students to learn better.

Teaching/Instructional materials are especially important to learn a new language and other subjects because they develop the proper images in their mind and create an interesting atmosphere for the student to make learning easy and clear. It is important to further highlight the roles of instructional materials in the teaching and learning process to include the following:

- They hold retention and save the teacher time and keep the learner busy
- They capture the learners' interest and add variety and break the monotony of instruction
- The use of instructional material arouses curiosity, stimulate imagination and enlarge the learners and teachers view point.
- They develop continuity of thought and concretize the abstract
- Educational media saves the teacher much efforts
- Learning process is reinforced by the use of additional sensory experience.
- Other uses of instructional materials are:
- Classroom instruction: Materials support face-to-face teaching.
- Online courses: Materials are used in digital learning environments.
- Self-study: Materials enable independent learning.\
- Training and development: Materials support professional growth.
- Assessment and evaluation: Materials help measure learner progress.

By understanding the benefits and challenges, instructional designers and educators can create effective materials that support learning and address the needs of diverse learners.

3. Types of media materials/instructional

For the purpose of this study a proper delineation has to be done for a better understanding of our study. Media materials and instructional materials are related but not exactly the same thing. Media materials refer to the various forms of communication used to convey information, entertainment or educational content to audiences. On the other hand, instructional materials are specifically designed to support teaching and learning. They are resources used to convey knowledge, skills or attitudes and are typically created with a learning objective in mind.

Instructional materials can include media materials, but also encompass other resources like: Textbooks, Workbooks, Lesson plans, educational software, Online course, Simulations, Games, Quizzes, Assessments. In other words, all instructional materials are media materials but not all media materials are necessarily instructional materials. Media materials can be used for entertainment, information or other purposes beyond instruction.

By way of distinction Reiser and Dempsey (2012) distinguished between instructional media (eg text, images, audio, video) and instructional materials (eg textbook, workbooks, software), emphasized that materials are typically more comprehensive and structured. Reiser and Dempsey distinguish between instructional media (e.g., text, images, audio, video) and instructional materials (e.g., textbooks, workbooks, software), emphasizing that materials are typically more comprehensive and structured. Smaldino et al. define instructional media as the channels or tools used to convey messages, whereas instructional materials are the actual content and resources used to support learning. Morrison et al. differentiate between instructional media (e.g., text, graphics, audio, video) and instructional materials (e.g., lesson plans, assessments, educational software), highlighting that materials are more focused on learning outcomes. Dick et al. discuss instructional media as the means of communicating information and instructional materials as the resources and activities designed to support learning. These references provide a solid foundation for understanding the distinctions between instructional media and materials.

Instructional materials are a vital component of the educational process, serving as a catalyst for effective teaching and learning. These materials play a crucial role in facilitating the conveyance of knowledge, skills, and values from instructors to learners, thereby enhancing the overall learning experience. The strategic use of instructional materials can significantly impact student engagement, motivation, and academic achievement. In teaching and learning a well-designed instructional material can help to:

1. Clarify complex concepts and ideas
2. Support diverse learning styles and abilities
3. Encourage active learning and participation
4. Provide opportunities for practice and reinforcement
5. Facilitate assessment and feedback
6. Promote inclusivity and cultural sensitivity
7. Foster critical thinking, creativity, and problem-solving skills

On the part of the teacher effective use of instructional materials can also help teachers to:

1. Save time and effort in lesson planning and preparation
2. Differentiate instruction for varied learner needs
3. Create a structured and organized learning environment
4. Encourage collaboration and teamwork among students
5. Stay updated with curriculum changes and developments

In today's digital age, instructional materials have evolved beyond traditional textbooks and chalkboards to include a wide range of digital resources, such as educational software, online courses, and multimedia content. This shift has opened up new possibilities for personalized learning, increased accessibility, and global connectivity.

However, the successful integration of instructional materials requires careful consideration of factors such as:

1. Learning objectives and outcomes
2. Student needs and preferences
3. Teacher expertise and training
4. Technological infrastructure and support
5. Cultural and linguistic diversity

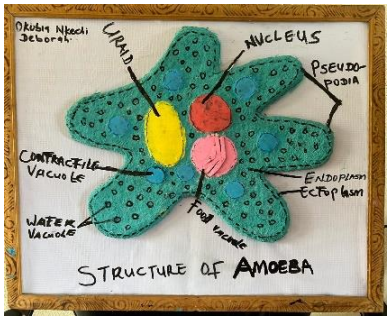
Some of Our Produced Instructional Materials Used in Teaching Some Secondary School Subjects

Computer

A computer cut out from a carton as an improvised instructional material

1. Visual aid: The carton computer cutout can serve as a visual aid to help students understand
the basic components of a computer, such as the monitor, keyboard, and CPU.
2. Interactive learning: Students can use the cutout to create a mock computer setup, exploring
the different parts and their functions.
3. Creative projects: The cutout can be used as a base for creative projects, such as creating a computer model or designing a futuristic computer.
4. Storytelling: The cutout can be used as a prop for storytelling, helping students to create scenarios and stories related to computer use.

Amoeba



1. Visual representation: The papier-mâché amoeba serves as a 3D visual aid to help students understand the structure and shape of an amoeba.
2. Interactive learning: Students can explore the texture and shape of the amoeba, enhancing their tactile learning experience.
3. Biological concepts: The amoeba model can be used to teach various biological concepts, such as: Cell structure and function, Cellular transport (e.g diffusion, osmosis), Microscopic organisms
4. Creative projects: Students can use the amoeba model as a base for creative projects, such as: creating a diorama of an amoeba's habitat, designing an amoeba-inspired sculpture.

Horsewhip

1. Natural insect repellent: The roots of certain plants, such as citronella or lemongrass, have
natural oils that can repel flies.
2. Organic farming: Using a horsewhip made from plant roots can be a sustainable and eco-friendly way to manage pests in organic farming.
3. Outdoor activities: The horsewhip can be used to ward off flies during outdoor activities like hiking, camping, or picnics.
4. Animal protection: The horsewhip can be used to protect animals from fly bites, especially in rural areas where animals are more susceptible to fly-borne diseases.

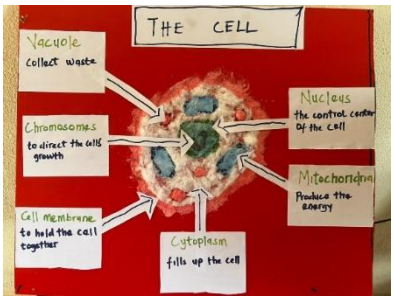
Farm Carrier (Village Basket)

A local carrier or village basket made with canes for carrying products from the farm in a typical village setting
- Canes (e.g., bamboo, rattan, or local reeds)
- Thinner cane strips or fibers for weaving

Wooden or bamboo frame (optional)

1. Carrying farm products: Use the carrier to transport fruits, vegetables, grains, or other farm products from the field to the village market or home.
2. Gathering firewood: Collect firewood and other forest products with the carrier.
3. Carrying goods: Use the carrier for general transportation of goods, such as carrying water, Cassava, Yam, Corn other essentials.

The Cell



A cell made of wool, color, and other materials can be a creative and interactive way to teach students about cellular structure and function. Here are some importance and uses of such a model:

Importance:

1. Visual aid: A colorful, tactile model helps students visualize and understand complex cellular components.
2. Engaging learning: Interactive materials like wool and other textures make learning fun and engaging.

Uses:

1. Teaching cell structure: Illustrate cell membrane, cytoplasm, nucleus, and other organelles using different materials.
2. Demonstrating cell functions: Show how cells divide, grow, and respond to stimuli using the model.

Abacus

The abacus is an ancient calculating tool that has been used for thousands of years, with a rich history and significance. Here's an overview of its importance, production, and usage:

Importance

1. Early calculating tool: The abacus was one of the first calculating tools, allowing for basic arithmetic operations like addition and subtraction.
2. Developed mental math: Using the abacus helped people develop mental math skills, improving cognitive abilities.

Construction: The abacus consists of a frame with wires or rods, holding the beads in place.

Parts of Plants

A cut-out part of a plant from polythene material can be used for various educational and creative purposes, such as:

1. Plant anatomy models: Create 3D models of plant structures like leaves, stems, roots, and flowers to teach students about plant anatomy.
2. Botany lessons: Use the cut-outs to demonstrate plant growth, development, and functions,

Climbing Rope

A traditional climbing rope (like a coconut tree climbing rope) can be used to teach various concepts, such as:

1. Cultural significance: Sharing the importance of coconut trees and traditional climbing methods in various cultures.

2. Physical education and fitness: using rope climbing as a fun way to improve strength, endurance and agility

Means Transportation

A cut-out airplane, ship, and trailer and a means of transport on a flannel board as an instructional material

Importance:

1. Visual representation: Provides a clear and concise visual representation of different modes of transportation.
2. Interactive learning: Encourages hands-on learning and exploration.
3. Multisensory experience: Engages students through sight and touch.
4. Real-world connections: Helps students understand real-world transportation systems.

Usage:

1. Transportation lessons: Teaches students about different modes of transportation and their uses.
2. Storytelling and scenarios: Creates interactive stories and scenarios to teach transportation concepts.
3. Geography and mapping: Demonstrates route mapping and geography skills.

By thoughtfully selecting and utilizing instructional materials, educators can create a rich, engaging, and effective learning environment that supports the diverse needs of all students and helps them achieve their full potential.

Instructional materials are resources used to support teaching and learning, helping to convey information, concepts, and skills to students. These materials can take various forms, including:

1. Textbooks and workbooks
2. Online resources and educational websites
3. Multimedia content like videos, podcasts, and interactive simulations
4. Visual aids such as diagrams, charts, and infographics
5. Hands-on materials like manipulatives, kits, and equipment for experiments
6. Assessments and quizzes to measure student understanding
7. Educational games and activities

In teaching and learning Effective instructional materials are:

- Aligned with learning objectives and outcomes
- Relevant and engaging for the target audience
- Accurate, up-to-date, and unbiased
- Accessible and inclusive for diverse learners
- Flexible and adaptable for different teaching methods and environments

Instructional materials play a crucial role in enhancing the learning experience, supporting teacher instruction, and promoting student achievement.

Okebukola in his article, significance of instructional materials in enhancing teaching and learning outcomes, emphasizes that instructional materials play a crucial role in: Facilitating effective instruction, promoting student engagement and motivation, supporting diverse learning, styles enhancing teacher productivity, and improving academic achievement. The author also discusses the characteristics of effective instructional materials, including relevance, accuracy, and cultural sensitivity. He further emphasizes that the effective use of instructional materials is a cornerstone of successful teaching and learning. These materials serve as a bridge between the teacher's instruction and the student's learning, facilitating the acquisition of knowledge, skills, and attitudes. Instructional materials play a vital role in:

Enhancing student engagement and motivation
Supporting diverse learning styles and abilities
Promoting deeper understanding and retention of subject matter
Encouraging active learning and critical thinking
Providing opportunities for practice and feedback
Facilitating assessment and evaluation of student learning

The importance of instructional materials cannot be overstated. They help teachers to:

- Clarify complex concepts and ideas
- Organize and structure their teaching
- Differentiate instruction for varied learner needs
- Stay updated with curriculum changes and developments

Moreover, instructional materials have evolved significantly in recent years, with the advent of digital technologies and online resources. This shift has opened up new possibilities for:

- Personalized learning and adaptive instruction
- Increased accessibility and inclusivity
- Global connectivity and collaboration
- Real-time feedback and assessment

Despite these advances, the effective use of instructional materials remains a challenge for many educators. Factors such as limited resources, inadequate training, and insufficient support can hinder the successful integration of these materials into teaching practice. Therefore, it is essential to explore the role of instructional materials in teaching and learning, examining their benefits, challenges, and best practices. By doing so, educators can harness the full potential of these resources to enhance student learning outcomes and achieve educational excellence.

Some Common Types of Media Materials

1. Print Media: Physical materials like newspapers, magazines, books, brochures, and posters.
2. Digital Media: Online content like websites, social media, blogs, podcasts, and e-books.
3. Broadcast Media: Audio and video content shared through radio, television, and online streaming platforms.
4. Visual Media: Images, graphics, videos, and films used to communicate messages or tell stories.
5. Audio Media: Music, podcasts, audiobooks, and voice messages used to convey information or entertainment.
6. Interactive Media: Video games, simulations, and virtual reality experiences that engage users.
7. Multimedia: Combinations of text, images, audio, and video, like presentations, infographics, and animations.
8. Social Media: Online platforms for user-generated content, like Facebook, Twitter, Instagram, and TikTok.
9. Outdoor Media: Billboards, signs, and public displays used for advertising and announcements.

Dick et al. discuss instructional media as the means of communicating information and instructional materials as the resources and activities designed to support learning.

These references provide a solid foundation for understanding the distinctions between instructional media and materials.

For this study, Kemp's instructional design model (1985) and Assure Model by Heinich et al (2002) were adopted as development models of our production of instructional materials

1. Kemp's Instructional Design Model (Kemp, 1985)

Context: Identify learning objectives, audience, and learning environment.
Content: Determine the subject matter and learning activities.
Learning Activities: Design activities that support learning objectives.
Assessment: Develop assessments to measure learner performance.
Implementation: Deliver the instruction and support learners.
Kemp's model emphasizes the importance of context and learning activities in instructional design.

2. ASSURE Model (Heinich et al., 2002)

Analyze: Identify learning objectives, audience, and performance gaps.
State: Clearly state learning objectives and outcomes.
Select: Choose appropriate media and materials.
Utilize: Implement the instruction and support learners.
Require: Assess learner performance and instructional effectiveness.
Evaluate: Refine the instruction based on feedback and assessment.
The ASSURE model provides a comprehensive framework for instructional design, emphasizing analysis and evaluation.

Benefits of Production of Instructional Materials

1. Improved learning outcomes: Well-designed instructional materials can enhance student engagement, understanding, and retention.
2. Increased efficiency: Instructional materials can reduce instructor preparation time and improve delivery consistency.
3. Cost-effectiveness: Reusable materials can reduce costs associated with instructor-led training.
4. Flexibility: Instructional materials can be used in various settings, such as classrooms, online courses, or self-study.
5. Accessibility: Materials can be designed to accommodate diverse learning needs and abilities.

Challenges of Production of Instructional Material

1. Development time and costs: Creating high-quality instructional materials can be time-consuming and expensive.
2. Maintenance and updates: Materials may require regular updates to remain relevant and accurate.
3. Compatibility issues: Materials may not be compatible with all devices or platforms.
4. Limited interactivity: Some materials may lack engagement and interactivity.
5. Dependence on technology: Technical issues can hinder material accessibility.

4. Conclusion

Instructional materials play a crucial role in supporting teaching and learning. Effective materials can enhance learning outcomes, increase efficiency, and reduce costs. However, development and maintenance can be time-consuming and expensive. Compatibility,

interactivity, and technology dependence are also concerns.

In conclusion, the practical production and utilization of instructional materials play a vital role in enhancing student engagement, motivation, and overall learning outcomes. By harnessing the potential of innovative materials, educators can create immersive, interactive, and inclusive learning environments that cater to diverse student needs.

Through the strategic use of visual aids, 3D models, cut-out displays, and tactile aids, educators can: Simplify complex concepts, foster deeper understanding, encourage active participation, develop critical thinking and problem-solving skills, promote creativity and innovation, enhance academic achievement and retention, moreover, the creation and implementation of instructional materials offer opportunities for educators to: reflect on their teaching practices, adapt to changing student needs, integrate technology and multimedia resources, collaborate with colleagues and students, continuously assess and improve instructional effectiveness

Ultimately, the practical production and utilization of instructional materials have the power to transform the educational landscape, making learning more engaging, effective, and enjoyable for all students. By embracing this approach, educators can unlock the full potential of their students, empowering them to succeed in an ever-changing world.

As we move forward, it is essential to continue exploring innovative materials, technologies, and pedagogies that can further enhance student engagement and learning outcomes. By doing so, we can ensure that education remains a dynamic, responsive, and student-centered enterprise, equipped to meet the challenges of the 21st century.

5. Recommendations

From this study the following recommendation / suggestion were made:

1. Conduct needs assessments to determine learning objectives and material requirements.
2. Design materials that are engaging, interactive, and accessible.
3. Use a variety of formats to cater to different learning styles.
4. Regularly update and maintain materials to ensure relevance and accuracy.
5. Consider digital formats for flexibility and ease of updates.
6. Pilot-test materials to ensure effectiveness and identify areas for improvement.
7. Provide training and support for instructors and learners.
8. Evaluate material effectiveness through feedback and assessment.

By following these recommendations, educators and instructional designers can create effective instructional materials that support learning and teaching.

References

Black, P., & Wiliam, D. (2009). Assessment for learning: Beyond testing. Studies in Educational Evaluation, 35(1), 1-6.

Bonwell, C. C., & Eison, J. A. (1991). Active learning: Creating excitement in the classroom. ERIC Digest.

Bower, B. (2007). Instructional materials: A critical component of teaching and learning. *Journal of Dick*

W., & Carey, L. (2004). The systematic design of instruction. Allyn & Bacon.

Dick, W., & Carey, L. (2004). The systematic design of instruction.

Gagne, R. M. (1985). The conditions of learning and theory of instruction. Holt, Rinehart and Winston.

Hativa, N. (2013). The impact of instructional materials on student engagement. *Journal of Educational Multimedia and Hypermedia*, 22(1), 5-20.

Heinich, R., Molenda, M., & Russell, J. D. (2002). Instructional media and technologies fore learning (7th ed.). Merrill Prentice Hall.

Mayer, R. E. (2009). Multimedia learning. *Psychology of Learning and Motivation*, 53, 1-19.

Ofoegbu, T. (2009). Teaching and Learning Resource: in Curriculum theory and practice; Abuja, Curriculum Organization of Nigeria (CON)

Okebukola, P. A. (2006). The place of instructional materials in teaching and learning. *Journal of Educational Research and Development*, 2(1), 1-13.

Oliva, P. F. (2009). Developing the curriculum. Allyn & Bacon. *Educational Research*, 100(4), 239- 244.

Reiser, R. A., & Dempsey, J. V. (2012). Trends and issues in instructional design and technology. Pearson Education.

Smaldino, S. E, Lowther, D. L, & Russell, J. D. (2015). Instructional technology and media fro learning (11th ed). Pearson Education

Stiggins, R. J. (2005). Student-centered classroom assessment. Allyn & Bacon.

Tomlinson, C. A. (2003). Fulfilling the promise of the differentiated classroom. Association for Supervision and Curriculum Development.

Ughamadu, K. A (2006). Curriculum: Concept, Development and Implementation. Onitsha, Lincel Publishers.