EFFECTS OF WEB READING, ONLINE ANIMATION MODELS, ONLINE FLASH MODELS, AND ONLINE YOUTUBE LEARNING IN DIGESTIVE SYSTEM

Ananta Kumar Jena[1]
Department of Educational Sciences
Assam University, Silchar-788011
E mail: akjenaaus@gmail.com

Abstract: In this virtual learning era, the teachers are directly applying the web reading, online animation models, online flash models, and online YouTube learning in teaching of science. The subjects (n=52) of an Indian elementary schools were randomly assigned to traditional treatment (n=10), online web reading (n=12), online animation (10), online flash model (n=11) and online YouTube learning (n=9) in digestive system. Pre intervention and post intervention data collected and analyzed by t test, ANOVA and Scheff Multiple Comparison techniques. It is resulted that web reading, online animation models, online flash models, and online YouTube learning has significant effect over traditional approach. This inductive research work could be applied for specific observation for broader generalization.

Key words: Digestive systems; online animation models; Online flash models; Online YouTube learning and Web reading

Introduction

Now a day, scientific methods of teaching are designing with collaborative learning style which encouraging investigation, and gathering of information. Besides these, explaining, interpreting, and hypothesizing are the common strategies to understand the concept, principal and theories of science. It's no doubt *students are clarifying their doubt or misunderstanding through these approaches, but still, why students' have no increasing rate of critical thinking, science curiosity and investigating ideas. That is why, teachers are applying innovative instructional modules to teach science.* Most of the approaches are student centred, while teachers are passive and students are active. Nevertheless, the question is in front of the world of education, whether virtual learning environment *motivate the learners and affect directly the students' critical thinking in science or not. If yes, what are these models, and how these models are effective over traditional methods?* In few decade back, traditional teacher-centred approaches was effective, while most noble laureates, scientists have completed their studies, starting from primary education level to post graduation levels. However, question in debate now, why we recently emphasizing on current models. To find the answer of this question, author tried to apply the web reading, online animation models, online flash models and online YouTube learning model in science teaching for its long term and broad generalization. Learning is an active process that requires previous knowledge, intelligent and creativity. In fact, learners have to learn the new knowledge by collecting, analyzing, sorting, and constructing the materials on their semantic behaviour. They might be able to acquire new ideas, himself/herself or from any sources for long-term retention. That is why, most effective teaching methods are designing only to stimulate thinking or to replace boring with the exciting activities. However, authors are emphasizing the truthfulness, flexibility, usability and applicability clearness about the issues. Similarly, sequencing relevant information, focuses on inquiry, thinking creatively are the methods in recent days. If we think critically about our own study, we can always read, write with an active mind, where our reading, writing will not be followed by an external teaching method. Web reading, online animation models, online flash models and online YouTube learning model prepared to realize the existence of knowledge and knowledge structure.

Web reading, online animation models, online flash models and online YouTube science learning

The concept in the form of hypertext content in the internet one can search by the search engines through electronic gadgets. The hyperlinks help to search other contents, which the reader can promptly get to, or where content can be uncovered logically at various levels. The hypertext pages are interconnected by hyperlinks, regularly actuated by a mouse click, key press grouping or by touching the screen. Separated from content, hypertext used to depict tables, pictures and other presentational substance structures with hyperlinks. Hypertext is the fundamental idea characterizing the structure of the World Wide Web, with pages regularly written in the Hypertext Mark up Language (HTML). It empowers a simple to-utilize and adaptable association and offering of

data over the Internet. Animation is the process of creating motion and shape change of a concept picture by means of the rapid display of a sequence of static images that differ from each other. Several studies have demonstrated positive impact of animations on understanding abstract processes. In general educational terms, animations can be viewed as a technique of visualization. Studies from numerous nations have exhibited positive impacts, which the utilization of diverse and creative philosophies and visualization advances may have to understudies' understanding of focal logical ideas (Wu & Shah, 2004; Kozma & Russel, 2005). Movements as moving showed materials are utilized all the more frequently at schools to delineate element changes over the long run and area, and represent phenomena or ideas that may be hard to picture (Cook, & Levinson, 2009). Flash Video document use to convey feature over the Internet utilizing Adobe Flash Player form and fresher. Flash Video substance inserted inside SWF documents. There are two diverse feature record forms known as Flash Video (e.g. FLV and F4V). The sound and feature information inside FLV records are encoded in the same way as they are inside SWF documents. Youtube is a feature-imparting site headquartered in San Bruno, California. People have transferred the majority of the substance on Youtube; however, media enterprises including CBS and BBC associations offer some of their material through YouTube, as a feature of the Youtube organization program. Six years the researcher applied different teaching strategies in primary schools and has faced so many difficulties of making the desired changes among students and other related problems due to time constraints, tensions in classroom realities. He realized the limitations of existing models that have shown in the above suggestive questions. That is why, the researcher emphasized the recent idea of web reading, online animation models, online flash models and online YouTube placed for further investigation in front of the world of education. Web based learning method has a significant effect on students' scientific process skills (Bayrak & Bayram 2003).Web-based learning applications influenced the K-12 students learning, and it changed the students and teachers' perception about the Web applications. It has intermediate effect via students and teachers' perception was found between the quality of Web-based applications and student learning (Liu, 2007).Web-learning environments have made learning much more convenient by stretching the spatial and temporal barriers. The study assessed the relative effectiveness of two different types of Web-learning environments (e.g. Distributed Passive Learning (DPL) Vs. Distributed Interactive Learning (DIL) environments) and resulted that the DIL environment is superior to the DPL environment in terms of both the learning process and the learning outcome (Khalifa and Lam, 2002). Widespread use of the Web and other Internet technologies in postsecondary education has exploded in the last 15 years. Effect of Web-based learning technology on students' engagement and self-reported learning outcomes in face-to-face and online learning environments resulted that a general positive relationship between the use the learning technology and student engagement and learning outcomes (Chen, Lambert, Guidry, 2010). Similarly, Jang, Hwang, Park, Kim, Kim (2005) examined the effects of a Web-based teaching method (versus a traditional lecture method) on undergraduate nursing students' learning of electrocardiography (ECG). Knowledge about ECG among students in the Web-based group was significantly lower than that of students in the control group ($p < .01$). Conversely, the ability to interpret ECG recordings was significantly higher among students in the Web-based group ($p < .05$). Rosen (2009) found the significant impact of animation-based on-line learning environment on transfer of knowledge and on learning motivation. Ainsworth (2008) found that innovations that educational technology has made available is new forms of representations, such as animation, multimedia, and virtual reality impacted the processes and outcomes of learning results. Aksoy (2012) determined the effect of animation technique on academic achievement of students in the "Human and Environment" unit lectured as part of the Science and Technology course of the seventh grade in primary education. It results that animation technique was more effective than traditional teaching methods in terms of enhancing students' achievement. Cayari (2011) suggested how YouTube has affected music consumption, creation, and sharing. Here, researcher the observed original songs, covers, collaborations, documentaries, self-interview, video blogs (vlogs), and live performances through YouTube.

Significance of the study

The current method of teaching natural science in elementary schools is didactic and does not engage pupil's actively. How can we guess what little children know the inner part of their bodies? How it is possible to the elementary school students? It is required to know where the food, water, and air enter and where it goes out. After intervention, children could recognize the specific organs in their own bodies from the diagram and linked with the intake of food and air (Garcia *et al* 2011). Teaching elementary school students about the digestive system is a challenging task. In this context, to understand the concept of digestion, students should learn self-using web, online animation models, online flash models and online YouTube. They should feel the mechanical breakdown of food, enzymatic activity of pepsin and amylase, antibacterial activity of hydrochloric acid, and importance of the villi for absorption through online animation (Sorgo *et al* 2008). Most of the researches show

that the virtual-learning environment helped most to the learners to understand science concepts. However, pupils' questioning in Lithuania, Germany, Romania, Malta and Czech showed that most of the respondents prefer real learning environment or combine real and virtual environments while learning natural sciences (Vilkoniene, 2009). Learning as an active process in which learners become aware about to find the conceptual relations for conceptual refinement has been called conceptual change (Jena, 2011). Here, classroom learning is not sufficient for the learners rather direct observation, web reading, online animation models, online flash models and online YouTube learning necessary for them, and it should not be compulsory all students.

Research questions

Is it possible to learn science through web reading, online animation models, online flash models and online YouTube? If yes, how modern methods are effective among students to clarify the misconceptions. Is there any effect of web reading, online animation models, online flash models and online YouTube model on the achievement of digestive system? Do the web reading, online animation model, online flash model and online YouTube models effective over the control group's pre and posttest score of digestive system?

Objectives

1. To study the effects of web reading, online animation models, online flash models and online YouTube learning over traditional learning.
2. To study the relative effects of web reading, online animation models, online flash models and online YouTube learning over traditional learning.
3. To study the best effective method among the web reading, online animation models, online flash models and online YouTube learning over traditional learning.

Hypotheses

1. There exists significant difference in the pretest and posttest of web reading, online animation models, online flash models and online YouTube learning and traditional learning.
2. There exists significant difference in the overall pretest and posttest of web reading, online animation models, online flash models and online YouTube learning and traditional learning.
3. There exists a significant effective method among the web reading, online animation models, online flash models and online YouTube learning over traditional learning.

Methodology

Participants

Sixty elementary students, aged between 12 and 13 years attended a school in an urban area, were the participants. Section A of General science class was randomly assigned to an experimental group (n = 42) while Section B assigned as the control group (n = 10). However, the experimental group was assigned for self-web reading, online animation models, online flash models and online YouTube on science learning taught through animation cum discussion instruction, the control group was used the traditional instruction.

Design of the study

This study was a *Non-Equivalent Pretest-Posttest Quasi Experimental Design* assessed the effect of independent variables (*i.e.* web reading, online animation models, online flash models, and online YouTube learning) on dependent variables (*i.e. learning performance*). To minimizing the effect of *extraneous variables*, the researcher used *ANOVA and Scheff Multiple Comparison* and random sampling techniques. The findings of the study were generalized upon the whole population. First, Digestive system, misconception test was administered to the control and experimental group students to identifying their degree of misconceptions in Digestive system. However, these concepts of Digestive system, students were studied in the last semester and it was the right time to assess the students' misconception levels. The control group students were taught through traditional approach and experimental group exposed to web reading, online animation models, online flash models, and online YouTube learning of digestive system materials. However, the process of viewing the web reading, online animation models, online flash models, and online YouTube learning of digestive system and graphic was under the supervision of the researcher. The virtual experimental intervention like web reading, online animation models, online flash models, and online YouTube learning was assigned to the experimental group and traditional lecture to control group. After the end of the intervention, a posttest was administered to both the groups of students. To observe the effects of web reading, online animation models, online flash models, and online YouTube learning of digestive system treatment; t-test, ANOVA & Scheffe multiple comparisons was used (*see* Design of the study in Box-1).

Box-1 Design of the study

Sl. No.	Group	n	Pretest/ Misconception test	Treatment	Post test
1	Experimental Group(42)	12	T^1	web reading model	T^2
		10	T^1	online animation model	T^2
		11	T^1	online flash model	T^2
		9	T^1	online YouTube learning	T^2
2	Control Group(n=10)	10	T^1	Traditional	T^2

Questionnaires

Digestive System Concept Test (DSCT)

In order to assess students' understanding of Digestive system concepts, a multiple-choice test was developed by following all the standardized criteria. A 15 mark multiple-choice items having a correct response, two wrong responses and a strong distractor framed for each item followed by measuring the correction of guessing, item difficulty, and item discrimination power. The reliability (Split-half .78 & Cronbach α .75) and validity (Content Validity Ratio .67) of the test was fixed during the standardization procedure.

Procedure of data collection

From the beginning of March, first, week of 2014, the author randomly selected 50 elementary school students from the population. The researcher advised and facilitated the participants to continue three-month self-learning through different virtual models to find out the result for the generalization. Mostly, web reading, animation models, flash models and YouTube like four packets of online learning materials were used to learn digestive organs' identification, structure and function. The concept like the digestive system; the buccal cavity; the gastrointestinal system; the intestines; the liver, gall bladder, and pancreas, and the absorption of nutrients were the experimental group students learn through web reading, animation models, flash models and YouTube. Earlier, these web reading, animation models, flash models and YouTube model of digestive system was familiarized with the student. That is why, experimental class was exposed to virtual learning environment (*see* Appendix I). Before virtual learning, a pre-test; and after learning, the post-test was administered among the students to know early performance. Experimental group students self studied the digestive system includes the buccal cavity; the gastrointestinal system; the intestines; the liver, gall bladder, and pancreas; the digestion of food, and the absorption of nutrients through web reading, online animation models, online flash models and online YouTube using internet different websites. Activity sheet was used among the students to do the activities (*see* Appendix II) while the control group was used the traditional instruction.

1.8.0 Analysis and results

Hypothesis 1 There exists significant difference in between the pretest and posttest of web reading, online animation models, online flash models and online YouTube learning, and traditional learning.

Table 1.1 Mean and t test of learning through web reading, online animation models, online flash models and online YouTube learning over traditional methods of teaching.

		N	Mean	df	t	P
Traditional Teaching						
	pre-test	10	6.10±1.197	9	7.359	.00
	post-test	10	9.40± .699			
Web Reading						
	pre-test	12	8.75± .965	11	7.176	.00
	post-test	12	12.33±1.155			
Online Animation						
	pre-test	10	8.30±1.05	9	10.864	.00
	post-test	10	12.60±9.843			
Online Flash Model						
	pre-test	11	8.82± .603	10	11.353	.00
	post-test	11	12.36±1.027			
Online Youtube						
	pre-test	9	8.56± .527	8	11.068	.00
	post-test	9	12.44±1.014			

Table-1.1 showed the descriptive inferential analysis of achievement of digestive system of the school. It results that Traditional Teaching Students' posttest mean (9.40± .699) was higher than the pretest mean (6.10±1.197) whereas the virtual modes of learning performance was better than the traditional students' performance. When α=0.05, the p value (<.00) indicates significant difference between the outcomes of pre and post of digestive system test of traditional learners' performance. The $t_{(9)}$ =7.359 was significant. Similarly, Web Reading students' posttest mean (12.33±1.155), Online Flash Model students' post test mean (12.36±1.027) and Online YouTube students' posttest mean(12.44±1.014) were surprisingly better than their respective pretest mean. Their respected t value ($_{11}$ /7.176, $_{10}$ /11.353 & $_{8}$ /11.068) was significant. Conversely, online animation students' posttest mean (12.60±9.843) was surprisingly greater than the pre test mean (8.30±1.05) and that posttest mean was better than other virtual and traditional learning performance. The $t_{(9)=}$ 10.864 was significant.

Hypothesis 2. There exists significant difference in the overall pre-test and post-test of web reading, online animation models, online flash models, online youtube learning, and traditional learning.

Table 1.2 ANOVA of overall pretest and posttest of web reading, online animation models, online flash models and online YouTube learning and traditional learning.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	358.163	1	358.163	173.283	.000
Within Groups	210.827	102	2.067		
Total	568.990	103			

The $F_{(1/102)}$ 173.283 when the level of significance is set at 0.005, the small p value (.000) indicates significant difference in overall pretest and posttest of web reading, online animation models, online flash models and online YouTube learning and traditional learning.

Hypothesis 3. There exists a significant effective method among the web reading, online animation models, online flash models, and online YouTube learning over traditional learning.

Table 1.3(a) ANOVA of overall pretest and posttest of web reading, online animation models, online flash models and online youtube learning and traditional learning methods.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	124.514	4	31.128	6.933	.000
Within Groups	444.477	99	4.490		
Total	568.990	103			

Table 1.3(a) reveals the ANOVA result of the outcomes of pre and posttest of learning digestive system through web reading, online animation models, online flash models and online YouTube learning and traditional learning. Like the total five methods comparisons, the results favoured the post intervention outcomes of the students ($F_{(4/99)}$ 6.933 $p < .000$). Hence, there existed a significant difference among the methods such as web reading, online animation models, online flash models, and online YouTube learning over traditional learning.

Table 1.3(b) Scheffe Multiple Comparison among the learning methods such as web reading, online animation models, online flash models, and online YouTube learning over traditional learning.

(I) Methods	(J) Methods	Mean Difference (I-J)	Std. Error	P
Traditional	web reading	-2.792*	.642	.002
	online animation models	-2.700*	.670	.004
	online flash models	-2.841*	.655	.002
	online youtube	-2.750*	.688	.005

Table-1.3(b) interprets Scheffe Multiple Comparison of pretest and posttest level of analysis of web reading, online animation models, online flash models, and online YouTube learning over traditional learning. The mean difference between Traditional and Web reading & online flash model (-2.792 & -2.841 $p < .005$) was significant and both Web reading and online flash method was effective over the traditional method of teaching. Similarly, The mean difference between Traditional and Online animation & Online YouTube model (-2.700 & -2.750 $p \leq .005$) was significant and both Online animation & Online YouTube model was effective over the traditional method of teaching. Figure-1 Comparison among the pretest and posttest mean score of web reading, online animation models, online flash models, and online YouTube learning over traditional method of teaching

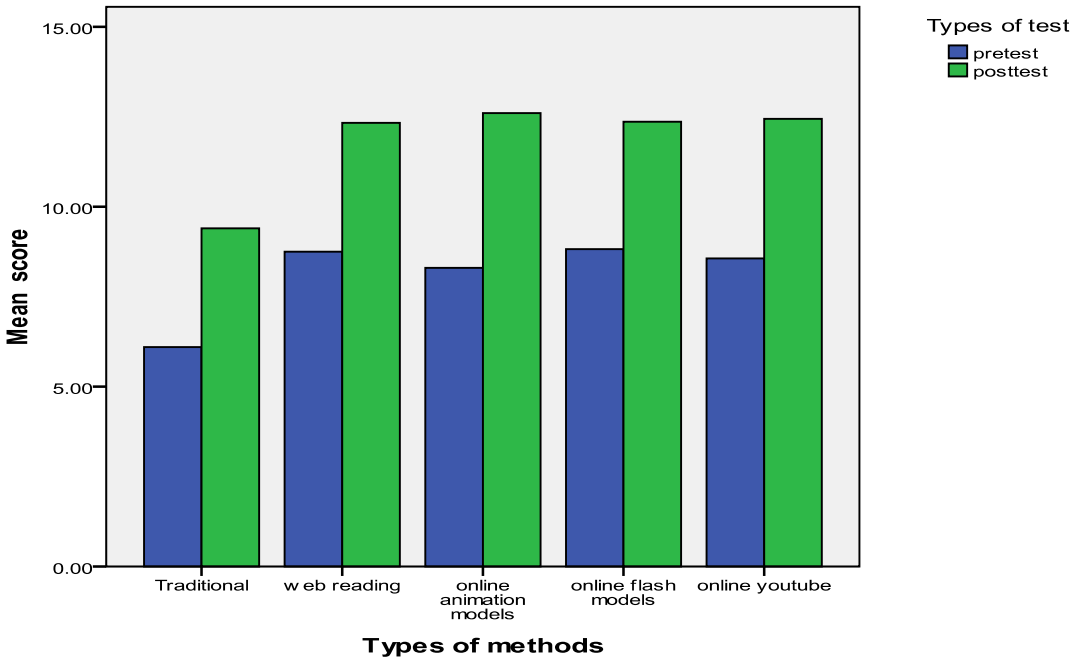


Figure 1 interprets the comparison among the pretest and posttest mean score of web reading, online animation models, online flash models, and online YouTube learning over traditional method of teaching. It showed two distributions in the histogram on the same ordinate axis, the pretest and posttest scores of web reading, online animation models, online flash models, and online YouTube learning over traditional method of teaching. The vertical line (the Y axis) OY, and the horizontal line (the X axis) OX represents the types of methods and mean score respectively. Y axis represents the scores with mean pretest and posttest score measured from the origin

such as web reading(8.75 & 12.33), online animation models(8.30 & 12.60), online flash models (8.82 & 12.36), and online YouTube learning (8.56 & 12.44) over traditional (6.10 & 9.40) method of teaching.

Discussion

The author experienced that science education needs the effective teaching, and that could only be fulfilled by the virtual model of teaching. However, it is a challenging task in front of world of educationist to prepare course materials in these virtual models because virtual teaching strategies are the new hope and new possibility to make significant incremental changes in epistemology, pedagogy, and practice in science education. Moreover, there is no difficulty for implementing these virtual models, in pedagogy and practices. These should be included in the curriculum for classroom transaction at elementary level but *who will implement these, where these should be implemented, are the recent questions?* The researcher experienced that the children recognised specific organs in their own bodies which they associate with the intake of food and air (Garcia-Barros, et al, 2011). Teaching school students about the digestive system is not a challenging task for a teacher, but how, traditional method help students to realise the chewing and other inner activities performed in oesophagus, stomach, small intestine, large intestine. Similarly, how students observe the mechanism of breaking down of food, enzymatic activity of pepsin and amylase, antibacterial activity of hydrochloric acid, and the importance of the villi for absorption, without animation or any other movable images (Sorgo et al 2008). In fact, both real and virtual environments necessary while teaching natural sciences (Vilkoniene, 2009). Similarly, testing the pH of various liquids is one of the most popular activities in 5th- through 8th-grade classrooms and virtual learning an opportunity to learn the structure and function of human digestive system (Kim, 2008 & Teixeira, 2000) and not only these, other activities would necessary in the teaching of science (Peiter, 1996). Therefore, more information sheets, one or more activity sheets and a detailed lesson plan includes lesson objectives, a list of supplementary teaching and classroom materials includes laptops, internet facilitate computer laboratory, evaluation items, and answer keys to the student should be supplied. Hence, the teachers of the world will realize the importance of virtual models of teaching science, and I think, the result might be encouraging. The evidences also found that teachers have positive attitude, value, belief, and behavior, towards new method of teaching. Therefore, the teachers' of the world should realize and try to apply these virtual models in science learning.

Conclusion

Teaching Science through web reading, online animation models, online flash models, and online YouTube learning is not a challenging task for the world of teachers. To promote these, seminars, conferences, and workshops should organize to develop modules to apply at the grassroots level. The teacher training institutes, teacher educators, policy makers, and curriculum framers, should utilize the effectiveness in practical situation. It should introduce in the primary and secondary teacher training classes to train the pre-service teachers those they apply in the primary and secondary classes. The educationist, administrators, teachers, and student community should realize the significance of web reading, online animation models, online flash models, and online YouTube learning. Open, distance learning, corresponding courses should be open through web reading, online animation models, online flash models, and online YouTube learning over traditional learning and those should free for all age or group of learners. In this paper, the author has tried to present the theoretical foundations of virtual models with a little bit of experiment for its generalization. While at first glance, virtual model may appear to understand the foundations for this tool and its proper use will lead the user to see that, this is truly a profound and powerful tool. The researcher wish to use this document as a foundation for further experiment, and this needs critique, and dialogue regarding the use of this tool. The researcher invites his entire colleagues to use these virtual models as a teaching tool. In his opinion, virtual model should apply for the generalization for long-term benefits.

Educational implications

In preliminary, the researcher faced trouble during the implementation of web reading, online animation models, online flash models, and online YouTube learning model, among elementary school students, but in the experiment, he experienced a lot. For further study, he has established this model in front of a world of education for its proper course development and its improvement. As a result, it is recommended the world of colleagues to attempt this practice during instruction to the elementary students in the teaching of science.

Useful for curriculum development

The policy makers and educationist should take incentive to design web reading, online animation models, online flash models, and online YouTube learning model curriculum for all subjects in science. The student should classify the themes that they want to emphasize and they organize knowledge differently to challenge their ways of thinking but in traditional course plan students have no freedom to think or organize knowledge. In the web reading, online animation models, online flash models, and online YouTube learning model, student could identify related concept from the HTML text, which helps them to move beyond traditional disciplinary boundaries. In fact, the ontology model curriculum helps students and teachers to select appropriate instructional materials. The curriculum framer may facilitate to reconceptualise the web reading, online animation models, online flash models, and online YouTube learning course of content to provide a base for discussion among students. This web reading, online animation models, online flash models, and online YouTube learning curriculum can help to develop courses integrated, logically sequenced, and have continuity with previous and new knowledge.

It is applicable in the formal schooling

The greatest challenge is to introduce web reading, online animation models, online flash models, and online YouTube learning model in formal schooling. Teachers need to become familiar with the use of web reading, online animation models, online flash models, and online YouTube learning model first than it will be easiest to use in general classroom situations. Teacher education programs should adopt such model for the learning.

For open, corresponding and distance education

Web reading, online animation models, online flash models, and online YouTube learning model is an emerging model needs the wide use in universities and institutions around the globe. The researcher realised that this model also useful for open, correspondence and distance education and the self-instructional material should design sequentially in such a way that learners would realize the real classroom or campus at their home.

Acknowledgement
I thank our colleagues for their great support. I apologize to all those participants who were directly participated in the study that I could not mention their names in this report due to the ethical constraints.

References

Ainsworth, S. (2008). How do animations influence learning? In D. Robinson & G. Schraw (Eds.), Current Perspectives on Cognition, Learning, and Instruction: Recent Innovations in Educational Technology that Facilitate Student Learning. pp 37-67. Information Age Publishing.

Aksoy, G. (2012). The Effects of Animation Technique on the 7th Grade Science and Technology Course. *Creative Education, 3,* 304-308. doi: 10.4236 /ce.2012 .33048.

Bayrak,B.K., Bayram,H.(2003). The Effect Of Web Based Learning Method In Science Education On Improving The Students' Scientific Process Skills. International conference on the future of education, PIXEL online.net.

Cayari, C. (2011). The YouTube effect: How YouTube has provided new ways to consume, create, and share music. *International Journal of Education & the Arts*, *12*(6). Retrieved [date] from http://www.ijea.org/v12n6/.

Chen,P.D., Lambert , A.D., Guidry,K.R.(2010). Engaging online learners: The impact of Web-based learning technology on college student engagement Computers & Education, 54(4), 1222–123.

Cook DA, Levinson AJ, Garside S, Dupras DM, Erwin PJ, Montori VM.(2008). Internet-based learning in the health professions: a meta-analysis. Journal of American Medical Association, 300(10),1181-96. doi: 10.1001/jama.300.10.1181.

Garcia-Barros, S.; Martinez-Losada, C.; Garrido, M.(2011).What Do Children Aged Four to Seven Know about the Digestive System and the Respiratory System of the Human Being and of Other Animals? International Journal of Science Education, 33(15), 2095-2122.

Jang, K.S., Hwang, S.Y., Park, S.J., Kim, Y.M., Kim, M.J.(2005). Effects of a Web-based teaching method on undergraduate nursing students' learning of electrocardiography. J Nurs Educ., 44(1), 9-35.

Jena.A.K.(2011).Concept mapping as a constructivist approach for meaning making in science learning and attitude among elementary school students. Ph.D.Education.Utkal University,Odisha.

Khalifa,M. and Lam,R.(2002). Web-Based Learning: Effects on Learning Process and outcome IEEE transactions on education, 45(4),1-5.

Kim, H. (2008).Teaching Human Digestion and pH Using Technology Science Activities: Classroom Projects and Curriculum Ideas, 44(4), 147-152.

Kozma, R., & Russell, J. (2005). Students becoming chemists: Developing representational competence. In J. Gilbert (Ed.), Visualization in science education (pp. 121-146). London: Kluwer.

Liu, L. (2007). An intermediate effect between the quality of web-based learning applications and student learning. International Journal of Technology in Teaching and Learning, 3(2), 29-46.

Peiter, A.(1996). Introduction to Animal Nutrition. Instructor Guide and Student Reference. 28(7-8),118. Instructional Materials Laboratory, University of Missouri, 8 London Hall, 2316 Industrial Drive, Columbia, MO 65202; 800/669-2465.

Rosen, Y. (2009). The effects of an animation-based on-line learning environment on transfer of knowledge and on motivation for science and technology learning. Journal of Educational Computing Research, 40(4),451-467.

Sorgo, A.; Hajdinjak, Z.; Briski, D.(2008). The Journey of a Sandwich: Computer-Based Laboratory Experiments about the Human Digestive System in High School Biology Teaching. Advances in Physiology Education, 32(1), 92-99.

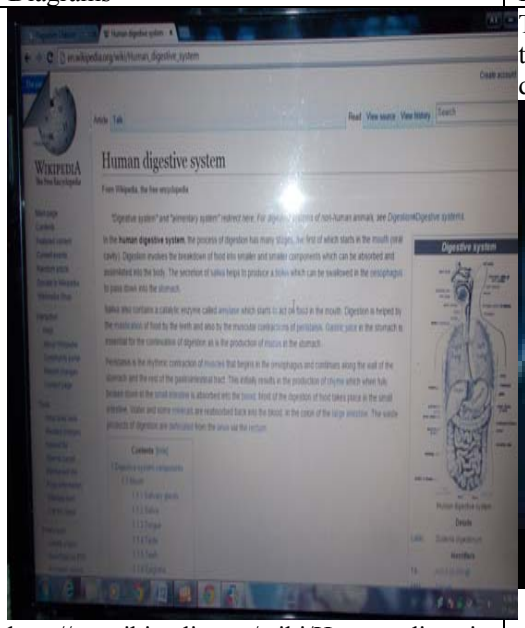
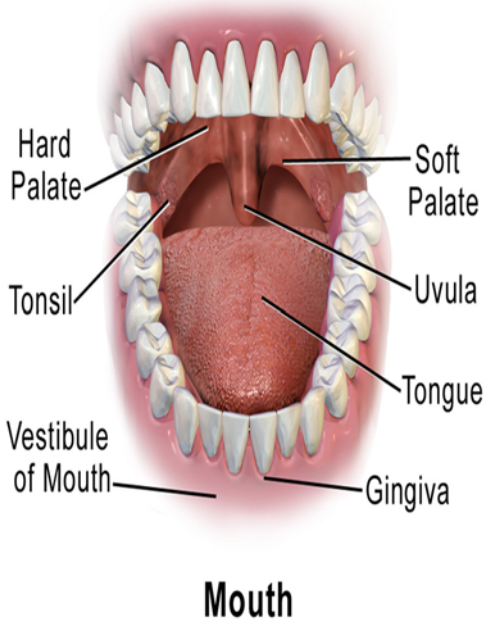
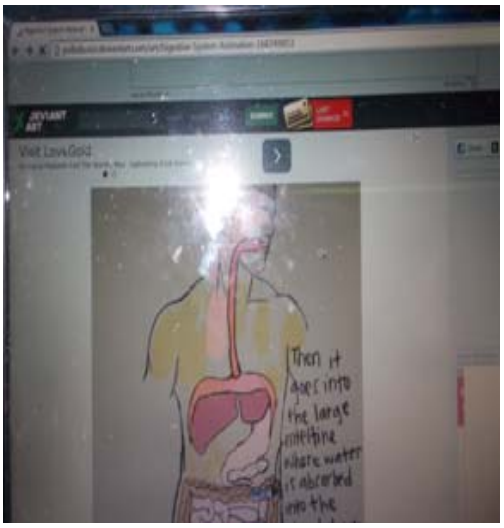
Teixeira, F. M.(2000).What Happens to the Food We Eat? Children's Conceptions of the Structure and Function of the Digestive System. International Journal of Science Education, 22(5), 507-20.

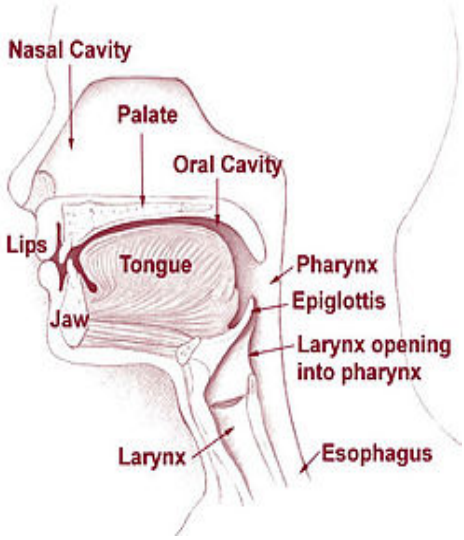
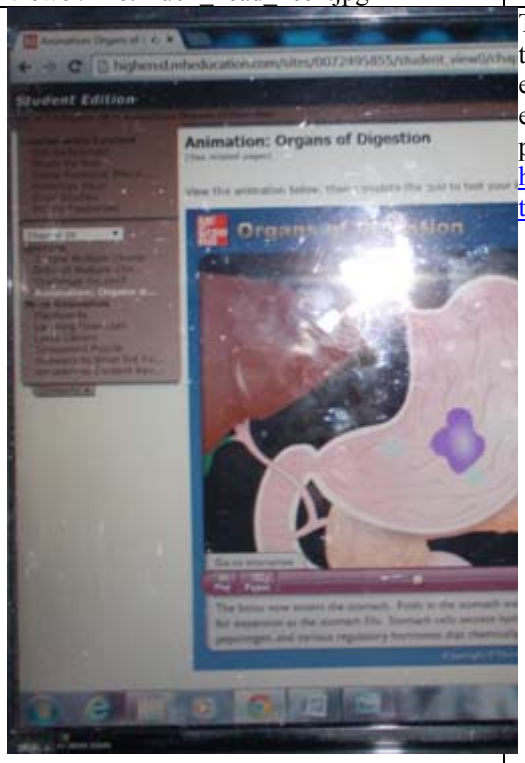
Vilkoniene, M.(2009).Influence of Augmented Reality Technology upon Pupils' Knowledge about Human Digestive System: The Results of the Experiment. Online Submission, US-China Education Review, 6(1), 36-43.

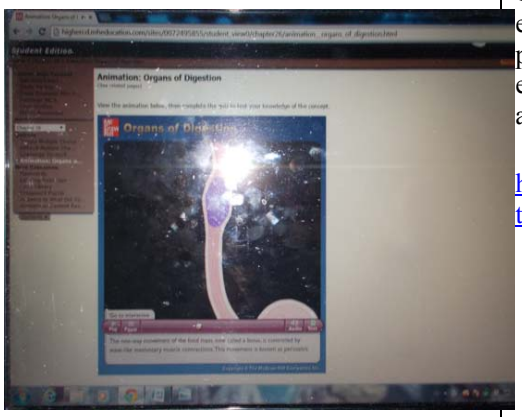
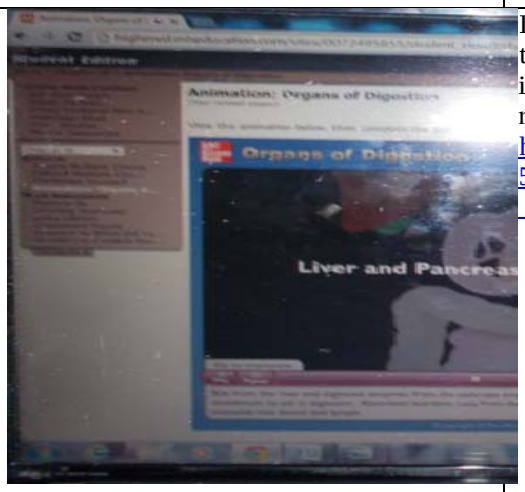
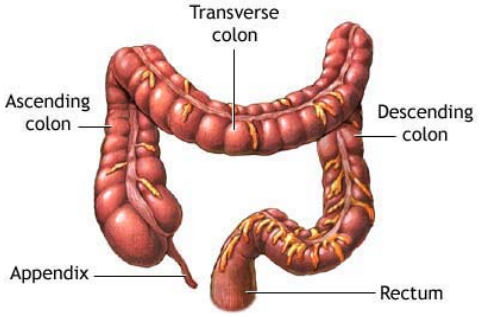
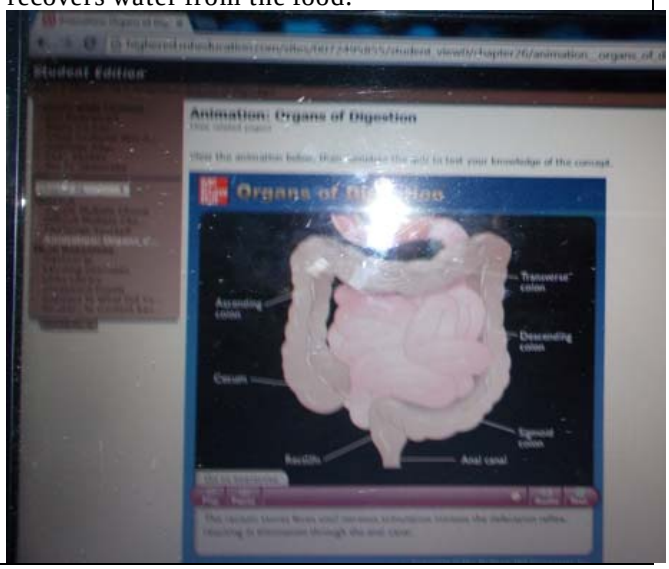
Wu,H-K., and Shah,P.(2004). Exploring visuospatial thinking in chemistry learning Science Education, 88(3), 465–492.

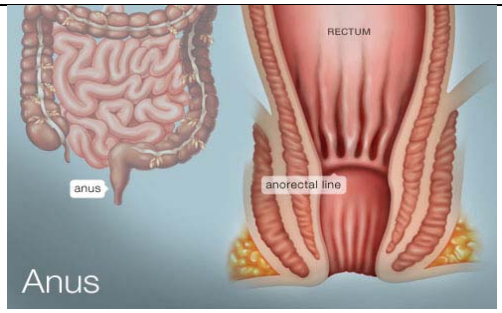
Appendix-I

Activity-I **assigning students to read** web **and to watch** online animation models, online flash models, and online YouTube learning model **the animation and flash models of human digestive system**

Concept	Diagrams	Identification & Discussion
Digestion	 http://en.wikipedia.org/wiki/Human_digestive_system	These are the different external and internal organs, but their structure performs different functions in food digestion. www.youtube.com/watch?v=1h2VW8USCAA 
Mouth	 http://en.wikipedia.org/wiki/Human_mouth#mediaviewer/File:Blausen_0653_MouthAnatomy.png	In the mouth, teeth break the food and grind into smaller parts and at the same time, saliva makes them into bolus. http://polkabeast.deviantart.com/art/Digestive-System-Animation-168749853 

Pharynx	 http://en.wikipedia.org/wiki/Pharynx#mediaviewer/File:Illu01_head_neck.jpg	The pharynx is a funnel-shaped muscular tube and it is the common route for both food and air into esophagus where epiglottis is a security guard or the gatekeeper for both esophagus and lungs.
Oesophagus & stomach		The esophagus helps to move the food from the mouth to the stomach. The stomach is existed between the esophagus and the small intestine. It secretes digestive enzymes and HCl to aid in food digestion and send the partially digested food to the small intestine. http://highered.mheducation.com/sites/0072495855/student_view0/chapter26/animation__organs_of_digestion.html

Peristalsis & stomach		The contraction and relaxation of muscles inside the esophagus, creates a wave and down the muscular tube is peristalsis. The peristaltic wave occurs when the bolus enters the esophagus and down the bolus into esophagus and into the stomach. http://highered.mheducation.com/sites/0072495855/student_view0/chapter26/animation__organs_of_digestion.html
Small intestine, liver and pancrease		Inside the stomach, Hydrochloric acid breaks down the food into small parts and supply to the small intestine. In the small intestine, food neutralized into molecules and absorbed into the blood stream. http://highered.mheducation.com/sites/0072495855/student_view0/chapter26/animation__organs_of_digestion.html
Large intestine	 http://highered.mheducation.com/sites/0072495855/student_view0/chapter26/animation__organs_of_digestion.html	The large intestine divided into ascending colon, transverse colon and descending colon, which recovers water from the food. 

Anus	 www.webmd.com	The colon collects indigestible parts of food and refuses in time. www.learnerstv.com/video/Free-video-Lecture-258-biology.htm

Appendix-II

Activities Sheet

Student activities	Conception
Activity-1 List the terms related to digestion **What are these organs related to digestive system, that we have learnt earlier? Draw these organs.** **What do you know about the digestive system? Please discuss each other.** **Activity-2 sorting and classifying organs** **Students are individually advised to draw a diagrams or each group draw a part of the diagram.**	Mouth Pharynx Oesophagus Stomach, liver, pancreas Small intestine Large intestine Rectum anus The digestive system catabolic process by which food simplifies and absorbs into the blood, and the remaining goes outside of the body.
Activity-3 Do you know the work of teeth and tongue? **Do you guess saliva be helpful in digestion?** **To know the chewing force of the jaws, students are advised *"take a piece of apple on the table to understand the importance of the mechanical breakdown of food".*** **Activity-4(a) chews a piece of apple and grinds a piece of apple by a grinder. See, are these equal?** **Work sheet-(write what you perceive?)** _____ _____ _____	In the mouth, teeth break the food into smaller parts in the same time saliva simplifies and makes into bolus. Saliva makes the food wet and makes it easier to swallow so you do not choke.
Activity-5 enzymatic activity of pepsin and amylase, **Take two or more teaspoons of saliva of your own and collect these in a bottle. Chew few dry potato chips and after a few minutes add a few drops of saliva to the chewed potato chips. After that add a drop of iodine and see the color of that chewed potato chips.** **Work sheet-(write what you perceived?)** _____ _____ _____	Saliva contains amylase and potato chips have starch (sugar). Starch simplified due to act of amylase. In presence of iodine, starch converted into dark color.

Activity-6 pH test

Testing the pH of various liquids is one of the most popular activities in 5th-grade classrooms.

Take pH paper and test their change of colors.

Saliva(mouth)
HCl(stomach)
Sea water(alkalinity)
Urine(alkalinity/acidic)
Blood(alkalinity/acidic)
Lemon juice(acidic)

Acidic liquids like; HCl, lemon juice (pH below 7) turned the paper red while alkaline liquids like; saliva, urine seawater (pH above 7) changed the pH paper blue or purple. Litmus paper is good for roughly estimating the relative pH of liquids. Alkalinity reduces acidity and totally changes into neutral.

Activity-5 Oesophagus
From the mouth, where does the food enter?
Rubber tube and semisolid mud

Take a rubber tube and put some semi solid mud. Hold it vertical and see, what happen?

The esophagus is a long muscular tube, extended into the stomach. Food does not travel not by itself; rather it pushed due to contraction and relaxation of the muscles. This is peristalsis. It takes only few seconds to send the food into the food to the stomach. However, the esophagus moves the food from the mouth to the stomach

Work sheet-(write what you perceive?)

_____

_____

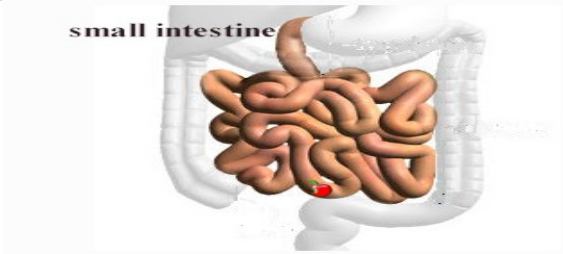
_____

.

Activity-6 Stomach
Do you know the function of this bag like organ?

Hydrochloric acid and sea water

In the stomach, Hydrochloric acids break the food down into parts that absorb into the blood supply at small intestine. Inside the stomach hydrochloric acid used to regulate the basicity (pH) of solutions



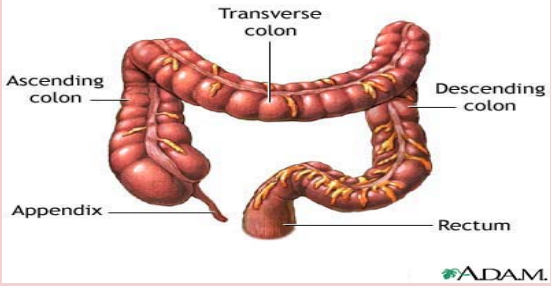
www.uen.org
Activity
What is that? Have you seen this at chicken centre?
Inside the stomach, Hydrochloric acid breaks down the food into small parts and supply to the small intestine. In the small intestine, food neutralized into molecules and absorbed into the blood stream.

The average length of the small intestine in an adult human male is 6.9 m and in the adult female 7.1 m. It is approx. 2.5–3 cm in diameter. Most of the digestive enzymes that act in the small intestine are secreted by the pancreas and enter the small intestine via the pancreatic duct. Digested food is now able to pass into the blood vessels in the wall of the intestine through the process of diffusion. The small intestine is the site where most of the nutrients from ingested food are absorbed. The inner wall, or mucosa, of the small intestine is lined with simple columnar epithelial tissue. The food that remains undigested and unabsorbed passes into the

large intestine.
www.wikipedia.com

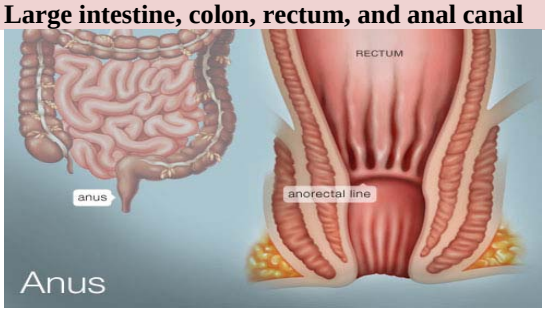
See text and make a note

_____
_____
_____
_____



The large intestine is about 4.9 feet (1.5 m) long, which is about one-fifth of the whole length of the intestinal canal. Its function is to absorb water from the remaining indigestible food matter, and then to pass useless waste material from the body.

Large intestine, colon, rectum, and anal canal



The anus is an opening at the opposite end of an animal's digestive tract from the mouth. Its function is to control the expulsion of faeces, unwanted semi-solid matter produced during digestion,

www.webmd.com
Activity
Anus
Do you know where undigested food go outside? If your answer is anus, see the structure....