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Averting the Eclipse of a Field: Educational Technology as a Case

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Abstract
What do practitioners in Educational Technology do that is distinct and different from those of other educators? In other words, how can we associate a given set of academic papers with the field where no clear-cut difference can be observed between Educational Technology papers and those of non-specialists? This could be due to the emphasis placed on technology in education and relegating instructional design (ID) or instructional system design (ISD) and other subsets to the background. Therefore, the paper maintains that if Educational Technology must maintain its worth, value and relevance, ID/ISD, for instance which is the chief corner stone of the field should be given its due place. After all, it is ID/ISD that should prescribe the place, type and how technology should be integrated in an instructional process, and not technology itself being the driving force. The paper therefore showcased some misconceptions about Educational Technology and its implications. It also focused on the ways the field does go about achieving the task of facilitating learning and improving performance of the "learner" with emphasis on instructional processes, instructional and learning theories, while still recognizing the invaluable place of technological resources in teaching and learning. This is how the paper approached the process and product approaches about the field that enjoys making learning an easy task.

Keywords: eclipse, merger, design, audiovisual movement, facilitation

Introduction

The misconceptions about the field of Educational Technology deserve to be fully addressed or else the field will become on open one, that is, a field without boundaries. In fact it will move the field back to a phase it had already passed from its evolutionary evidence. This phase was the audiovisual education movement phase when Educational Technology was labeled Audiovisual Communications. The 1963 first formal definition of the field lends credence to this position (Junaszewski & Persichitte, 2010) [10]. Since the early sixties to present, it is obvious that the field had undergone several structurally and physiological changes, hence we now discuss the evolutionary development of a field. A thorough perusal of the various landmark definitions of the field; 1963, 1972, 1977, 1994, and 2010, would attest to the fact that the field which started as audiovisual communication now has a name not only tied to media and technologies, whether analogue or digital. Educational Technology today is not technology in education and will never be or else it would amount to going back to its original name. The various modifications ushered by the later definitions to the most current suggest that technology in education is more or else an integral component and so cannot be the meaning of the field itself. After all, any person can use technology in teaching and learning.

The position above appears compounded with the down play treatment on a major subset of the field even among Educational Technologists of today, especially with the advent of the computer and other modern technologies. May-be it can be seen as an infliction occasioned by the nomenclatures; Educational Technology or Instructional Design in some sectors. The paper submits that the latter is a subset of the former and as a subject that wisely recommends; the type, when, and how technology should be applied in education, amongst other functions. So, one can see that in Educational Technology, media and technologies cannot be the first thing that should come to play. The field today has become a study and ethical practice primarily concerned with facilitation of learning and improving performance by creating, using, managing appropriate technological processes and resources, and not mere application of media and technologies in education (Januszewski & Molenda, 2010) [3, 11, 21]. Unfortunately, some persons still view the field with the wrong binocular lenses. However, a brief look at some misconceptions that plaque the field would suffice here.

Misconceptions about Educational Technology

Educational Technology: Field and profession in the affiliation of the authors is a post graduate course that affords masters' students maiden experience to share their understanding of what the field offers. A synthesis of students' reacting as to the meaning of the field leaves us with such misconceptions as:

Technologies in Education

This could be tied to an age-long misconception perhaps influenced by the first official definition of the field; the audio-visual communication movement. It was seen as media born of the communication revolution primarily concerned with the design and use of messages which controlled the learning process. Its focus was on audiovisual communication, hence the name (Ely, 1963) [6]. It is common to see the use of modern digital tools; Learning Management Systems (LMS) for instance being labeled Educational Technology. If that is correct, it then suggests that users of Blackboard, Edumodu, Moodle, Atutor,

Canvas, Eliademy, Form LMS, etc are Educational Technology practitioners. It has to be reiterated that the mere use of technologies; chalk, chalkboard, writing materials, various projectors, slides and transparences and others do not represent Educational Technology in the true meaning of the field. When we say a son really resembles the father, such saying can apply here. The son may be a carbon copy and resemblance of the father, but not a replacement and so cannot take the place of the father. Therefore, technologies in education cannot take the place of educational technology, so long as it remains a subset of the field of study.

Hardware and Software

Under this premise, an overt and obvious misconception is the hardware and software impression about the field. Today, various computer hardware and software adorn the learning space such that we have learning environments that are replete with various information and communication technologies (ICTs), courtesy the digital age. Input and output devices, hand held and mobile devices, application Apps; MS Words, Coral draw, Excel, PowerPoint, Statistical Package for the social sciences (SPSS), Hologram, Research and Communication software, amongst others are typical examples. The use of Virtual lessons, Google classroom, Flying and Flipp classrooms, Digital classrooms, Flipgrid, Jamboard, Khan Academy, Socrative, Zoom, Smart interactive Board and others are branded Educational Technology.

ICTs, admittedly have gained preeminence in the field just like in any other field of life and the earlier their place in the field is defined the better. This is necessary so that new entrants are not blurred on the true representation of a field that sues to making learning an easy task. Like the preceding paragraph, the emphasis here is still on the product impression about Educational Technology and so forms a subset of the field.

Teaching or instructional materials

Tied to the misconception under consideration is the common impression that the field represents teaching aids, teaching materials, curriculum, instructional materials and Open Education Resources (OERs).

Instructional materials, whether analogue or digital function optimally in the presence of relevant tools and devices (Betrus, 2010) [3]. On the other hand, online resources that are freely licensed and open for public use qualify as OERs.

The use of E-books, Wikipedia, Curriki, and Wikimedia, Power cent, Wikimedia commons, Webinars, MIT online courseware and other online course materials are typical examples.

That a field acknowledges, appreciates and sues for the integration of these rich learning materials to enhance learning; discourage the mono-knowledge source of the teacher as well as the provision of multi-media to check learners' cognitive load, increase knowledge source, does not make it to be tied to any one of those responsibilities. So, Educational Technology cannot be teaching aids, just as it cannot be teaching materials, online resources and so forth.

The field admit ably has all these as parts of the sub elements that should aid learning when they are fully explored, but submits that it cannot be defined with technology application only.

Information Technology (IT)

Educational technology is often mistaken for Information technology or rather computer studies. It is also a misconception. Though Educational Technology makes significant and sufficient use of what these fields do offer, that does not mean that they mean the same thing. IT and computer studies focus on design, development and use of technology systems, computers and telecommunications, artificial intelligence (AI), machine learning, deep learning. Emphasis here is on the design of physical devices, infrastructure and process to create, process, store, secure, retrieve and exchange all forms of electronic data. They are fields on their own and that have made the technology age of today what it is. In the words of Turban, Rainer and Porter (2003) [27]. technology is used to solve real world problems, education inclusion. The products of IT are what Educational Technology leverages as the course does not exist without IT and what the field offers.

Media Technology

Educational technology is not synonymous with such media technology as; data storage; art media, print media, digital media, electronic media, media psychology, et cetera. In the same way, it does not simply mean technologies used to compose create, produce and deliver media messages whether in the print, audio or visual or both. MT for short covers communication theories, appropriate to our post-broadcast, interactive media environment (Loon, 2007) [17]. Media, technology and society have a serious bond (Holmes, 2005) [14]. When Education technology explores the provisions of these fields as in open and distance learning, the essence is to see how learning can be accessed by the learner via media, technologies or both irrespective of distance and geographic locations.

Implications of Misconceptions

The concern of this paper is confirmed when we realize that the integration of the technologies so for mentioned in the section above is not delimited to the field of Educational Technology. So, if non practitioners do integrate technologies, hardware and software, teaching aids and materials, modern gadgets and digital tools in their pedagogical roles, what is it that makes Educational Technology practitioners distinct from them? This forms the crux of the discourse. The pitfall of some influential models in technology integration did not helped matters in this direction. The TPACK model is a typical example. It is a model that places technology knowledge ahead of other elements; pedagogy knowledge and content knowledge. (Shulman, 1986; Mishra & Koehler, 2006) [25, 19]. The critical work of Williams and Torunarigha (2020) [29, 30]. on this model did enough justice on this observation. The authors contend that in instructional arrangement, emphasis should be placed on pedagogy knowledge first before other elements like content knowledge and technology knowledge, just as they maintain that technology is an integral component of an instructional process. It is with this lens that some persons still see the field as Technology in education, perhaps influenced by such and other related models. When Educational Technology is seen from the perspectives above, it then suggests that any user of technology qualifies as an educational technologist. Our children do use technology to learn, we do use technology in one way or the other in our daily lives for communication,

entertainment, educational purposes, and the rest. When technology usage is the meaning of the field then the fear of this paper is confirmed. What an irony and danger for a field of study! And where every user of technology is an educational technologist, we can then agree that any forms of eclipse, whether partial or total is inevitable.

The fear expressed in this paper is also compounded by the no distinct, clear-cut differences that exist between related academic papers on technologies in education of Educational Technology specialists and non-specialists. This is most common and noticeable in multi-disciplinary journals where articles are drawn from different backgrounds. In other words, one can hardly define such paper by the affiliation and area of specialty of the author(s). After all, all educators that are ICTs complaints are at liberty to experiment on the application of whatever software for instance in enhancing students' academic performance in their various core areas. Most Educational Technology papers show conspicuous presence of application software but partial or total absence of instructional design components. This is the missing link. And because of this missing link, it becomes very difficult to associate such a paper with its source.

The extinction or merger suffered by some fields in history could be attributed to the inability to establish fields' boundaries. Even though knowledge is a dynamic thing and every field is said to be eclectic in nature, the fact remains that every field is defined by known boundaries. There are fields' delimitations. They cover the area of concentration and peculiar attributes of a given field of study. When a field of study is not identified with such peculiar traits and potentials, it is clear that her roles could be played and complemented by other related fields. This portents danger for a field of study and that confirms the fear expressed in this subsection. Let the other key components of the field be promoted outside technology infusion, integration and institutionalization. It will make the field stand out on its own and not an open association without any clear-cut criteria for enlistment.

Right the Wrong

Educational technology is a process of how best learning outcome can be maximized, and not a product or use of technological products even though they form a life line of the field. So we are right to say that the field and technology are like inseparable twin and a manifestation of the saying that it takes two to tango. The field is concerned with how best instruction can be approached as to yield the best and desired result. It is a field that targets at changing such narratives that: learning is a hard thing; learning is based on a deficit models of the students; information must emanate from a source teacher; hence learning was a process of information transfer and reception; learning is an individual thing and even a linear process. The field changes these narratives, hence learning is today a natural process as no all learners learn the same way; learning is a social process, an active not a passive process, both linear and non- linear; integrative and contextualized (Resta, 2002) [22]. The field being eclectic in nature thus sees how best learning can be facilitated so as to achieve the desired outcome.

Learning Facilitation

Armed with vast knowledge of instructional processes; instructional theories; kinds of learning theories and technological resources; the instructional activities of practitioners should be far better than those of non-practitioners. The instruction/lesson handling should not only be effective, but also engaging, appealing and efficient in terms of desired result delivery. There should be overt evidence of learners exposed to the dictates of the field performing better than those engaged by non specialists. It is making learning very easy that makes the field stand tall among equals. Hence, learning facilitation should lead to improve performance of the learner, teacher, instructor and organization as a whole. Achievement of this feat is dependent to a great length on effective instructional design.

Instructional Design Processes

How best to design instructions (online or offline) so as to maximize output is the core role of Educational Technology. This job description requires knowledge and expertise of instructional design models or processes. Modern literature is replete with dependable instructional design models. The Gerlach and Ely (1980) [9]. mix of linear and concurrent model; the Morrison, Ross and Kemp (1994) [20]. nine element model; the Heinich, Molenda, Ross and Smaldino (1999) [13]. ASSURE model and the Newby, stepich, Lahman and Russell (2002) [21]. PIE model; are just a tip of the ice berg. The common and identical features of their various elements gave rise to the ADDIE model a household name among practitioners. The acronym stands for: A (analysis); D (design); D (develop); I (implement) and E (evaluate). These elements have also influenced the place and roles of practitioners who have become instructional analysts, designers, developers, implementers and evaluators. A concise look at the activities of the various stages will add more meaning to the discourse.

Instructional Analysis

The use of the construct target audience rather than learner is a deliberate one in ID. The reason is that the work of an instructional analyst is not limited to institutions of learning but transverse to other sectors of life where human development via training is a must. Accordingly, this vital phase involves such front-end analysis as:

1. Audience analysis (including background, characteristics and prerequisite knowledge and skills of the audience.
2. Technology analysis; identify existing technology capabilities.
3. Task analysis: determine the job-related task performed as a result of the training/instruction or performance support.
4. Critical-incident analysis; determine what skills or knowledge should be targeted in an intervention.
5. Situational analysis; identify environmental or organizational constraints that may impact or impede goals.
6. Objective analysis; ability to write objectives for the task to be addressed.
7. Extant-data analysis; identify existing or available training materials and mental, and lastly
8. Cost-benefit analysis; identify cost and benefits, and return of investment (Lee & Owens, 2004. P 14).

The phase as seen is a vital one. It can be seen that this phase is involved in all sorts of information gathering as to be able to identify and achieve a thorough x-ray of all the

activities listed above and more. Instructional or teaching methods, approaches, strategies and skills, amongst others that would aid in attainment of instructional goals and objectives are defined right from this stage. It is the invaluable place of this phase that informs the position of Young and Williams (2020) [29, 30]. to conclude that analysis phase is the foundation of the instructional design process.

Instructional Design

Automobiles come in different designs, just as we also have different building designs. The same concept plays out here. The shape, structure and plan on how an instruction should look like are fashioned at this stage. For instance, one cannot design an online lesson for a target audience that is not computer compliant or tech savvy. This is just for the first two activities (audience & technology) listed under the paragraph above. The ADDIE family in general or Systems Approach Models to be specific by Gagne, Wager, Golas and Keller (2005) [8]. on this phase will be ideal here. The authors insist that the following are core activities at this phase. Design by these authors should be able to;

1. Translate course goals into overall performance outcomes, and major objectives for each unit of the course,
2. Determine the instructional topics or units to be covered, and how much time will be spent on each.
3. Sequence the units with regard to the course objectives
4. Flesh out the units of instruction, indentifying the major objectives to be achieved during each unit.
5. Define lessons and learning activities for each unit
6. Develop specifications for assessment of what students have learned.

As seen, this phase specifies blueprints, storyboarding, lesson formats and assessment templates and puts all that were identified in the preceding phase into consideration. It is the structure that influences the shape, arrangement and alignment of all the other factor elements identified at the analysis phase

Instructional Development

Here, draft materials, portfolios and actual storyboarding is done. The course materials, course ware, the spelt-out strategies, methodologies and technologies are given detailed look on how and when they should be used. ALL the lesson sequencing, unit plans are written and objectives stated with relevant elements and in clear and specific terms. Development stage provides us with a created course document, real storyboarding and rapid prototyping training materials to be used for an identified target audience training and programme. When we see any training manual, syllabus, scheme of work and even a lesson plan, they are evidence of this phase. In the words of Arshavskiy (2013) [1]. it is a phase that brings a design to life by using text, storyboards, graphics, audio or video or both and by assembling all these elements into a compelling course. On this premise, we can submit that the product of this stage is a tangible one that can be felt, seen and perhaps stored say in hard or soft forms.

Instructional Implementation

An instructional expert and by extension an educational technology practitioner should be versed in instructional implementation. Rich and armed with activities right from inception of an instructional package, courseware and all that it entails, implementation here becomes a no stress issue. This is because the target audience and characteristics are known; objectives are specific, clearly stated; methodologies and strategies settled, media and technologies explicit and familiarity with other dependent factors is assured. The implementation phase is the actual trial stage and how proper this execution goes, is a long way in bridging the knowledge or skill gap that existed prior to its presence. It thus reduces or obliterates the discrepancy or gap that existed. A well implemented courseware for instance moves our target audience from their undesired position to the desired state. Williams (2013) [28]. will add that knowledge gap reduces between the beginning and close of this phase.

Instructional Evaluation

Ability to conduct evaluation of instructional processes, training and programmes leaves the practitioner with the name of an evaluator. To be able to function effectively, this phase exposes us to such concepts as; formative and summative evaluation. In the former, it serves as a confirmation test of what transpired at each stage of the entire design process; analysis, design, development, implementation and even evaluation proper. For instance, when a practitioner is revisiting all the activities of say the analysis phase to confirm if nothing is skipped, omitted, or left out; it is a form of formative that is taking place. Tessmer (1993) [26]. would maintain that it is a process of reviewing of pilot stage courses in order to determine the strengths and weaknesses before the programme of instruction is finalized. So, it helps us avoid the mistake of had I known and other consequences of mounting a programme without due confirmation of its veracity.

To be able to conduct the summative kind of evaluation, the practitioner is endowed with knowledge of various summative evaluation models, and the circumstances to which they can apply. This is evaluation after the implementation proper. It normally sets to ascertain how the activities of the various phases have been able to lead to goals attainment in general; and training or instructional objectives at last. So it serves for learner assessment, programme evaluation and course maintenance and revision as expressed by Gayne *et al* (2005). In line with this reasoning, Kirtpatrick (1996) as in Bates (2004) [2]. would add that reaction of learners/trainees, learning expressed, behavioural change and organizational performance could represent 4-levels of evaluation. Whatever be the case, it is a confirmation phase that sets to justify the cost, time, energy and essence of a training or programme. And for sure, a yes feedback justifies the worth of the entire design process.

Instructional Theories

To achieve facilitation of learning, the field also explores the gains of some instructional theories to the fullest. The 9 – events of instruction; schema development processes and the zone of proximity and scaffolding; modes of instruction; amongst others. Gain learner's attention, informing learners of objectives, stimulate recall of prior knowledge and presentation of materials are core activities of such events. Also, to provide guidance to learners, elicit performance, give feedback, assess performance and enhance retention and transfer, complete such major events to could guarantee a result-oriented instruction.

These events should apply, whether the learning is verbal, attitudinal, cognitive strategies, intellectual and motor skills (Gagne, 1987) [7]. Schema on the other hand represents a mental block of define shapes and slots. Assimilation is possible where novel knowledge matches existing schema. And where different, adjustment of existing schema is the rule or creation of an entire new one. When there is assimilation, equilibrium is said to be present and disequilibrium is the case where assimilation is absent. The untold influence of these stages is corroborated in the work of (Mcleod, 2018) [18].

Ability to discern between what learners can do and what they cannot do but has the potential of doing such if aided by More Knowledgeable Other (MKO) summarizes the Zone of Proximal Development (ZPD) construct (Books.google.com, 2012) [4]. Scaffolding on the other hand, recommends a step- by-step support of an instructional approach from the simplest to complex, in agreement with the spiral curriculum spirit). And to cap it all, the enactive, iconic and symbolic modes of representations of instruction also provide a wise format of lessons presentations (Bruner, 1996) [5]. The tie between ZDP and scaffolding is said to be an indisputable one (Sanders & Welk, 2005) [24].

Learning Theories

As already shared, the field explores the provisions of various processes which we have addressed under instructional design models and various theories; behavioural, cognitivism, constructivis, motivation to a great extent. In the words of Robinson, Molenda and Rezabok (2010) [23]. behaviourism gave rise to teaching machines, personalized instruction, personal tutoring, direct instruction, personalized system instruction and computer assistant instruction.

Cognitivism explores product application of project developmental theory, instruction processing theory, schema theory, audio, visual and audiovisual learning and digital multimedia. Constructivism on the other hand leverages on situated cognition, problem-based learning and collaboration. Connectivism as at today is what internet provision have also earned us, outside other sundry experiences and which has increased the knowledge base and source of learners. Motivation in instructional design is readily achieved when attention, relevance, confidence and satisfaction of learners are given their due place (Keller, 2010) [15].

Technological Resources

They are considered here as tools deployed to make learning though pleasurable, yet meaningful. This makes resources of interest to the field labeled as technological in nature, whether digital or analogue, improvised or ready-made, by design or utilization, interactive and web-based environments. Betrus (2010) [3]. would add that community resources, virtual field trips, information-rich learning environments settings are invaluable resources, while appreciating ethical uses of resources and human expertise often labeled subject matter experts(SMEs). The section of the paper on misconceptions has already done justice on resources or technologies of relevance in the field of Educational Technology, and it will amount to a mere repetition revisiting same here.

However, it will be pertinent to note that the subject of technological resources covers a wide spectrum in the field of Educational Technology which is also driven by the wind of innovation and change of these resources.

Conclusion

No one single paper can cover all that a field of study holds. What is achieved here is an overview of a field that the facilitation of learning and improvement performance of the learner, instructor, trainer, the educator, an individual or an organization are major goals. Educational technology successfully accomplishes this by combining technology of education with technology in education and in the right order. On no account should the latter concept be mistaken to represent the field under consideration or else Educational Technology would become a field without boundaries. And when the field is approached from the position of the paper, then one would appreciate the undeniable role of Educational Technology; yesterday, today and the future.

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