

Application of instructional system design (ISD) models for training and re-training building technology graduates in building construction industry

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Abstract

Human beings remain a national focus for any productive venture, revolutionized the business world for both growth and wealth of mankind. To satisfy productive enterprise, workers need to create and utilize their abilities for the achievement of organizational goals and the fulfillment of individual career satisfaction. This cannot be attained if workers are not properly trained and re-trained. Training and re-training of workers is an essential tool used to renew and upgrade workers skill performance. Different types of training and re-training programmes were discussed. Building technology graduates of universities and polytechnics and their responsibilities in building construction industries were also explained. Application of Instructional System Design (ISD) models were recommended to simplify the training and re-training process during career alterations due to changes in technology.

Keywords: Training, Re-training, Building Construction, Instructional System Design

Introduction

Human beings are the key elements in any organization as they plan, organize, coordinate and harness all other resources towards the achievement of organizational goals. The level of skills of individual as a worker is one of the factor that determine the increase or decrease in the output level of any organization. Training and re-training is an indispensable tool for human and national development and so a worthwhile investment for greater productivity in the organization. Hence, training and re-training of personnel at all levels has always been recognized and identified as an important factor that generates expertise or skill needed for a particular task. Application of Instructional System Design (ISD) models simplified the training and re-training process during career alterations due to changes in technology. Technology in building construction industries has caused many changes in the production of building among technology graduates. For the new and old building technology graduates to solve immediate current changes in today's building technology, individuals and organizations need to source for effective training and re-training programme pattern.

Training and Re-training

The purpose of training is to achieve a change in behaviour of those trained. Training is a learning process that involves the acquisition of knowledge, sharpening of skills, concepts, rules or changing of attitudes and behaviour to enhance the performance of employees. It is an attempt to improve current or future employee's ability to perform through learning and leading to skilled behaviour. According to Jackson and Schuler (2003), training is an efficient methodology of changing the conduct, information, abilities and inspiration of workers in a bearing to expand the adequacy or effectiveness and organizational goal accomplishment. It is also regarded as the acquisition of skills, knowledge and abilities for someone to function effectively and efficiently in the performance of one's vocation. Therefore, to create expertise expected to perform a specific assignment or series of task inside vocation enclosure, training ought to be a progression of learning and persistent activities solving the intended issues systematically that leads to re-training process (Okwori & Alawode, 2015). On the contrary, re-training of workers involves the renewal or updating of workers' skills, knowledge, attitude and competencies to enable them perform their assigned tasks creditably (Imhabekhai, 2000). Re-training is a function of observed training needs considering the innovation or changes occurring in the practices of production. The fast pace of technology proves the need for skill upgrading and workers' re-training. A lot of technological advancement has emerged recently in the world of work. According to Mabel and Olomukoro (2012), the changes in technology have made the skills and knowledge of workers less relevant in today's technology to be efficient and productive in their vocations. Furthermore, Momoh (2012) asserted that the major forms of training and re-training for workers include in-service training and formal training.

1. *In-Service Training:* In-service training essentially takes two forms namely: on-the-job training and off-the-job training. On-the-job training takes place at the work place and possibly while at work (Egungwu, 1992). Orientation and induction trainings are parts of on-the-job training for new employees and also newly promoted workers providing the general information needed about the organization's policies and practices. On-the-job training is provided for workers by the organization through established institutions like Nigerian Institute of Building (NIOB), Centre for Management Development (CMD), Industrial Training Fund (ITF), Health and Safety (HS), universities among others. It is also provided through regular attendance and participation in seminars, conferences and workshops which are very vital in training manpower. Off-the-job training takes place outside the work environment and are provided through series of courses by established training institutions. Workers are provided with opportunities for continuous learning and acquisition of knowledge, skills and attitudes for effective jobs performance. Federal Republic of Nigeria (2004) recognized the importance of training of workers to the growth of the nation when it stated for different categories of workers' and professionals' in-service, on-the-job, vocational and professional training shall be provided in order to improve their skill. As a result, the Nigerian government has made certain effort in establishing training centres to train skilled manpower to man the various sectors of the economy.

2. *Formal Training*: This is the training received in formal institutions. It spans from primary to tertiary institutions. According to Mabel and Olomukoro (2012), formal schools are the traditional places for acquiring knowledge and skills, for they provide the atmosphere for structured learning which makes assimilation process easier. Training in formal school increases the performance level of the trainees and can be readily assessed through testing of ideas and the resources put together in one place for maximum utilization. This is so because of the concentration of teaching efforts, instructional aids, and feedback mechanism. This type of training provided depends on the training needs of the workers and objectives of the organization. In order words, worker re-training needs are most understood in industries where the technology changes like that of telecommunication industries, manufacturing industry, aerospace industry, construction industry and other related industries.

Building construction

Shelter is the third universally accepted essential need of all mankind following food and clothing. It is however, the most difficult to satisfy because of the intrinsic factors involved in the provision of human habitats. Building construction is an old human action; its scope of activities is quite wide with different building techniques and building materials as a result of modern technology. The activities in building construction industry involves planning, designing, erection, management, maintenance and other operation of diverse civil, mechanical and electrical engineering of building construction projects through professionals, technicians, building crafts and building operatives in accordance with Nigerian Institute of Building (NIOB). Building construction industry involves building team that brings together a diverse group of individuals and seeks to resolve differences, build and develop the group into an aligned, focused and motivated work team that shared goals, objectives and priorities (Albanese, 1993). The construction of buildings both commercial and residential building activities in building construction industry can be grouped into construction management, building structure, building services and building maintenance in any building project. Construction management in building project deals with resources: time, equipment, technology, money, manpower and materials for procurement and management of construction projects. The experts in building technology organize these resources into activities, execute the activities in logical sequences and manage to complete the projects within the stipulated time and budget. Trained workers are required to look into the whole building cycle from inception to the end of economic life, dealing with the procurement, construction, design and balancing of the conflicting requirements of clients, users and the community before erection of buildings take place. Erection and construction of residential and commercial building in a building project comprises of workers who are competent in the execution of the building structures. According to Peter (2002), building structure is defined as an organized combination of connected parts (elements) which are constructed to perform a required function. These elements are; column, beam, wall, stairs, roof, floor which can be of cast in-situ or precast and erected together to make a whole.

Building structure is classified into two main parts: substructure and superstructure (Peter, 2002). Substructure is the structure below the ground level and that up to and including the ground floor slab and damp-proof course. Superstructures are structures above the substructure both internally and externally that encloses partition. Production of modern building structures is associated with modern building services during and after the construction process. Building services are what makes a building to be life and such services are electricity, water, plumbing, harnessing solar, wind and biomass energy, communications, security and alarm systems, fire detection and protection among others. The changes in technology have brought modern building services that certain instructions and specifications must be followed and observed by trained personnel. Building services are interdisciplinary professions that are responsible for all activities associated with structural, electrical and mechanical. It involves the specification, design, installation and management of all the engineering services associated with the built environment. These services are necessary in any building structure and need to be maintained. Building conservation preserves and maintains the building structures and its services. According to British Standard Institution (2008), maintenance is the combination of all technical and associated administrative action intended to retain an item in or restore it to a state in which it can perform its required function. According to Bamisile (2004), it is in line with British Standard (BS), there are preventive, predictive and corrective maintenance. All are to restore or retain the building to its functional state. The totality of features and characteristics of building structures and services are to bear its ability to meet the intended need. Maintenance is necessary to be adequately designed, planned, and provided by qualified and experienced workers. These are all needed throughout the entire period that the building remains in use or occupied. Building project deserves to be constructed and managed effectively by the trained personnel so as to retain or restore and serve its purpose.

Building technology graduates

Building technology graduate is like any other personnel who engages in a particular work in anticipation of agreed wages or amount to be paid in return for the works or services renders to employer or client. This implied that, building technology graduate as a worker can either be employed in building construction industry or be self-employed. In the context of this paper, building technology graduate can be employed by the government or private organization or entrepreneur to produce, construct, maintain or manufacture building materials, assemble building elements/components or render services as regards to building production. Nigerian Institute of Building (NIOB) recognizes building technology graduates as the graduates of universities and technologists from polytechnics. These graduates are expected to be under umbrella of NIOB to produce, manage and maintain building structures and services for the use of mankind. The graduates are expected to perform as project managers, building surveyors, building services experts, and building maintenance managers and also function in the areas of building research, building finance, and building economics among others.

Building graduates are to work under or along with registered builder for successful execution of building construction activities such as construction management, building structure, building services and maintenance in any building project and likewise to be self-reliance in the world of building production. The services of building technology graduates are required by government ministries, parastatals, government, tertiary institutions and organized private sectors (Nigerian Institute of Building, 2011). According to Kolawole (2002), the duties and responsibilities of building technology graduates in building construction industries among others are: construction methodology, construction programmes, project quality management plan, early warning system chart, information requirement schedule, progress and program chart, assessing the workmanship skills of craftsmen, defect analysis, project management, suggesting solutions to technical problem, general building site inspection, building materials science, facility asset management, procurement of works, building surveys and due diligence, dilapidations advice, refurbishment advice and management, schedule of conditions, historic building and forensic inspection, feasibility/viability studies, maintenance of essential services, alternative building solutions, assessing the organization structure of constructors, reinstatement valuations, design and construction phase management construction design management co-ordination, reducing waste, pollution and environmental degradation, build maintainability analysis of production information, preparation of or writing report on the following builder's documents, study production information, building damage assessment report, monitoring of development projects for finance providers, lenders, investors or occupiers.

Instructional System Design (ISD) Models

Instructional System Design (ISD) is the use of demonstrated learning procedures to focus the what, where, when, and how of instruction (US Army Field Artillery School, 1984). ISD model has been utilized to design training, education and development programmes for any organization to get the most from its resources. The foundation of training and re-training, advancement and training projects can likewise be constructed by utilizing an ISD approach with next to zero changes (Learner, 1986). ISD is alluded to as ADDIE and can be adapted to any study. ADDIE is an acronym for the five-phase courseware development program of Analysis, Design, Development, Implementation and Evaluation. It is also called or SAT (System Approach to Training).

Instructional System Design ISD models are apparatuses utilized by instructional designers and human execution technologist to develop instruction systematically. These models are utilized to guarantee that instruction is not grown in a random manner and are not quite the same as Instructional Design (ID). Instructional Design models only concentrate on the design and somewhat on the analysis parts. Based on this, Instructional System Design (ISD) which is called ADDIE models contrast from Instructional Design (ID) models. ADDIE models have been considered as most appropriate instructional system for training and re-training on account of its broad scope, dynamic and flexibility guideline for building

effective training, re-training and performance support tools (Merrienboer, 1997). Reiser and Dempsey (2002) said that ADDIE models have been described and implemented in theory, principle and practice. There are several different ADDIE models that focus on improved career performance of employees in the various phases of their systems such as; Dick and Carey (DC) and Morrison, Kemp and Ross (MKR) are most understood for the training and re-training programme. Though, there are minor contrasts among the different ADDIE models like that of DC, MKR among others. ADDIE models in its evaluation utilize formative evaluations as a part of each of the five phases and a summative evaluation toward the end of the process. According to U.S Army Field Artillery School (1984), the development of quality instruction does not happen coincidentally, there are established procedures to assure the instruction meets the needs, issues and objectives of trainees. Improvement to ADDIE model is the use of rapid prototyping. This is the way of accepting or developing criticism while instructional materials are being made and used. This model saves time and money by transmittable training and re-training needs of building technology graduates of universities and polytechnics while they are very simple to fix.

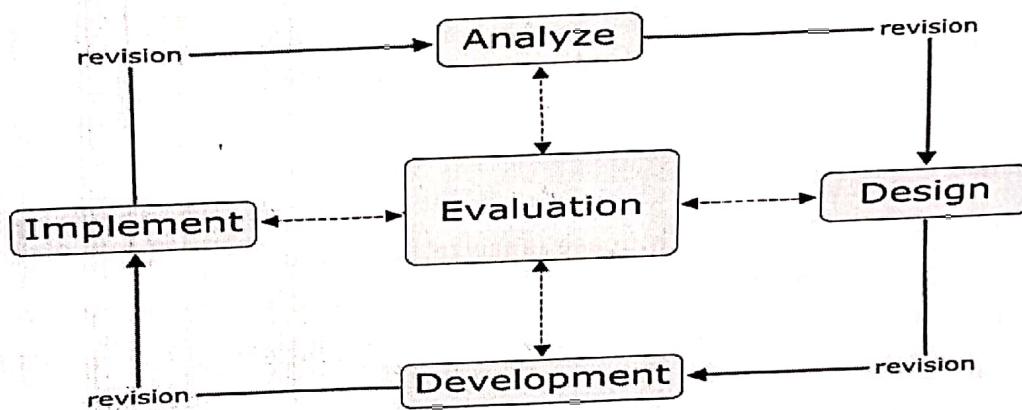


Fig. 1: ADDIE Model's Five Phases (Source: Morrison, 2010)

Most systematic learning and training design models take after a methodology like that of ADDIE model. To create a training programme practicable for the learner/trainees of building technology graduates in building construction industry, the accompanying activities usually and normally take place when adopting ADDIE Model's five phases:

1. Analyze

- (a) Determine industry result or linkage.
- (b) Analyze framework (division, work, and so forth.) to pick up a comprehension of it.
- (c) Compile a job task of all tasks connected with each job (if necessary).
- (d) Decide on task that individuals need to become performers (needs analysis).
- (e) Build performance measures for the tasks to be learned.
- (f) Choose instructional setting for the tasks to be learned such as classroom, e-learning, on-the-job, self-study, blended among others.
- (g) Figure cost and compare to benefits gained.

2. Design

- (a) Develop the learning objectives; incorporate both terminal and enabling objectives.
- (b) Identify and list the learning steps needed to perform the task.
- (c) Develop performance tests to show mastery of the tasks.
- (d) List the entry behaviour that the learner must demonstrate prior to entering the learning program.
- (e) Sequence and structure the learning objectives.

3. Develop

- (a) List activities that will help the trainees learn the task.
- (b) Select the delivery methods (media).
- (c) Review obtainable material so that you do not reinvent the wheel.
- (d) Develop the instructional courseware.
- (e) Synthesize the courseware into a viable learning program (system).
- (f) Validate the instruction to ensure it accomplishes all goals and objectives.

4. Implement

- (a) Create a management plan for conducting the training.
- (b) Carry out the training.

5. Evaluate

- (a) Review and evaluate each phase (analyze, design, develop, implement) to ensure it is accomplishing what it should.
- (b) Perform outside evaluations – examine that the tasks for the trainees in their workplace.
- (c) Revise training framework to improve it and to meet prospect challenges.

ADDIE model is an exploratory problem-solving technique that uses evaluation and feedback to improve performance (heuristic) of the trainees. The model is not a mechanical, algorithmic, step-by-step procedure as it has been criticized. The importance of gathering and distributing information in each of the five phases shows that training process is not static and linear, but rather an iterative flow of activities that is dynamic and iterative. This model shows the strategies for training and re-training building technology graduates of universities and polytechnics in building construction industries as it may.

Therefore, ADDIE model is designed to solve human performance problems related to learning or training and re-training (Watson, 1981). The simplicity of the ADDIE model actually allows the trainees to focus more on each stage of the construction process during the training and re-retraining exercises. The straight forwardness of the ADDIE model also permits the building graduates to concentrate and consolidate on each stage of construction during the exercises. This depends on how the trainers handle the training and implement the model.

Conclusion

Training and re-training is a process and a way of assisting individual to fulfill job satisfaction and achieve organizational goals in a related field or specific tasks to acquire needed knowledge, skills and attitude. In order to bridge the gaps flanked by the advancement or changes in technology in building construction industries, training and re-training programme (formal or in services training) must be a continuous exercise throughout working experience. Conclusively, training and re-training of building technology graduates of universities and polytechnics patterned on ISD methodology using ADDIE model (Analysis, Design, Development, Implement and Evaluate) in all the building divisions such as construction management, building structures, building services and building maintenance in building construction industries will give expected results as the need may be.

Recommendations

Based on the preceding discussions, the following recommendations were proffered:

1. The building construction industries should organize training and re-training that will affect the industry positively in order to achieve the goals and objectives of the organisation and as well serve as motivational tools for the building technology graduates of universities and polytechnics in the industry.
2. ADDIE model should be adapted to train, re-train and design in such a way to solve human performance problems and handle by experts so as to improve and generate skilled workers among other categories in the building construction industry.
3. The building technology graduates of universities and polytechnics in the building construction industries should make themselves available whenever training and re-training programmes of it kinds are provided. They should improve themselves through other means of learning and also use technologies to get ideas relating the area of their disciplines.
4. Nigerian Institute of Building (NIOB) and other related bodies nationally and internationally should assist the building industry in training and re-training building technological graduates of universities and polytechnics through their various training and re-training programmes.
5. Governing bodies should improve on the existing school programmes available for training and re-training her undergraduates, review tertiary's (universities and polytechnics) building technology curriculums and incorporate other related programmes as it may concern.

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