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Research Article

The Analysis of Multimedia Technology Applications in Food Safety Teaching

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Abstract: This study discusses the multimedia assistant tools in Food Safety Course teaching and discover the reason of study efficiency decreasing. It is that the multimedia has been seriously generalized behind this kind of prosperity scene. The author systematically analyzes the reason why the teacher's teaching result and student's learning efficient is low based on the information cognized theory. And think the cognitive load is the key to research the multimedia application in teaching.

Keywords: Cognitive load theory, generalization, multimedia

INTRODUCTION

With the rapid development of science, technology and economy, the multimedia information technology based on computer and Internet rapidly emerge into the field of education. It enriches the instruction contents immensely and improves the instruction efficiency of teachers, with the purpose of motivating students' learning interests and expanding their scope of knowledge. Therefore some areas or some schools value multimedia methods highly. They make a huge investment in building multimedia resources and value the application of modern instruction methods as the key index of evaluation of instruction. Teachers of all subjects compare their advantages and disadvantages by using multimedia technology to assist the instruction process.

The Food safety not only related to people's health, safety of life and social economy, but also is the foundation of state and society stability. It involves a wide range of fields and sides, in order to grasp of the course content, many teachers relies on multimedia technology excessively in teaching Food Safety. It is so impractical to raise it in classroom teaching that will results in the generalization of multimedia application and eventually influences instructional effects and causes excessive waste of resources. Besides, when it comes to its origin, multimedia application instruction is instruction program established as instruction tools, evolving from CAI (Computer Assisted Instruction) and meaning conducting instruction process with the assistance of computers. Although with the advance of technology, the intension and extension of its concept have essential change. Theory research has branch out and incorporate the instruction research on Skinner's behaviorism into the research on multimedia learning cognitivism. Change is not supposed to take place in essence of multimedia technology as instruction assist tools. The significant reason of generalization is that many teachers has deviated from its purpose, value multimedia as key instruction tools and strategies. For the purpose of this article, systemic research from the perspective of cognitive information process is on developing students' cognitive load and independent cognitive ability, providing theoretic evidence for preventing the further expansion of multimedia application generalization in instruction.

MATERIALS AND METHODS

Generalization: Generalization only has been defied in Concise Encyclopedia Britannica rather than Ci Hai (Chinese Dictionary), Modern Chinese Dictionary and other dictionaries, explaining the phenomenon that organisms react in the same way facing different stimulates which are familiar to another. Obviously it differs in some degree with what we understand vulgarly. To be specific, generalization states deducing the definition to other things from one appropriated for one thing. Or spreading from specific to general, in order to expanding its scope and causing loss in advantage. The application status of multimedia in instruction (especially in college education) is almost all instructional contents or instruction of all sorts of subjects cannot depart from multimedia like computers, projector, PPT and so on, if hardware allowed. In this case, for one thing, once there is power failure in schools, it is awkward for many teachers to stop their instructional process. For another thing, according to contents of courses in elementary or secondary, multimedia instructional resources or the process of its design related to any course or section or lesson even any knowledge point can be searched from the internet. The phenomenon that ignoring the nature of subjects and the cognitive process of learners learning every subjects, farfetched to utilize multimedia to conduct

resources development, design and application in instruction is defined as generalization of the multimedia application in instruction. The overdue generalization impedes the effect that teachers expect to reach in instruction, even retroacts, the resources that multimedia resources designers expended giant financial resources and manpower to develop being destroyed. The fundamental reason is ignoring the cognitive process of learners facing knowledge information of different natures, the match process of the externalization of the knowledge in multimedia and the internalization of it in students.

Cognitive load: Cognitive load theory was first commented by John Sweller, cognitive psychologist from University of New South Wales in Australia, in the study published in Educational Psychology Review in 1988, indicating new direction of research in education and instruction. Research shows that the cognitive construction of human is composed of working memory and long-term memory. Working memory is asserted by Baddeley (2001) in the base of researching short-term memory, being considered as in charge of information storage and process. It is limited in capacity, approximately 5~9 terms of basic information or message block enabling to be stored for one time (Chen, 2007). When processing the stored information, working memory can only process 2~3 terms of information once, because the interaction between the stored elements needs space of working memory, resulting to reduce the quantity of information that can be processed together. Long-term stated by Ericsson and Kintsch in 1995, is thought of limitless in capacity and the center of learning. Knowledge is stored in the form of schematic in long-term memory. Schematic organizes information according to the use of the information (Mie, 2008). It provides the mechanism of organizing and storing knowledge. It is the key of memory, can be whatever learned. No matter what the size, it can be treated as an entity in memory. Son element or schematic of low level can be integrated into schematic of higher level, no longer occupying the space of working memory. When the schematic being constructed, plenty of practical activities make it automatic, systematic and possible to release space for other activities and then reduce the load of working memory efficiently. In order to construct schematic, information must be processed in working memory, which means that before information being stored in long-term memory in the form of schematic, the related part of information have to be extracted from working memory and operated (Stephen, 2008). Due to the difference of schematic in complexity level, meaning the difference of compactness of the relation between the elements in schematic, the demands of processing the working memory differ. Besides, the load of working memory could be influenced by the essential and presentation of material, the effect of students' activities as also, thus the process of information processing in working memory seems to be significant.

Cognitive reaction time: Students' learning and cognition is a procedure of information processing in system (Liu, 2007a). Cognition is information processing, including the conversion, simplification, process, storage and use of the input information. Every stage in the procedure has to do some special operation to input information, while reaction is the outcome of series of stages and operations. Therefore, when a certain knowledge represent, learners should expend a certain time on process firstly, then temporarily store it into working memory, finally prepare for the entrance of knowledge to long-term memory (Liu, 2007b). The time for process is reaction time. In the research of cognitive psychology, experiments such as encoding for short-term memory and sentence-picture match could be adopted to measure the time and to measure the learners' cognitive process. This period of action time absolutely was often ignored in instruction. Teachers are to blame that in the process of using multimedia courseware to present contents of courses, with their hands busy to controlling the mouse, their eyes focus on the screen, their attention sink in the content, they accelerate the speed of explaining and the capacity of knowledge invisibly, making the representation of instructional information so coherent that exceed learners' limited storage capacity of working memory (Barsalou, 2003). Thus the instructional information will be blocked before entering into working memory and will be covered by the approaching instructional information (Baddeley, 2001). Due to it, the knowledge structure which enter into the long-term memory are not complete, then will be hard to be saved for long time, thus generating the phenomenon that "see" knowledge in class and "forget" knowledge after class.

RESULTS AND DISCUSSION

Multimedia as the modern instructional assistant tools provides enormous convenience for either the "teach" of teachers or the "study" of students. It is so convenient that causing teachers lost in instruction. Considering the reason, they ignore that the process and the effect of multimedia learning are influenced by many internal and external factors, such as learners' previous knowledge, learners' cognitive style, the form of media presentation, the relationship of media, character of media, nature of instructional contents and strategy in instructional process (Merriënboer and Ayres, 2005). However, the essences of these factors are judged by the matching relationship of learners' cognitive characteristic and media in the presentation of different instructional contents. This study expands to analyze according to it:

- In instruction, the capacity and rate of multimedia transmitting instructional information with distinctive nature of characteristic differ from that of students' acceptance of the information.
  When multimedia used to transmit instructional information in instructional process, students need

time to conduct the psychological process like distinguishing and making choices in the cognitive procedure of learning complex knowledge. The time mentioned is determined by the capacity and rate of multimedia transmitting information (Zhaoyan, 2006). The advantage of utilizing multimedia to instruct is multimedia can make the relationship between elements of complex information visible to reduce the memory space needed for students in handling the complex relationship between factors when constructing schematics and then ease students' cognitive load and enhance instructional efficiency. But in fact, multimedia reduces the memory space needed in handling the complex relationship between all elements, however increases many information element in return. Additionally, it is the opinion that simplifying the cognitive process that made teachers accelerating the speed of knowledge explaining, resulting in the release of time needed for students to construct cognitive schematic. It increases the cognitive load produced in receiving information instead of reducing it. What is meant is that while utilize multimedia to present knowledge, make the rate for teachers to externalize the semantic meaning of information differs from that for students to internalize the semantic meaning from external information. For instance, when teachers are explaining the non-visual programming language such as assembly language, C language, the increase in instructional contents and information capacity will be huge, if teachers are explaining with multimedia technology. But in the reason of teachers' sufficient preparation of lessons and previous knowledge structure richer than that of students, the rate of analyzing, explaining and externalizing a long code is higher than that of students' internalization for the external knowledge of code, thus reducing the time for students to reflect on. In this condition, the quantity of information that accepted by the students in working memory in unit time exceeds the previous cognitive load, which makes students easier to be tired of thinking or cause eye strain and then brings the learning efficiency down. On the contrary, teachers extend the time for the semantic externalization of code by writing codes in the blackboard and analyzing. For students, time for semantic internalization of codes increases, which helps students thinking deeper. With the capacity for short-term memory restricted, accelerated transfer process makes it easier to be forgettable, only part of it can be transformed into long-term memory (Mayere, 2001). Thus it is not beneficial to explain the knowledge about reasoning which is rigorously thinking and strong in abstraction, represented by higher mathematics, fundamentals of compiling, algorithm structure. Therefore it is not strange that the phenomenon that students understand in class but forget after class comes into being.

- That accelerating the internalization process of students' transfer of knowledge structure from the previous one to the new one makes the deprivation of the process of exploding what students learn.

  For students, in the process of studying and thinking, there is a process and ability that within it a series of actual experience and information codes transform to each other, what we call the ability of semantic encoding, abstract summarization and long-term memory. But in instruction with multimedia applying, the step of developing the ability of key cognition is often ignored. In the instance of a text, it is a series of complex process that from author's composing and learners' learning to learners' imitating and expressing and then developing unique thought and finally experiencing as really as possible, reappearing the author's intention. In traditional instructional mode, students accept information codes after reading, then store into the unit of working memory. These objective experience and images will transform into language information codes as the schematic constructing way of students. But if utilizing multimedia to instruction, it is teachers who translate language information codes and transform into images and experience that will be accepted by students. Therefore, in the process of transmitting knowledge, teachers and media tools take the place of students' thinking. Students seem to have learned knowledge, but in fact it is only a physical imitation of encoding and a short-term memory mode which has not entered into long-term memory to conduct schematic encoding. As a result of lacking the transforming process from receiving information codes to experience and images, it makes students' self-ability be hard to be promoted.
- That integrating the authors' intentions with multimedia resources or works will have a set influence to students' internal process of the knowledge structure transferring from previous to the new one.

  In the experiment on Macaca rhesus, Harlow, American comparative psychologist, found that animals would gradually found the fixed solution to solving problems of the same class while studying the projects repeatedly and would improve solving efficiency greatly if come up with similar projects. We call the discovery thinking set. Thinking set once formed, on the one hand, will promote the speed and ability to solving problems of the same class. On the other hand, it will obstruct concrete analysis of new projects, even create incorrect conclusion-negative effect, because of being limited by fixed solutions. When the condition of a problem has qualitative change, thinking set will make the solvers obey the rules. It is difficult for the solvers to bring up new minds

and make new decisions, resulting in the negative transfer of knowledge and experience. For example, when explaining the text, The Lotus Pool By Moonlight, if the teacher present a splendid video, externalizing the view into a fixed mode, the views representing the scenery of the lotus pool by moonlight in students' minds are similar, which leads the deprivation of the space for students to imagine. Therefore, when explaining ancient Chinese proses, poetries and proses, it needs students to conduct information encoding with the help of reading and then transfer encoding information to experience and images by themselves, in order to reach the purpose of promoting students' ability of imagining and creating.

- That depending too much on multimedia resources and courseware, like analog simulation and virtual reality, to carry though the instructional experiments weakens students' experimental ability, manipulative ability and ability for solving practical problems.

  The purpose of instructional experiments is that students can attain knowledge which is perceptual and conceptual, develop their minds and ability of creativity. However, in actual instruction, many teachers are the generation after 80s, who have high education background and do well in multimedia information technology. "Telling" the experiments with the courseware is easier than doing experiments. Besides, many experiments spend time and effort, as well as high cost, thus, many schools avoid experimental lessons and use demonstrative experiments to replace the ones should be done by students. According to the research for a certain area in shanghai, the fulfillment rate of experimental lessons is less than 80% for that time. That utilizing the multimedia analog simulation technology to present the course and result of the experiments which replacing students' actual operation will cause students' ignorance of experimentation and lead students to only remember the result and conclusion automatically by rote. What is more significant is that restorability and repeatability of multimedia software resources result in the randomness and blindness of operation. The attitude which is lack of carefulness and preciseness is taboo in experimental operation.

For another thing, study with overdue dependence on multimedia computers makes some change in the way to store and memory knowledge for students. Plenty of concrete knowledge is stored completely in internet or the computers, rather than their own long-term memory. What stored in their brains is the contents of the knowledge structure, which makes knowledge that the students have learned dispersive and messy. In this condition, the knowledge is short of logicality and is non-systematic, thus it could not form schematic in long-term memory. As result, when comes into practical problems, students are specious and could not consider deeper (Engelkamp, 1998).

CONCLUSION

Multimedia brings giant change for education and instruction and promotes the effect and efficiency of it as the achievement of modern technology. But it is difficult to change learners' cognitive framework and the knowledge constructing mode in cognitive process when utilizing multimedia to instruction, resulting from the internal essence of multimedia.

For conclusion, in the instruction with multimedia, teachers should balance it in the basic of concrete instructional contents and impose restrictions on using multimedia, with the purpose of avoiding the generation of generalization.

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