

## **Ibn Khaldun Journal of Social Science**

Vol. 1, No. 1, 2019, pp 22-37

DOI: 10.32832/ikjss.v1i1.2386

### **Educational technology based on skill in learning era of 21 century**

**Zainal Abidin Arief\***

Universitas Ibn Khaldun Bogor, Indonesia

*e-mail: zainalabidin.arief@uika-bogor.ac.id*

#### **ABSTRACT**

In the perspective of instruction educational technology based on skill in this 21 century going together the ability of higher order thinking included creation activities, evaluation, and analysis, those were different with the problem that faced by human being on the previous period. Therefore, human quality needs to be enhanced so that able to confront and overcome a variety of problems and challenge in life. The raising of human quality only can be able to acquire through quality educational process. The quality educational process constitute either one of study in educational technology study field, where it could facilitate of learning so that achieving the result of learning which maximal by employing a variety of learning resource potential optimally. The potency of students' knowledge can be benefitted by learning technology in augmenting and producing quality graduate and having competitiveness with ability of higher level thinking. To get the high quality graduate, its need the instrument through utilization of human resource development. A technology that emphasize on the effort neither of rising of human Performance, rather individually nor in organization scale. In this case, it is a technology which effort the raising of students' Performance, educational Performance or learning designer and improvement of the institution.

*Keywords: educational technology; human quality; skill*

## **I. INTRODUCTION**

In the 21 century the problems that faced mankind are very madly and different with the problems that faced nowadays and before now. Therefore, human qualities need to be enhanced in order to overcome a variety of problems in their life. The raising of human quality in educational technology perspective can only be attained through quality educational process. Quality Education reflected on human resources, if low means educational quality still low.

This case of course will influence the social trust about educational quality itself. The quality of educational process constitute one of study in the field of educational technology, where it can facilitate the learning until achieving the result of learning maximal by employing a variety of learning resource potentation optimum. Knowledge potential that can benefitted in producing instructional technology correctly is through educational enhancement of human Performance, namely a technology which emphasize on the enhancement effort of students Performance, educational Performance or instructional designing and Performance enhancement of institutional educational.

This paper will discuss about educational technology based on skill in instructional era of 21 century which correlated with higher order thinking which comprise creation activity, evaluate, and analyzing with the enhancement of technology performance.

## **II. TECHNOLOGICAL CONCEPTION OF EDUCATION**

In this paper will be discussed some conceptions that correlated with the meaning of educational technology, and deftness instruction in 21 century.

Innovation in educational field especially information technology have changed the educational world face from correspondence system become learning system, it comes to be called far distance learning. Even far before that known as descriptive of any educational technology through educational personal, so date back that the big change in educational field have occurred through the communication technology development that use satellite service, micro wave transmission, optic cable and computer that enable its event communication that double-quick, effective and efficient. The use of interactive technology that's what has changed educational world face apace one other thing instruction material production, designing for learning material that nowadays available a deal of and so sophisticated.

In a row with technological development of communication, so the concepts of educational technology have rapidly developed with advancement technology and science. In its development the definitions of educational technology from year to year have experienced revolution suitable with requirement demanding in instruction. This thing can be followed starting from the development of definition in 1963 inter-alia formulated by Departement of Audiovisual Instruction which pionieer from AECT organisation (Reiser, 2002) that formulated mentioned the design and use of message which control learning process". The aim from that definition that the message or material which is conveyed in the class should

be designed then benefitted correctly in instructional process. The formulation of educational process in 1963, at second hand showed that educational personages at that time had attention maintain on problems of learning referred on that formulation, the term of design aimed at designing of instructional procedure which is done systematically. The essential of educational technology from this definition is message or teaching material which is achieved by teacher to students.

Thereby, the result of learning which is attained by student depends from material which is achieved. It is that achieved need to be designed and benefitted in learning process, this thing so that the message or material which is achieved can be accepted and digestible correctly by students. In the definition in 1963 the term of control referred on learning process which controlled. It means that learn to focus on educator as people who control learning process of students.

Furthermore AECT in 1972 defined that educational technology as work on field which engage in preparing facility human learning through investigation, development, organization, and utilization systematically all learning resources and through entire management process. As compared to the definition previously. The definition in 1972 had a lot of advancement. It is correlated with: 1) educational technology not only correlated with designing, utilize the message to manage the learning process. 2) educational technology has become work on field or a profession correlated with the implementation of learning facilities. 3). Learning process managed better, not just enough message or learning material which is achieved, but it can occur because of utilization learning resources managed correctly (Prawiradilaga, 2012).

The definition in 1972, has explained that the concept of educational technology, where it constitute a work on field or profession in case of facilitating instructional process through utilization learning resources. Those here conotated as instructional media. Thereby, educational technology could correlated with the implementation systematically in instructional process on a variety of level.

The official definition and complete of educational technology that outed by AECT in 1977 defined that it constitute a complex process and integrated which engage people, procedure, concept, medium, and organization which analyze the problem and engineer, applying, evaluate and manage the solution of problems that engaged in all human learning aspects (AECT, 1977). Definition in 1977 identifies educational technology as theory of study field and profession. In 1977 AECT formed the special task force named AECT Task force on Definition and terminology, that tasked to formulate the work definition, until produced the discrete formulation between educational technologies with instructional technology. In this definition educational technology not only as breaking sector, but also behold as science. Educational technology referred on education in the wide meaning, whereas instruction technology only correlated with instructional process.

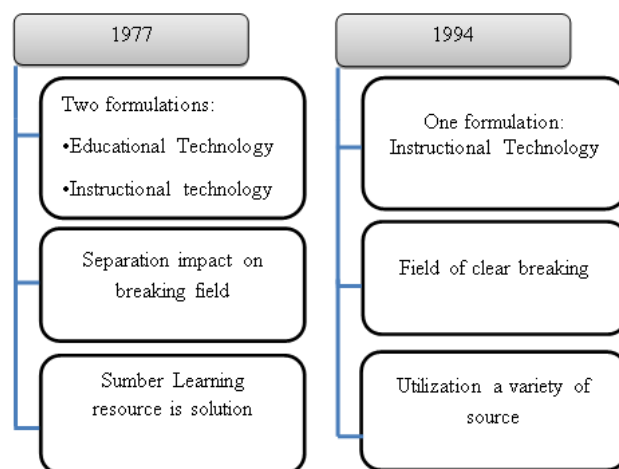
In the definition by Association for Educational Communications and Tecnology (AECT) described the differences between term for “educational technology”, “ Instructional technology,” and technology in education” based on space scope of term apiece. In 1977, educational technology used to describe a part of education that used to manage the problem

that correlated with all aspects of learning for human through complex process and fitter together. This interaction also enable educational technology for covering of learning through mass media and system of instruction endorser included its management system. Technology in education used to describe technology aplication that used by education endorser system like value report, making finance and schedule. Instruction technology defined as a part of educational technology by using rasional that instruction is education part which only correlated with learning which have character controlled and purposive (AECT, 1977).

AECT launched the definition of educational technology in 1994 written by Seels and Richey (1994). AECT mentioned educational technology as “Instructional technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources of learning”. That definition concealed to instruction technology. Into the bargain, appearing the term of theory and practice which mean that instructional technology emphasize to theories which supported educational practitioners to its apply in tasking field every day. When practice In the field have mistaken about theories so it can be input for repairing that theories, until instructional technology theories having scientific base which dynamic and sturdier. The term of process in definition in 1994, showed that instructional technology constitute a process in finishing of learning problem chronically. Other term this included in definition in 1994 namely learning resource. It is in that definition used to overcome learning problem. Thereby, the definition in 1994 more and more strengthen for instructional technology as a theory and practice in efforting of overcoming the learning problem through learning recourse utilization.

Definition in 1994 described clearly about region or sector garapan from educational technology. The field of breaking of educational technology which included on that definition namely consists of design region, development region, utilization region, management region. There are some differences which enough conspicuous between definition in 1994 with 1977. Those are according to Dewi Salma Prawiradilaga (2012: 31) as follow.

**Tabel 1.** Comparative definition in 1977 and 1994



In 2004, AECT launched the definition of educational technology according to references from Januszewski dan Molenda (2004) as follows: "Education technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" the structural of definition in 2004 has thinking channel which complete as a profession. First component which formulated is relevance between theory and practice. Formulate theory of building or science become matrix and escort for doing applied and practice. The escort arranges the thinking pattern of an instructional technologist for working. Applied or practice are the testing of technological capability of instructional to overcome the problem in the field. Asymmetry between theory and practice always happen, indeed this thing must be accepted as a usual. Need to be analyzed that asymmetry is not the error of theory, but the asymmetry assumed as symptom for restudying of theory. Thereby, every theory can be repaired because presence of opportunity from practice or applied which it's testing in the field. Formulation 2004 screen of asymmetry and relevance between theory and practice which actually all this time has carried out by educational technologist but rid of supervision.

According to definition of AECT in 2004 that educational technology having some excesses as follows: as a concept in the field of breaking in facilitating of learning practice, defined as follows: "Educational technology is the study and ethical practices of facilitating learning and improving performance by creating, using, and managing, appropriate technology process and resources (AECT, 2008)". Based on that definition, it can be meant that educational technology is ethical practice and study to facilitate of learning and increasing the Performance with creating, using and managing resource with employing the effectiveness technology. Thereby that educational technology is instruction engineering, how the effective learning is, efficient and gratify.

Studying, its means of understanding theoretically how the concept of educational technology need repairing of ongoing knowledge through research and reflect in practice, where included study terminology which showed the information collecting and analyze through research. Ethical practice, practice constitute activity that is not in contradiction with norm and value which correlated with professional value which will be don, like rules in a working. Ethical committee of AECT has increased ethical caginess of professional. Ethical rules of professional distinguished become three categories namely: 1) Individual committee, like right protection for getting material and result, protecting of happiness from health on professional; 2) social committee, like honesty on public based on problem in educational field or fair in practice which proper with servicing on profession; and 3) professional profession, like increasing of professional knowledge; and deftness give practice correctness for working and idea publication.

Instructional facilitation, instructional event can be carried out and arranged face-to-face or in virtual environment, in the same manner as far distance learning. Instructional facility can arrange of learning and help to create of learning environment easier and interesting. Instruction can be categorized according to taxonomy. One of stated by Perkins

(1992). Kind of simple instruction is information retention. The aim of instruction can include of understanding as storage.

Improving performance. Educational technology increase Performance and effectiveness; that learning process must quality, and refer to the students' ability for using of new capability that acquired. The concept of improving performance allied to human Performance technology. This study also mentioned, create, exploit, and manage. Creating indicate on research, theory and practice implied in the generalization of learning material, environment and learning system in a wide meaning.

Utilization indicates practice and theory allied in carrying out the learners to contact with condition and learning resource. Utilization started with having resource and proper proses between method and material, in other word, during selection conducted by instructor and learner. Management constitutes one of responsible in technology region of education. Production process of media and the development of learning that become more crucial in big scale, need capability and skill with management expertise of project in management.

Appropriate, this terminology meant the apply aptitude of process and source, suitability and suitable with the purpose that hoped. The expedience terminology of technology used broadly in the community region as compared to practice and instrument classically and mostly started with problem solution.

Technology, is a terminology that explained the activity approaches of human based on the application systematic based on pedant or organize of pedant for practice assignment (Januszewski and Molend 2004) Process: the process kajian as activity which at all times aimed at result. Educational technology used special process for designing, developing, and producing of learning resource, categorized on huge process of learning development.

Source is a great deal of learning resource which central to identify the region. Sources are people, instrument, technology, and material design to help the learners. Source could include ICT system which sophisticated, communication source like library, animal zoo, museum, and people with expert and special knowledge.

This Technology conception of education will develop along field that had, and they straight develop, therefore it today tentative, bide by space and time. The study for ten years to the fore constitutes the development from region before now, and each region continuing its development. The definition on 2008, eg still same that outed by AECT in 2004 which mentioned by Januszewski, & M. Molenda on the book of Definition. In A. Januszewski, & M. Molenda (Eds.), *Educational Technology: A Definition with Commentary*. The study in 2008, more specific emphasize on study and practice ethics. The study of educational technology from AECT in 2008. Educational Technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological process and resources". Educational technology as one of medium for increasing of performance.

According to Association for Educational Communications and Tecnology(AECT, 2008) there are three Performances which must be enhanced namely:

- 1) Students participant Educator Performance and educational Planner.
- 2) Educational organization Performance

Its question is how to increase the Performance of student participant, educator Performance and education designer with the Performance of educational organization itself? This thing correlated with the development of technology and information, model, strategy, approach, instructional paradigm and instructional method become something that should developed in correlated with educational technology, although actually that its correlated with technology have been only small part from the Performance raise purpose of the instruction for student participant, educator and educational planner with educational institutional performance. Knotted Domain stated in a wider distance, namely the study on what have previously worked namely the history of breaking emergence and the study since the birth term of this sciences discipline to present day, namely creativity era of 21 century.

### III. THE INSTRUCTION OF SKILL IN 21 ERA

The instruction of skill in 21 century era constitute the skill which needed by student participant for fronting the world change, because a lot of changes which occurred on this globalization era, like workplace alteration, automatization, polizy which demand the individual responsible.

#### A. *The skill of 21 century*

The skill which needed by students participant or learner to confront the world change, until they are able to pass through life favorably, effective and efficient namely with employing resource and effectiveness technology. Many changes that occur such as workplace alteration, automatization, globalization, policy which increase individual responsible. Educational education can add to facilitate students' participant for developing the skill of raising the instructional innovation through information skill, media and technology which should mastered by student participant to get the skill. The 21 century skill based on main subject and 21 century theme. Main subject consist of reading of English, and art language, world language, art, mathematic, economic, science, geographic, historic, and government and nationality. Theme of 21 century is global awareness, finances, economic, business, and business literacy; civilian knowledge; health literacy; and environment character. This 21 century skill must be supported by system of century endorser like appraisal standard, curriculum and instruction, professional development, and learning environment. Information skill, media, and technology consist of information literacy, communication literacy, and media literacy, which correlated with:

- a) Literacy information, this is comprise access and information evaluation, using and information management which comprise using of accurate information and creative for issue or problem confronted, managing of information ideology from a variety of source, and applying of basic understanding from ethic problems/law around access and using information.

b) Literacy media comprise media analysis and creating of media product. Analyzing of media consist of understanding both of meaning why message of media built and for what purpose with how to study individual in interpreting the message which different, how the results from different standpoint and exception, with how media can influence the believing and behavior in applying basic understanding from low problem/ethic around access and using media

c) Literacy of information technology and communication for applying technology effectively. This ability consist of the use of technology as instrument for research, administering, evaluating, and information communication, using digital technology (eg, computer, media rotator, GPS, etc), communication instrument/network, and social network which expedotopis to access, managing, integrating, evaluating, and creating information which function in skill knowledge and applying of basic understanding from low problem and ethics around access and the use of information technology and expedotopis communication and zero in on. The skill in life in carrier narrow cover the skill of cultural social across, productivity and creative accountability and briefing self with responsible leadership

### *B. Instruction of meaning*

Instruction process means in the perspective of educational technology by good right begun with creative problem solving and oriented on student participant with using the system and learning resource in that wider, with the result that teachers and students concurrently active in interaction and communication in learning process, so then the process of communication can run well. The better of interaction quality so it hoped will better in the learning results which have meaning and end the students have learning experience deepen and captivated with able to increase the process optimization in learning. Instruction means in technological context of education constitute the instruction which work up into students built the knowledge themselves, not to be transmission by teacher to student. To experience the meaning learner, students have to do activities that more than just a access or looking for information, they need to know how is the way to investigate, understanding, interpreting and channeling that information. The instruction of meaning presuppose that teacher have to change their character from giver for guiding, because the students from thought about what are they doing, teacher plays role in enamoring and advocating the activity which engage students in thinking. Teacher also has to accept than may it possible the cogitation of students cap the climax their knowledge. When a learner connecting new information gotten or basic knowledge that has been gotten previously, so that information will be consolidated into long memories and can be used in other time on different opportunity.

The instruction of meaning in the perspective of educational technology has characteristic as follows.

1. (Active of manipulative. Students actively mixed up with meaning task where they manipulate object and parameter of environment with observing the result of their manipulation.)

2. (Articulate and reflective. Students articulate what they have, finishing and reflecting on activity and observing with contemplating new experience with their knowledge previously).

3. Intentional and directed. When students actively and intentional effort to achieve the cognitive purpose, they think and learning all the more because they accomplish the intention.

4. (Authentic instructions have the quality of complex/contextual must buried in real life, as useful context).

5. (Cooperation and collaborative. Let the students for joining together, employing each skill and expropriate each knowledge for overcoming problems and doing task. When they collaborate and communicate, so they learned that there are more than one way to see the world and some solutions for finishing life problems.)

Thereby that instruction called having meaning if after studying the students understand learning materials and can be able to its applying for overcoming their problems.

After studying, students have a lot of skills which is used for overcoming the problems in their life. Teachers have to integrate the skills in teaching on main academic lesson.

#### Concept mapping for meaning instruction

In concept mapping that instruction process in essentials the students have to learn actively engage in task which is achieved teacher only as facilitator and acting as moderator. In the perspective of educational technology that instructional process oriented on needed, capability, and students characteristic, students have to active to build the concepts. Concept mapping can be used to display ideas and concepts like it's amend a picture network, collecting information, knowing of pattern in information and can take the conclusion soon. Novak (1972) did observation about concept mapping begun since 1972 from a research program which need a way that can show the structural alteration of knowledge from students into time frame they learned along 12 years. Concept mapping can help students in studying how to learn, namely learn how to learn". Furthermore said by Novak (1972) than concept mapping contended a picture or word in central as focus for eyes and brain. From that central there are 5 to 10 branches outed. Above that branches have words or pictures which represented of main ideas which tight correlated with central idea. Every main branches will divided into some small branches. Above that have some words and pictures which represented concepts which correlated with main idea in each branches. A horde of ideas which correlated with bee line or line form curve which constitute of relation connection which appear between concepts. Branch and twig arranged of developing by right so that using the space residue of empty favorably until it is easier in doing the increment. The instruction of meaning in the context of educational technology constitute the instruction which wove into students build their ideas and concepts like its amend a picture network, collecting information, characterize of pattern in information and can take the conclusion soon.

C. *The skill of higher order thinking (HOTS).*

There are two thinking level, namely lower order thinking and higher order thinking. Lower order thinking to the point of knowing something back to someone by getting the same way by what accepted and constitute of memorized memory. Lower order thinking only using limited ability on routine things and mechanical characteristic, eg memorize and repeated information which is given previously.

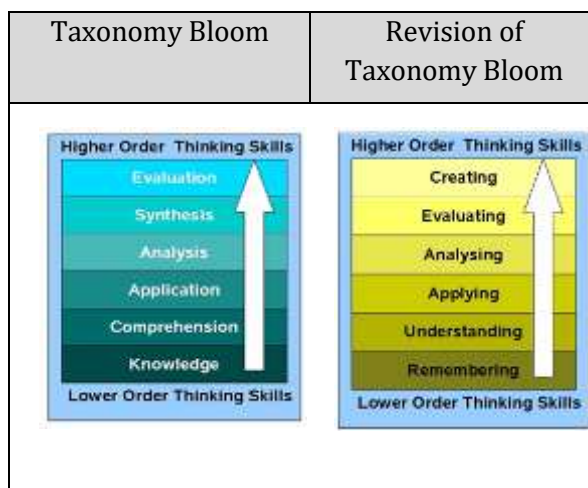
Higher level thinking is doing something that suitable with fact and knowledge. It is used if someone accepts of new information and save it then used or rearranged to need of problem solving based on situation. HOTS enamored students or for interpreting, analyzing or even able to manipulate information previously until not monotonous. Higher Level thinking constitute a medium for understanding fact and knowledge, to conclude facts and knowledge, for connecting between facts and knowledge which found and other concepts, categorize facts and new knowledge with fact and other concepts, categorize facts and knowledge, its manipulated, collocated it together with new way, and applied it to look for the new solution for new problem, below is the table of Lower and higher level thinking.

**Tabel 2.** Comparison between Higher order thinking with lower order thinking

<i>Lower order thinking (LOT)</i>	<i>Higher order thinking (HOT)</i>
<ul style="list-style-type: none"> <li>• Usually only with giving information</li> <li>• Process which carry out like repetition</li> <li>• There is no activity mental</li> <li>• Memory Rote</li> </ul>	<p>Usually with carry out something suitable with fact which experienced.</p> <p>Usually carried out in some steps, as follow.</p> <ol style="list-style-type: none"> <li>1. Understanding the subject</li> <li>2. Conclusion</li> <li>3. Connecting the knowledge with fact</li> <li>4. Collocating the knowledge and fact on the same place or same way</li> <li>5. Applying the knowledge for looking for the new problem solution</li> <li>6. Producing the solution.</li> </ol>

In 1965, psychotically team led by Benyamin Bloom developing the level classification of important thinking behavior in instruction. Then in 1990 Lorin Anderson a student of Bloom carried out revision to Taxonomy Bloom, in order to taxonomy better with working demand in 21 century. The ability to evaluate become capability of the second highest, whereas creation become the highest capability. Creation is the development from synthesis ability. Below is contain the classification blueprint of thinking level, higher order thinking skills (HOTS) and lower order thinking skills (HOTS) which can be seen on the table below.

**Tabel 3.** Comparison between Taksonomi Bloom with revision of Taksonomi Bloom (1965)



Below is the revision table of Taxonomy Bloom by Lorin Anderson a student of Bloom (1990) based on level of capability C1 to C6:

**Table 4.** Revision of Taxonomy Bloom by Lorin Anderson (1990)

Told Taxonomy Bloom	<b>C1</b> Knowledge	<b>C2</b> Comprehension	<b>C3</b> Application	<b>C4</b> Analysis	<b>C5</b> Synthesis	<b>C6</b> Evaluation
Taxonomy of revision (Anderson)	<b>C1</b> Remember	<b>C2</b> Understanding	<b>C3</b> Applying	<b>C4</b> Analyzing	<b>C5</b> Evaluating	<b>C6</b> Creating

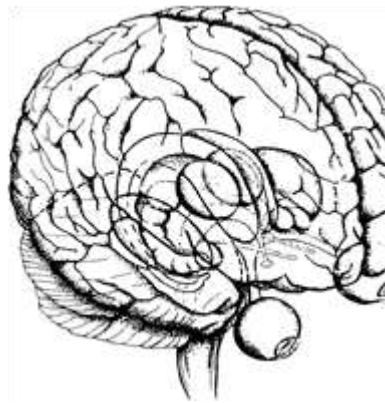
- *Maximize the function of left and right brain fission*

The ability of higher order thinking which consist of creation, evaluate, and analyze can be done with maximizing fission function of left and right brain. Buzan (1991) said that this along we with computer and microscope electron chased after what actually become more difficult hunt that ever chased mankind, we still have to acknowledge that a number of whole knowledge that we have attained at tjis time perhaps less than 1 % from what that should be known.

When was conducted of testing appear of verifying that thinking works with a specific way, appearing of other test which showed of other decryption, or appearing of its other mentis human which success of making us to feel need to work back entire of its framework. Furthermore Buzan (1991) said that what we collected from effort for the moment is knowledge where brain manner of boundlessly more sensitive from that we guessed previously, and that every people that have what is called “normal” brain having potential and capability of much greater from convinced previously.

Meanwhile Joyce (2002: 3) said that there is region which still mistery, that wide and it had not plotted of land with nearer to us, namely ourself thinking. Its coverage is almost

same width with atmosphere space in the brain term of wrinkled, gray, and weight at least 1,5 kg, contained around 10 to 15 billion of nerve cell which able to make 10800 strips. Joyce Wyckoff (2002) in his books "The Brain", stated that Human brain can be able to save more of information than entire of libraries in the world. Furthermore Joyce (2001) in The Three-Pound Universe, Judith Hooper and Dick Teresi compared the brain with this universe. They stated that make the brain covered the universe.



**Picture 1.** Human brain that Mysterious and complex (adapted from Tony Buzan, 1991)

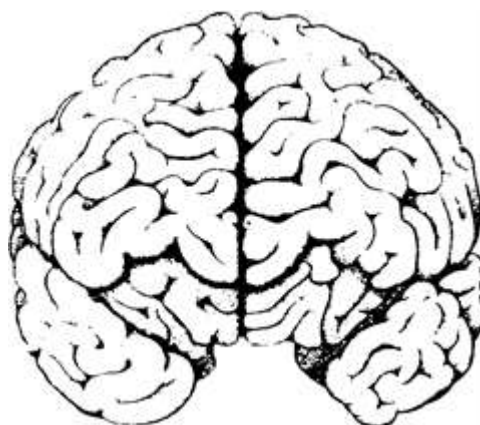
Collocating brain and our thinking with a bowl of jelly which have ossify until its surface authentically flat. When entering of thinking, set with information for himself such explained by Joyce Wyckoff (2002). This thing like dripping warm water with spoon to a bowl of jelly. Imagine that, warm water dropped above jelly surface, and then manipulated in such a manner until water drop flow to out of bowl. After this process repeated several times jelly surface will full with strips, hollowing, and ex strip for water current. Based on the research of Joyce Wyckoff (2002), water drop next (new information) will flow automatic into strip that have formed. Not a long moment, only need a few information (water) to activate all access. This is empathy process of pattern, information enter into an access, a manner, although example, a great deal of information bound in outside of access, that pattern will be active. Thinking automatically "correction" and "complement" information for choosing and activating a pattern, and then explained by Joyce Wyckoff (2002). Creativity and higher order thinking will appear if we increase jelly bowl and pushing water (information) flow to new access and making new connection.

If the brain must correlate with information efficiently so information must be arranged by getting in such a manner so that can be able to enter the small hole as easy as possible. This means if the brain work especially by key concept by getting other correlated and cohesive, so inscription and word connection in many things must be arranged by this way, and not with the traditional line. Compared with starting from above and go down in the form of sentences or list, so that creativity and higher order thinking appear had better starting from middle with opinion and main branch secretary as dictated by individual opinion and general form of central theme. Combining information from all which gotten previously and observing that the brain manage the information from chapter per chapter

about the characteristic of thinking dimensional, finding that note that more holographic and creative will far easier to be understood, appreciated, and having meaning.

Concept mapping maximize the fission membrane of left brain and right brain fission. In first of 1960, Roger Sperry, Psychology experimental at California technology institution, organizing the important experiment with epilepsy sufferer, he assumed that epilepsy attack on sufferer constitute the consequence from electric surprise which erratic between both of brain fissions.

He was a cutter “corpus callosum” which connected the membrane of both for brain fission. That operation could be stated success. Never did again the attack on sufferer, and they recovered with working normally. The research about the brain fission uttered part of the brain that all this time lie undiscovered. , namely part which recognize the pattern, to give the performance to the music, rhythm, and emotion, a part that basically visual and imagination and this is the characteristic of right brain fission. This latterly the term of right brain had been used as a popular way to state creativity, artistic, and near, as reverse from left brain fission which is deemed of boring, analytical, and stiff. This picture Below about both of left and right brain fissions.



R L

**Picture 2.** Membran of left and right brain fissions  
(adapted from Tony Buzan, 1991)

**Tabel 5.** The function of left and right brain fission.

<b>Right</b>	<b>Left</b>
Rhytm	word
Space awarness	Logical
Gestalt	Numeral
Imagination	Order
Daydream	Linearity
Color	Analysis
Dimention	List

Although correct that the brain has two fissions each with its specialization itself. People that dominant for the right brain fission are not better or worse than the people which dominant for left brain fission. The very important thing to be remembered that left and right brain fissions actually only the short term or metaphorical for specialization which effectively managed by each brain fission. Both of a series of fission determine our thinking process. The creativity appeared from extraordinary interaction between both of brain fissions and not only come from left brain fission. Accentuation on right brain characteristics purpose to balance our educational system which more incline to give emphasize on fission characteristic of left brain, namely, memorizing, language ability, arithmetical, logic thinking, and arrangement. We have been taught for finding and saying correct answer. Even until now the school only gives a little opportunity for training imagination and capability of alternative thinking.

Furthermore, in enforcing to develop the more approach on totally fission both of brain, so Sperry and Ornstein which quoted by Buzan (1991) have done the research that change history and won Nobel reward that two of brain side or two of brain membrane which connected by network of extraordinary nerve cubicle for its complex which called Corpus Callosum, dominantly correlate with activity type of different mental.

Based on the result of the research that at many people the brain membrane of left side correlate with logic, word, list, numeral, linearity, analysis, and anything else which is called activity "academic" whereas fission membrane of right brain all at more in "alpha wave" or asleep situation, ready to help. The membranes of right brain side which correlate with rhythm, imagination, color, daydream, space awareness, destalk, and dimension. Furthermore Buzan (1991) said that the membrane of left and right brain giving addition support to activity which will you do on memory system, record-keeping and communication, with higher order thinking mapping, because in every this field constitute the important thing for using both side of your brain fission.

Based on the Buzan's Research (1991) that if bended on how is the research about brain increases the strength on problems appeal until now. According to research that brain managing of information with better if it designed for "small hole" research consideration for left brain and right membrane Roger Sperry, Robert Ornstein and Eran Zaidel (2002) said that this research will see out on conclusion that organizing techniques of thinking and making note which is designed for fulfill need all of the brain should comprise not only word, numeral, order, and linearism, but also color, dimension, rhythm, space awareness, and all that, in other word concept mapping enable will encourage higher order thinking skill.

From anything perspective, if someone approach the problem, more than word character and information, ability function of remembering, holografis model of brain, although the brain research recently, at last its conclusion being equal, for employing and maximize the function left brain and right fission which enable can increases higher order thinking.

#### IV. SUMMARY

The quality of learning process constitute one of the study in a technological study field of education, where it can facilitate of learning until achieving of maximal result by employing a variety of resource potential and learning resource in an optimal fashion. Knowledge potential fo students can be employed by instructional technology in increasing and producing qualities graduated and having competitiveness with higher level thinking.

Based on definition of AECT (2008) can be concluded that educational technology is a study and ethical practical for facilitating of learning and increasing Performance with creating, using and ménage the resource with employing effectiveness technology. Thereby that educational technology is instructional engineered, learn how to effective learn, efficient and gratify with employing several of resources, looking for instruction solution through effectiveness technology.

The application of technology concept education based on skill in instructional era of 21 century, concluded that the skill which needed by students for confronting the world changes, with the result that they able to undergo life excellently, effective and efficient namely by employing effectiveness resource and technology, with maximizing fission function of left and right brain for increasing higher order thinking through creation skill, evaluate, and analysis.

General speaking can be concluded that for increasing result quality of instructional In technological perspective of education based on skill in instructional era of 21 century correlated with the ability of higher order thinking which comprise creation skill, evaluate, and analyze until needed instructional innovation effectively, efficient and gratify through concept mapping with maximizing fission function of left and right brain for increasing higher order thinking.

#### REFERENCES

- Abidin, Arief Zainal 2015, *Landasan Teknologi Pendidikan* Penerbit UIKA PRESS, Bogor
- Abidin, Arief Zainal 2016, *Teknologi Performance dalam Proses Pembelajaran*, Penerbit UIKA PRESS, Bogor
- Addison, Roger M. & Carol Haig. 2006. *Handbook of Human Performance Technology*, Third Edition. John Wiley & Sons, Inc.,
- AECT 1977. *AECT Task Force on Definition and Terminology The Definition of Educational technology*. Washington, DC; Assocation for Educational Communication and Tehnology.
- Barbara B. Seels & Rita C. Richey 1994. *Instructional Technology: The Definition and Domains of the Field*. Association for Educational Communication and Technology (AECT)
- Buzan, Tony 2002, *Gunakan Kepala Anda Teknik Berpikir, Belajar dan Membangun Otak* Delapratasa Publishing,

- Grayson Walker H., TRC. *Concept Mapping and Curriculum Design* (The University of Tennessee at Chattanooga).
- Januszewski, Alan., Molenda, Michael 2008. *Educational Technology: A Definition with Commentary*. Lawrence Erlbaum Associates,.
- Joyce Wycoff 2002, *Mindmapping Your Personal Guide to Exploring Creativity and Problem-Solving* (New York: The Berkley Publishing Group, a Division of Pinguin Putman Inc. 375 Hudson Street,
- Koay, Suan See 2014. *Higher Order Thinking Skills (HOTS): "21st Century Skills in Secondary Science, "Enhancing Higher Order Thinking Skills and Integrated Values Education": Customised Course for Indonesian Secondary Science Educator*. Penang, Malaysia: SEAMO RECSAM.
- Martin, Barbara L. and Leslie J. Briggs1986, *The Affective and Cognitive Domains: Integration for Instruction and Research* Englewood Cliffs N.J.: Educational Technology Publication Inc,
- Mihkilson, A., Concept Maps (www.document, 1996), URL. [http://www. Utas. Edu.au/docscult/concept.html](http://www.Utas.Edu.au/docscult/concept.html).
- Prawiradilaga, Salma Dewi 2012, *Wawasan Teknologi Pendidikan*, Penerbit Kencana PredanaMedia Group, Jakarta.
- Reigeluth, Charles M 2007. *"Educational Systems Development and Its Relationship to ISD", Instructional Technology, Past, Present, and Future"* Englewood, Colorado, USA, Libraries Unlimited, Inc.
- Richey, Rita C. dan James D. Klein2007, *Design and Development Research New Jersey*: Lawrence Erlbaum Associates,.
- Santoso, A.M. Rukky. 2002. *Right Brain Meningkatkan Kemampuan Otak Kanan untuk Kehidupan yang Lebih Berkualitas*. Jakarta: Penerbit PT. Gramedia Pustaka Utama.