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EFFECT OF WEB BASED INSTRUCTION ON ACHIEVEMENT IN BIOLOGY IN RELATION TO INTELLIGENCE

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Abstract

This study analyzes the effect of web based instruction on achievement in Biology in relation to intelligence. The study investigated 320 Class IX students from Amritsar city. Achievement test in Biology of 60 items and General Group Test of Intelligence by Ahuja were used to collect the data. Experimental group was taught with the help of website named Webzbio.com and control group was taught by conventional mode of instruction. The results revealed that students achieved higher when taught through web based instruction as compared to conventional mode of instruction. Intelligence of students effected their achievement and interaction effect of instructional strategies and intelligence was found to be significant.

Keywords:

Web based instruction, Achievement in Biology, Intelligence

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1. INTRODUCTION AND THEORETICAL FRAMEWORK

Intelligence comprised of mental abilities, is the necessary condition for achievement. Without intelligence knowledge cannot be obtained which is needed to deal with a number of situations and contingencies in life and help in gaining a greater amount of practical or theoretical experience. It is an established fact that intelligence is an essential factor in almost every type of reaction i.e. cognitive, connative and affective and every subject. It is the intelligence that increases the individual's capacity to learn quickly, solve problems, perform tasks quickly and accurately, comprehend and to carry ability for abstract thinking and thus, contribute to higher achievement. In the competitive era, everyone wants to be intelligent and outshine in the field by applying the gained knowledge through the ways of thinking and reasoning. But an individual with low intelligence cannot excel in any subject due to lack of capacity to act purposefully, to think rationally and to deal effectively with his environment.

It is due to the fact that the traditional classroom settings do not cater to the individual differences. Teachers generally meet the needs of average and above average students in their classes. They do not engage each and every student in the teaching learning process. They present information by using linear model like video may be shown from the beginning to the end or a textbook is covered from one chapter to next. Learning environment in this setting is mostly taecher designed and directed and pertinent to address intelligent students' learning needs. These types of learning experiences do not appeal to the students with low intelligence. There is a need to develop learning experiences which are diversified, exploratory, guided and soundly constructed.

In recent years increased awareness towards the latent benefits of adaptivity in web based instruction has been reported. This is due to the realization that traditional learning systems are not able to fulfil the requirements of individualized learning (i.e., learning system tailored to the specific requirements and preferences of each individual) (Paramythis and Loidl-Reisinger, 2003). Web-based instruction is probably one of the most flexible types of instruction, providing a forum where all intelligences can be represented and cultivated regardless of the physical location of the student (Nelson, 1998). . Web-based instruction is teaching and learning supported by the attributes and resources of the Internet (Khan, 1997; Relan and Gillami, 1997). Availability of various web based recourses helps these students in making the concepts clearer and results in better achievement. Graphics and animations are particularly capable of attracting learners' attention and facilitating their understanding of abstract concepts. The feasibility of animation and video is the result of a phenomenon known as persistence of vision, in which objects remain on the retina of the human eye for a moment after they are viewed (Vaughan, 1998). Success in online courses is probably a combination of technical, personal, cognitive, motivational and psychological factors. Successful students need to be able to monitor their own learning and progress, garner peer support, exercise good time management skills, and draw on experience to find resources on the Internet (Blocher, De Montes, Willis and Tucker, 2002; ACSDE, 1999).

Web based instruction provides both ideal resources and platform that can accommodate the students with different levels and types of intelligence. By designing web-based instruction which adheres to these intelligences, instructional designers will be creating course content which is more engaging to the end user. The more engaging the content becomes to the user, the more likely for educational success (Osciak and Milheim, 2001). Web-based resources assist teachers in identifying students' intelligences and engaging them in activities which best suits to their intelligence. Provision of different types of resources such as images, graphics, audio, video and animation in web based instruction appeal to students with high as well as to low intelligence students. Provision of e-mail, chat forums, webquest facilities etc. also help the students to communicate with their peer and teachers and construct their knowledge on the basis of feedback they get from them.

Internet-based tools provide multiple avenues for learning as well as the overall design of effective Web-based instruction and essentially fall into five categories: communication, listservs, chat forums, computer conferencing and class Web sites (Nelson, 1998). E-mail is the most common communication tool used in web based instruction and its use appeals to learners who have heightened intelligences in linguistic, interpersonal, and intrapersonal areas. Within a Web-based class, an instructor can e-mail a student a class assignment or a response to a question. In this case, the feedback would be individual (interpersonal intelligence), with the student having the opportunity to reflect on the comment (intrapersonal intelligence) and respond back to the instructor (linguistic intelligence). Finally, the action of typing the email to express the question or respond to the instruction is a demonstration of linguistic intelligence, with the overall communication between the student and instructor demonstrating interpersonal intelligence (Nelson, 1998).

From the above discussion it is clear that web based instruction not only enhance achievement of students but also accommodates students with different levels of intelligence (below average, average and above average) and different types of intelligences (linguistic, logical mathematical, spatial, musical, bodily kinesthetic, interpersonal, intrapersonal, and naturalistic). Many researchers (Osciak and Milheim, 2001; Dara-Abrams, 2002; Arroyo, Beal, Murray, Walles and Woof, 2004; and Own and Li, 2004) have developed hypermedia that accommodate different types of intelligences.

The perusal of the contents given above reveals that there is not a single study that explores the effect of web based instruction on achievement in relation to intelligence. Research is needed to understand the relationship between students' achievement having different levels of intelligence in web-based learning environment. This type of research will assist educators in planning, organizing, and delivering quality web-based instruction in a manner that will improve student achievement and accommodate different levels of intelligence.

2. OBJECTIVES OF THE STUDY

- To study the effect of different instructional strategies i.e. web based instruction and conventional mode of instruction on achievement of class IX students in Biology.
- To study the difference in achievement of class IX students in Biology with high and low level of intelligence.
- To study interaction effect of instructional strategies and intelligence on achievement of class IX students in Biology.

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3. HYPOTHESES OF THE STUDY

1. There will be no significant difference in achievement of class IX students in Biology taught through different instructional strategies i.e. web based instruction and conventional mode of instruction.
2. There will be no significant difference in achievement of class IX students in Biology with high and low level of intelligence.
3. There will be no significant interaction effect of instructional strategies and intelligence on achievement of class IX students in Biology.

4. RESEARCH METHOD

A. Research Design

In the present study, 2 X 2 factorial experimental design was employed.

4.2 Sample for the Study

Class IX student sample (N=330) was drawn randomly from the three schools of Amritsar city. The sample comprising of 330 students was administered two tests-test of achievement in Biology and test of intelligence. Out of 330 students, six students did not respond to all the items of achievement and four students did not respond to some items of intelligence test i.e. total of 10 students were dropped from the sample of 330 students. The scores of these students were not considered at the time of analysis. Hence sample comprising of 320 students were randomly divided into two groups- the experimental group and the control group. In order to make equivalent groups, matching was done at the pre-test stage for two variables- variable of achievement in Biology (pre-test) and intelligence. t-test was employed to compare mean scores on the variable of achievement in Biology and intelligence. Insignificant t-ratio showed that both the groups were matched and equivalent. The experimental group was taught with web based instruction and the control group was taught with conventional mode of instruction.

4.2.1 Sample Distribution on the basis of Instructional Strategy and Intelligence

As the present study involved two instructional strategies (web based instruction and conventional mode of instruction) and two levels of intelligence (high and low), hence the students (N=320) were distributed at two stages-on the basis of instructional strategies and on the basis of intelligence.

Stage I: Sample Distribution on the basis of Instructional Strategy

The sample was distributed on the basis of instructional strategies into two types i.e. web based instruction (WBI) and conventional mode of instruction (CMI). The distribution of the sample on the basis of these strategies is presented in table 1.

Table 1: Distribution of Sample on the basis of Instructional Strategies (N=320)

S. No.	Groups		Total No. of Students
	Experimental (Group taught with WBI)	Control (Group taught with CMI)	
	No. of Students	No. of Students	
1.	63	62	125
2.	49	49	98
3.	48	49	97
Total	160	160	320

Stage II Sample Distribution on the basis of Intelligence

The students distributed on the basis of instructional strategies (N= 320) were distributed into three levels of intelligence viz. high level of intelligence, average level of intelligence and low level of intelligence. For this purpose, General Group Test of Intelligence (GGTI) was employed. On the basis of the scores obtained, students coming in the top 27 percent were the students with high level of intelligence and students in the bottom 27 percent (Kelley, 1939) were those with low level of intelligence and students coming between the range of 28 to 72 percent had average level of intelligence. The middle group of students with average level of intelligence was excluded from the study. At this stage, the sample consisted of 172 students with two levels of intelligence i.e. 86 students with high level of intelligence and 86 students with low level of intelligence. Further, out of these 86 students with high level of intelligence, 43 were to be taught with web based instruction and the rest with conventional mode of instruction. The same strategy was applicable to the students with low level of intelligence. The data distribution at this stage on the basis of intelligence is presented in table 2.

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Table 2 Distribution of the Sample on the basis of Intelligence

Sr. No.		Treatment Groups		Total No. of Students
		WBI	CMI	
1	High level of Intelligence	43	43	86
2	Low level of Intelligence	43	43	86
Total		86	86	172

A. TOOLS USED

In the present study the following tools were used:

1. An achievement test in Biology for class IX was constructed and standardized to measure the performance of students before and after the treatment.
2. General Group Test of Intelligence (GGTI) by Ahuja (2005).
3. Web based instructional package in Biology for class IX was developed and validated (content wise).

6. PROCEDURE

Conducting the Experiment

The present study was conducted in four phases:
Phase I: Development of Web Based Instructional Package (WebBio) and construction of an achievement test in Biology.
Phase II (a): Matching the Groups
Phase II (b): Administration of an achievement test (pre-test) and General Group Test of Intelligence
Phase III: Implementation of web based instructional package
Phase IV: Administration of the achievement test (post-test)

7. RESULT AND DISCUSSION

F values were calculated to study the main effect and interaction effect of two factors viz. instructional strategy and intelligence with regard to gain scores of class IX students on the variable of achievement in Biology. The F values calculated by using two way ANOVA test is presented in table 3.

Table 3: Showing summary of 2 X 2 Analysis of Variance on gain scores on variable of achievement in Biology in relation to instructional strategy and intelligence

Source of Variation	SS	df	MSS	F-ratio
Main Effects A: Instructional Strategy B: Intelligence	 2939.07 692.00	 1 1	 2939.07 692.00	 57.85* 13.62*
First Order Interaction A X B (Instructional Strategy x Intelligence)	337.68	1	337.68	6.64*

***Significant at 0.01 level of Confidence**.

7.1 COMPARISON OF MEANS

Hypothesis I

F-ratio (vide table 3) for the difference between mean gain score on the variable of achievement in Biology of the groups taught through web based instruction and conventional mode of instruction came out to be 57.85 which is significant at the 0.01 level of confidence leading to rejection of hypothesis to be stated. Hence, the null Hypothesis Ho I stating "There will

be no significant difference in achievement of class IX students taught through different instructional strategies (web based instruction and conventional mode of instruction" stands rejected.
To further analyse the results, mean gain score of students taught through web based instruction were compared with mean gain score of students taught through conventional mode of instruction on the variable of achievement in Biology. Results are given in table 4.

Table 4 Comparison of mean gain score of students taught by WBI with mean gain score of students taught by CMI

Groups	N	Mean Gain Score	S.D	t-value
WBI	86	26.63	7.004	7.22*
CMI	86	18.36	7.966	

***Significant at 0.01 level of Confidence.**

The mean scores of the groups taught through WBI and CMI on the variable of achievement in Biology were found to be 26.63 and 18.36 respectively and the mean gain is in favour of group taught through web based instruction meaning thereby that the students taught by web based instruction achieved more as compared to those who were taught by conventional mode of instruction.

DISCUSSION OF RESULTS

An examination of F-ratio and means of two groups reveals that both the groups are significantly different on the mean gain score on the variable of Achievement in Biology. The result of the study shows that web based instruction is better than the conventional mode of instruction as an instructional strategy and has a noticeable impact on students' achievement. The significantly higher performance of web based instruction group can be attributed to the fact that teaching through web based instruction is able to draw the attention of learners and keep them involved in learning process. Study materials in the form of video, animations, interactions through the facilitative questions, e-links helps in stimulation of the senses of the learners leading to effective learning. The significant difference between web based instruction and conventional mode of instruction in achievement is also attributable to constructivist view of learning of web based instruction as learning becomes more interesting and effective when students have a control over learning environment. They can learn at their own pace and answer questions without constraint of time and place
The findings of the present study go in line with studies conducted by Sengel (2005), Morgil, Seyhan, Alsan and Temel (2008), Mugan (2008) who found significant effect of teaching through web based instruction on achievement of students in the science subject.

7.2 Hypothesis II

F-ratio (vide table 3) for the difference between mean gain score on the achievement in Biology of students with high and low levels of intelligence came out to be 13.62 which is significant at the 0.01 level of confidence leading to rejection of hypothesis to be stated. Hence, the null Hypothesis Ho II stating "There will be no significant difference in achievement of class IX students in Biology with high and low level of intelligence" stands rejected.
To further analyse the results, mean gain score of students with high level of intelligence were compared with mean gain score of students with low level of intelligence on the variable of achievement in Biology. Results are given in table 5.

Table 5 Comparison of mean gain score of students with HI with mean gain score of students with LI

Groups	N	Mean Gain Score	S.D	t-value
HI	86	24.50	7.37	3.15*
LI	86	20.49	9.19	

***Significant at 0.01 level of Confidence**

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DISCUSSION OF RESULTS

Table 5 reveals that the F-ratio for the difference between mean gain score on the variable of achievement in Biology of the group with high level of intelligence and group with low level of intelligence is 13.62, which is significant at 0.01 level of confidence. It means that both the groups were significantly different on the gain score on the variable of achievement in Biology. It may be inferred that the mean gain score of the groups having high level of intelligence and low level of intelligence may not be considered equal and are different beyond the contribution of chance.

An examination of means of two groups suggests that group with high level of intelligence resulted into higher mean gain score than the group with low level of intelligence. It reveals that the group which had high level of intelligence was more successful than the group that had low level of intelligence. The probable reason for this result is that the students with high level of intelligence have more ability to reason deductively and inductively, to think rationally, to adjust effectively, to act purposefully, to learn, to understand and to solve problems than students with low level of intelligence. Students with high level of intelligence are curious to get new information as compared to those with low level of intelligence. Therefore, intelligence appears to be significant contributor to achievement and high intelligence students can perform better in the achievement in Biology.

The above result has been found to be supported by the studies of (Chamundesweri and Vaidharani, (2006), Deary, Strand, Smith and Fernandes (2007), Dhall and Thukral (2009) and Gurubasappa (2009) who also found positive correlation between intelligence and achievement.

7.3 INTERACTION EFFECT

Hypothesis III

Table 3 reveals that the F-ratio for the difference in mean gain score on the variable of achievement in Biology of students due to interaction between instructional strategy and intelligence came out to be 6.64 which is significant at 0.01 level of confidence leading to rejection of hypothesis to be stated. Thus, the null Hypothesis III stating “There will be no significant interaction effect of instructional strategies and intelligence on achievement of class IX students in Biology” stands rejected. The results show that different groups scored different mean gain score on the variable of achievement in Biology for two types of instructional strategies and two levels of intelligence.

To investigate further, the results of F–ratio were analyzed by t–test. Students on the variable of achievement in Biology were compared in different combination pairs of two treatment groups (WBI/CMI) with intelligence (HI/LI). The following combination pairs were made:

(i) Students taught with WBI-Comparison of HI with LI
(ii) Students taught with CMI-Comparison of HI with LI
(iii) HI Group- Comparison of students taught through WBI with CMI
(iv) LI Group- Comparison of students taught through WBI with CMI
(v) Comparison of HI students taught through WBI with LI students taught through CMI
(vi) Comparison of LI students taught through WBI with HI students taught through CMI
(vii) The results derived from the interactions of above said combination pairs are presented in table 6.

Table 6 Comparison of students on the variable of achievement in Biology in different combination pairs of two treatment groups (WBI/CMI) with intelligence (HI/LI)

Instructional Strategy →	Group taught by Web Based Instruction (WBI)		Group taught by Conventional Mode of Instruction (CMI)	
Intelligence	High Level of Intelligence (HI)	Low Level of Intelligence (LI)	High Level of Intelligence (HI)	Low Level of Intelligence (LI)
Combination Pairs ↓	Mean = 27.23 SD = 7.19 N = 43	Mean = 26.02 SD = 6.83 N = 43	Mean = 21.77 SD =6.55 N = 43	Mean = 14.95 SD = 7.85 N = 43
WBI/HI	-	.799	3.68*	7.58*
WBI/LI	-	-	1.43	6.96*
CMI/HI	-	-	-	4.36*
CMI/LI	-	-	-	-

***Significant at 0.01 level of Confidence**

DISCUSSION OF RESULTS

Table 6 reveals that:

Students taught with WBI-Comparison of HI with LI
The t-ratio for the difference in mean gain score on the variable of achievement in Biology of the group of students with high level of intelligence taught with WBI and group of students with low level of intelligence taught with WBI is insignificant. It leads to the conclusion that the students taught with web based instruction and having high level of intelligence and students taught with WBI and having low level of intelligence achieved equal mean gain score.

Students taught with CMI-Comparison of HI with LI
The t-ratio for the difference in mean gain score on the variable of achievement in Biology of the group of students with high level of intelligence taught with CMI and group of students with low level of intelligence taught with CMI is significant at 0.01 level of confidence. It suggests that students with high level of intelligence achieved higher as compared to the students with low intelligence when taught through conventional mod of instruction. It means intelligence does contribute to higher achievement in classroom settings.

HI Group- Comparison of students taught through WBI with CMI
The t-ratio for the difference in mean gain score on the variable of achievement in Biology of the group of students with high level of intelligence taught with WBI and group of students with high level of intelligence taught with CMI is significant at 0.01 level of confidence. It leads to the conclusion that students with high level of intelligence and taught with WBI achieved higher as compared to the group of students with high level of intelligence and taught with CMI. The probable reason for the above result is that the more interactive facilities available in web based instructional package help the students with high level of intelligence in achieving higher scores as compared to those with low level of intelligence taught with conventional mode of instruction. It may be attributed due to the more individualized teaching as in WBI (Smith, Ferguson and Caris, 2001).

LI Group- Comparison of students taught through WBI with CMI

The t-ratio for the difference in mean gain score on the variable of achievement in Biology of the group of students with low level of intelligence taught with WBI and group of students with low level of intelligence taught with CMI is significant at 0.01 level of confidence. This is attributed to the fact that students find web based instructional package to be more interesting and visual images, simulation and videos help them in better learning, hence higher achievement. A more individualized teaching takes place in the virtual environment where learner involvement is a fundamental element which is missing in conventional classroom settings, thus, making WBI better for students with low intelligence.

Comparison of HI students taught through WBI with LI students taught through CMI

The t-ratio for the difference in mean gain score on the variable of achievement in Biology of the group of students with high level of intelligence taught with WBI and group of students with low level of intelligence taught with CMI is significant at 0.01 level of confidence. It may be due to their higher mental faculties that results in better achievement.

Comparison of LI students taught through WBI with HI students taught through CMI

The t-ratio for the difference in mean gain score on the variable of achievement in Biology of the group of students with low level of intelligence taught with WBI and group of students with high level of intelligence taught with CMI is significant at 0.01 level of confidence. The probable reason for this result is that provision of animation, e-links, communication facility and feedback in web based instructional package resulted in constructive learning, hence better achievement.

8. CONCLUSIONS

In the light of the analysis and interpretation of the data, the following conclusions are drawn:

1. Students taught through web based instruction are found to have achieved significantly high in Biology than taught through conventional mode of instruction. Thus, web based instruction proves to be better instructional strategy over conventional mode of instruction.
2. Intelligence proves a significant factor in achievement in Biology.
3. Significant interaction effect of instructional strategies and intelligence is found on achievement of class IX students in Biology.

REFERNCES:

[1] Ahuja, G.C. (2005). Group Test of Intelligence [GGTI]. Agra: National Psychological Corporation.

[2] American Center for the Study of Distance Education (ACSDE). (1999). *Critical success factors for on-line learning*. Retrieved April 13, 2010, from, http://www.ed.psu.edu/acsde/researchsummaries.htm.
[3] , I., Beal, C., Murray, T., Walles, R., & Woof, B.P. (2004). Web-based intelligent multimedia tutoring for high stakes achievement tests . Computer Science Department Faculty Publication Series, 111. Retrieved March 15, 2012, from http://scholarworks.umass.edu/cgi/viewcontent.cgi?article= 1110&context =cs_ faculty_pubs&sei-redir=
[4] Blocher, J. M., De Montes, L. S., Willis, E. M., & Tucker, G. (2002). Online Learning: Examining the successful student profile. *Journal of Interactive Online Learning, 1* (2). Retrieved April 13, 2010, from http://www.ncolr.org /jiol/issues /PDF/1.2.2.pdf
[5] Chamundeswari, S., & Vaidharani, S. (2006) General mental alertness and intelligence in relation to academic achievement of students at the secondary level. Journal of Educational Research and Extension, 43 (2), 32-46.
[6] Dara-Abrams, B. P. (2002). Applying multi-intelligent adaptive hypermedia to online learning. Retrieved March 28, 2012, from http://www.brainjolt.com/wp-content/uploads/2012/01/dissertation.pdf
[7] Deary, I. J., Strand, S., Smith, P., & Fernandes, C. (2007). Intelligence and educational achievement. Intelligence, 35 (1), 13-21.
[8] Dhall, S., & Thukral, P. (2009). Intelligence as related to self-confidence and academic achievement of school students. Journal of All India Association for Educational Research, 21(2), 80-83.
[9] Gurubasappa, H.D. (2009). Intelligence and self concept as correlates of academic achievement of secondary school students. Edu Tracks, 8 (10), 43.
[10] Khan, B.H. (1997). Web-Based Instruction (Ed.). Englewood Cliffs, New Jersey: Educational Technology Publications, 6. Retrieved September 2, 2011, from http://books.google.co.in/books?id=natcmen0J_gC&pg=PA6&lpg=PA6&dq=Khan+(1997)+defines+Web-Based+Ins
[11] Morgil, I., Seyhan, H. G., Alsan, E. U., & Temel, S. (2008). The effect of web-based project applications on students' attitudes towards chemistry. Turkish Online Journal of Distance Education-TOJDE 9 (2). Retrieved November 25, 2011, from https://tojde.anadolu.edu.tr/tojde30/articles/article_13.htm
[12] Mugan, P. (2008). The effect of intensively using web-based resources on the performance and attitude of high school Biology students. Retrieved May 25, 2012, from http://www2.uwstout.edu/content/lib/thesis/2008/2008muganp.pdf
[13] Nelson, G. (1998). Intemet/Web-based instruction and multiple intelligences. Educational Media International, 35(2), 90-94.
[14] Osciak, S.Y. and Milheim, W.D. (2001). Multiple intelligences and the design of web-based instruction. International Journal of Instructional Media, 28 (4), 355-361.
[15] Own, Z.y., & Li, K.w. (2004). Integrating the theory of multiple intelligences in the chemical equilibrium course to improve student's learning achievements (Abstract). In Proceedings of the IEEE International Conference on Advanced Learning Technologies, 886-888. Retrieved on March 23, 2012, from http://dl.acm.org/citation.cfm?id=1020160
[16] Paramythis, S., & Loidl-Reisinger, S. (2003). Adaptive learning environments and e-learning standards. In R. Williams (Ed.), Proceedings of the 2nd European Conference on e-Learning (ECEL2003), Glasgow, Scotland, 369-379.
[17] Relan, A., & Gillani, B.B. (1997). Web-based information and the traditional classroom: similarities and differences. In B.H. Khan (Ed.), Web-Based Instruction. Englewood Cliffs, New Jersey: Educational Technology Publications, pp 43.
[18]mSengel, E. (2005). Effect of web based learning tool on student learning in science education: A case study. Retrieved March 11, 2011, from http://etd.lib.metu. edu.tr/upload/3/12606683/index.pdf
[19] Smith, G.G., Ferguson, D., & Caris, M. (2001). Teaching college courses online vs. face-to-face. THE Journal, 28 (9), 18-15.
[20] Vaughan, T. (1998). Multimedia: Making it work. New York: Osborne McGraw-Hill. In M.P. Fazioli. (2009). Effects of personalized narration on learner motivation in a web-based environment. Retrieved April 13, 2010, from http://www.mpfazioli.com/Effects_of_Personalized_Narration_Fazioli.pdf