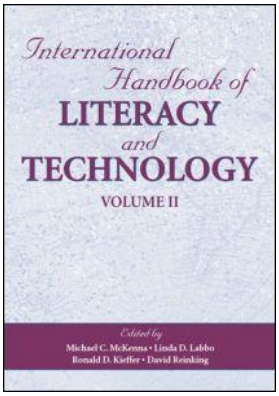

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Developing Digital Literacies: Educational Initiatives and Research in Colombia

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As in other countries, in Colombia printed texts no longer comprise the only materials for reading and writing. Information access, knowledge acquisition and building, and indeed participation in culture, are mediated by a variety of audiovisual and electronic devices centered around the computer. Consequently, Colombian teachers, like their counterparts around the world, face the challenge of transforming the concept of literacy by taking into account reading and writing through various digital media and genres including web pages, e-mail, chat room discussions, and hypermedia documents. Likewise, educational researchers in Colombia are trying to understand more fully the dimensions of reading and writing in digital environments.

In this chapter, I provide a glimpse into the efforts of Colombian society to grapple with the educational challenges of developing programs that contend with the new digital literacies. Specifically, I provide a brief overview of the socio-cultural context of education in Colombia and how digital technologies are integrated into that context, including several educational initiatives sponsored by various agencies. Subsequently, I describe some ongoing programs of literacy research that emanate from Colombian universities and that are aimed at understanding reading comprehension when students read hypermedia texts as opposed to printed texts.

COLOMBIAN EDUCATION AND DIGITAL LITERACIES IN SOCIO-CULTURAL CONTEXT

Sixty percent of the Colombian population, which is currently more than 40,000,000, live in poverty (www.dnp.gov.co). In Colombia's large cities, it is not unusual to see children sleeping under the bridges and walking down the streets searching for food in the trash cans. The free snack food offered by public schools to children and youngsters may be the only food they receive each day.

Recent figures indicate an approximate 16% unemployment rate nationwide. Eighty percent of the work force (approximately 4,000,000 people) earn a minimal monthly salary equivalent to approximately 116.7 US dollars. At this level of income, buying a standard computer for personal use would require saving an entire month's salary for most of a year. These figures illustrate the high cost of technologies in Colombia (see www.dnp.gov.co; www.dane.gov.co).

Regarding the current status of literacy and education in Colombia, 27% of adults 24 years or older, and 10% of the total population, do not know how to read or write. Sixty-two percent of Colombian families own fewer than 20 books, including school texts. Recent reports show that 80% of basic education students do not achieve the expected learning standards in mathematics and language (www.camlibro.com.co). Due to the lack of economic resources, only 17% of Colombian youngsters have access to higher education (El Tiempo, 2003).

However, despite this widespread poverty, Colombia, like many other countries, cannot afford to ignore the possibilities that the new digital technologies offer. For indeed, new digital technologies will not only determine future forms of literacy, but will afford opportunities to increase the economic development of the country and its citizens. Although Colombia is poorer than many nations where technology is more affordable and more fully integrated into daily life, new information and communication technologies (ICTs) are reconfiguring the landscape of education and the work place. Students increasingly need a higher level of skills in using these technological resources to be able to perform in school and at work. Businessmen, in Colombia as in many other countries, prefer to hire employees skilled in using digital technologies, and who are able to search quickly and efficiently for information, to assess the quality of this information, and to use it to solve problems.

With the support of the national, regional and local governments, many programs have been developed in cities and municipalities which are aimed at incorporating new technologies into educational processes, thus expanding opportunities for developing new literacies. Three projects are illustrative: a national project called "*Computadores para educar*" (Computers to Educate), and two projects that are currently under way in two large cities entitled "*La Red Integrada de Participation Educativa*" (Integrated Network of Educational Participation), in Bogotá, and "*Computadores e Internet Gratis para la Educación*" (Free Internet and Computers for Education), in Medellín.

The purpose of the national "Computers to Educate" program is to collect computers that are no longer used by companies and organizations in Colombia and other countries, to update them, and to deliver them freely to public schools for use in educational activities throughout Colombia. These computers are delivered completely operative to various educational institutions and are equipped with a network card and some basic software. At least one computer with multimedia capabilities and a modem is donated to each school. In order to facilitate the integration and use of these computers in academic programs, some teacher training and support for the development of appropriate curricula are offered. Thus far, this program has delivered 23,000 computers to 2,591 schools located in 700 municipalities of the country, especially in rural areas, benefiting approximately 868,000 students and 32,000 teachers (www.computadoresparaeducar.gov.co).

In Bogotá, the purpose of the "Integrated Network of Educational Participation" is to offer new computer technology to teachers and to the community, which is aimed at improving the quality of education and creating a more active participation of citizens in the betterment of their city. Some components of this program are the following: computer hardware; communication infrastructure and educational software; training for the educational community; an information system to support operative academic processes; and an educational Web site. At the time this chapter was written, 662 educational centers, 16 small libraries and three large libraries had been equipped and connected. In addition, 4,776 teachers and 2,498 administrative staff had begun computer training, not to mention the fact that 316 educational institutions are using virtual learning environments (www.redp.edu.co).

In Medellín, a program entitled "Free computers and Internet for Education" has been under way since 2002. This program has provided all public educational institutions of the city with computer labs, each with 21 computers and an Internet connection via modems. Thus far,

492 labs and approximately 10,000 computers have been installed. These computers will not only benefit approximately 400,000 students, but also the entire community, which will eventually have access to these labs. With the support of a research group from the University of Antioquia that works in the area of reading-writing and new technologies, a process to raise consciousness and training has begun for the teachers and students in the use of these resources. This project has transformed Medellín into the Colombian city with the school system best equipped in terms of ICTs (www.funfacionepm.org.co).

In addition to these programs, in order to improve the quality of the educational system from the basic to the higher levels and to enable it to better meet the future demands of the country in different fields, the National Ministry of Education has recently initiated a program to incorporate ICTs in education. That effort has three objectives: establishing equipment and infrastructure; developing curricular content; and defining processes and standards to use ICTs in basic and middle education. One of the strategies available for this program is an agreement between the Ministry of Education and Microsoft called "*Alianza por Colombia*" (Alliance for Colombia), the objectives of which are: training teachers in the use ICTs as didactic support; the development of ICT-based projects that help to improve education; and the development of computer-based learning materials for public distribution. The teaching training process will be oriented towards incorporating ICTs into the classroom, developing academic contents for various purposes, and establishing academic centers in order to train teachers to use ICTs in Education.

Thus, Colombia, despite it relatively poor citizenry when compared to the rest of the developed world, has clearly recognized the importance of developing new digital literacies. Further, the country and educational system have taken steps to initiate programs aimed at promoting the development of new digital literacies. Although the scope of these efforts is not as broad, and the hardware and software is not as current as in more economically developed countries, the commitment is strong and much progress is being made. In addition, Colombian researchers are engaged in on-going programs of research aimed at better understanding reading comprehension in multimedia environments, both to inform efforts in Colombia and to contribute to the knowledge base of the field more broadly. In the next section, after outlining relevant theory, I describe some representative research projects.

COLOMBIAN RESEARCH ON COMPREHENDING DIGITAL TEXTS

Like many other developing countries, Colombia cannot support or model the adoption of new digital technologies in its schools by relying entirely on the experiences and the results of studies carried out in other areas or contexts which present distinctly different social, economic, and cultural conditions. The fact that in Colombia a relatively small percentage of students attending public schools have a computer at home, and public education institutions have on average a ratio of only 1 computer for 85 students (www.ccit.org.co), limits the feasibility of applying experiences and findings about the use of ICTs in education that have proved successful in developed countries. Questions such as "What do these ICTs contribute to the quality of teaching reading and writing?" and "How to use these technologies to improve the reading skills of students?" are especially relevant in a country where the great majority of the population have limited access to these resources.

In an effort to make a contribution to the design of strategies that capacitate Colombian teachers and students in the efficient use of these ICTs, my assistants and I have conducted five experiments aimed at studying the comprehension of digital texts. The objectives of these experiments

were: to contribute to an appropriate incorporation of new technologies into the school curriculum, especially in the area of reading and writing; to research and compare the functioning of some factors associated with reading comprehension, such as the use of a dictionary, contextual analysis, semantic associations, recognition of main ideas, summary, and recall, when students read digital and print texts; and to contribute to an understanding of teaching of reading and writing using digital materials. However, currently the scope of these studies is relatively small and our findings thus far have not been published in peer-reviewed outlets. Thus, these studies are presented only as illustrative of the type of research we have conducted thus far and the kind of questions we are interested in exploring, not as a source of definitive findings or conclusions. The length of a book chapter does not permit me to provide much relevant detail about the experiments that we have conducted, nor to identify and acknowledge the limitations of the investigations and analyses. Therefore, readers of this chapter are urged not to cite these studies in literature reviews without these important caveats.

All of these experiments involved 40 children who were 11 or 12 years old and enrolled in the sixth grade at a middle-class private school located in Medellín, Colombia. Thus, this sample of participants is not necessarily representative of all Colombian school children at this age or level of schooling. In several of these experiments, we were interested in comparing the comprehension of digital texts among proficient and less proficient readers. Therefore, the 40 students in our experiments were selected from a group of 70 students based on reading comprehension scores on a standardized test (Henao Alvarez, 2001). Twenty children with the highest scores and 20 children with the lowest scores were selected. To complement this selection criterion, the Spanish teacher was requested to match the list of students with the highest and lowest scores in the reading comprehension test, according to her own criteria and evaluations. In her opinion, the 40 students selected on the basis of the test results accurately reflected her independent assessment of the students' reading comprehension. All 40 children were familiar with the Windows Operating System and had previously engaged in reading and writing digitally in relation to various applications on the computer.

The experiments were carried out during two-and-a-half weeks in the children's school for the part of the experiments that required reading printed texts and at a nearby university computer room where the children were bussed to read the digital texts. My assistants and I, not the classroom teacher, led all experimental activities.

These experiments address the following questions: When reading digital and printed texts, are there differences in readers' utilization of the dictionary, contextual analysis, the content and quality of semantic maps, the quality of summaries produced, and the recall of main ideas?

Experiment 1: Use of dictionary and contextual analysis. The purpose of this experiment was to compare the frequency of using the dictionary and the capacity of contextual analysis of two groups of competent readers as they read a hypermedia and a printed text. Our work in this experiment is guided by previous research suggesting that word meaning in a text is a decisive factor for its comprehension and that inadequate vocabulary knowledge is related to lower comprehension (Johnson and Pearson, 1978; Nagy and Herman, 1987). To evaluate a reader's familiarity with the words contained in a text or speech is a relatively reliable way of predicting their ability to understand the text or speech. Further, a good reading program should include effective strategies to develop vocabulary, helping students to know the meaning of many words, and to use them appropriately in reading, writing, and oral expression (Johnson and Pearson, 1978; Nagy and Herman, 1987). Further, as some authors maintain, reading is an effective instrument to learn the meaning of words (Nagy and Anderson, 1984; Nagy and Herman, 1987). Digital texts can offer readers a wide variety of readily available information during reading, including resources that provide rich possibilities for conveying definitions of concepts and terms,

providing dynamic means for actively constructing knowledge representations (Bagui, 1998; Stemler, 1997).

In the first experiment, 20 competent readers participated. They were randomly divided into two groups. The first group read a digital text, "*Algunos datos de Fernando Botero*" (*Some data about Fernando Botero*), accompanied by digital resources in the form of videos, pictures, and audio. A second group read a printed version of the same text, but without the digital supporting resources. Both groups were told to carefully read the corresponding text, at least twice. Reading time was not controlled, neither were there restrictions on the use of audiovisual resources among the group reading the digital version

In the digital version, a dictionary with appropriate definitions appears by activating an icon on the screen. The meanings of selected words could be accessed alphabetically or by typing in a word from the text. In the digital version, the computer registers the reader's navigation, indicating what links are activated, what nodes are visited, and how long the reader remains at a particular node. Thus, it is possible to establish accurately what word meanings a reader investigated and how many times a word was investigated. The readers of the printed version were given a booklet with the same words contained in the dictionary of the digital version, and they were asked to mark every word they searched.

Contextual analysis was evaluated with a Cloze Test designed by the researcher, using a text composed of different segments drawn from the experimental text and in which every fifth word was deleted for a total of 25 deletions. There were no deletions in the first and final sentence of the text.

Results indicated that the participants reading the digital version of the text investigated statistically more word meanings in the dictionary than the readers of the printed text. These results coincide with those from a study carried out many years ago in the U.S. (Reinking and Rickman, 1990). However, it is worth noting that in that experiment the average number of words investigated was relatively low in both groups when compared to the number of words not known by the children before the reading experience (approximately 60%). In the case of the digital texts, the access to the dictionary may have not been attractive enough for the users, because the search was not made by clicking directly on the unknown word, but by opening the dictionary through an icon. More research is needed to investigate how user interfaces might affect the number of words investigated and whether such factors have effects that vary by reading ability.

In relation to contextual analysis, the readers of the digital text outperformed readers of the printed text; however, the difference was not statistically significant. When readers try to decipher a word by means of contextual analysis, they transcend the smaller lexical unit represented by words, focusing their attention on the structure of a sentence or paragraph. If readers are able to take advantage of the context, they can perhaps use diverse means to help themselves acquire the meaning of an unknown word and thus understand the text more globally.

Experiment 2. Construction of semantic maps. The purpose of the second experiment was to determine if there were differences among semantic maps produced from key words identified in printed or digital versions of the text. In this study, a semantic map was defined as a representation of the different meanings of a word by creating a visual representation of relations among words of a text. In other words, it was a graphic representation of the diverse categories of meanings associated with a word. Semantic maps are often used as a teaching strategy based on the aptitude that students have for relating new words to their own experiences or previous knowledge, and for organizing them into categories (Heimlich and Pittelman, 1986). Semantic maps have been used as a didactic strategy for vocabulary building, because theoretically they help students to structure new learning by relating it to their previous knowledge. Likewise, they may contribute to developing more active readers, motivating them to evoke what they know about a

specific topic, and to use this information in their reading. This activation of previous knowledge has long been considered essential for reading comprehension. For example, when a specific conceptual schema is activated, the whole structure of the memory for this concept is also activated, thus facilitating the comprehension process (Johnson and Pearson, 1978; Johnson, Toms-Bronowski, and Pittelman, 1982; Heimlich and Pittelman, 1986).

The subjects of Experiment 2 were the same 20 children who participated in Experiment 1, but the students who read the printed text in the first experiment read the digital text in Experiment 2, and vice versa. The concept of a semantic map and the procedures for its construction were explained to both groups. During a 50-minute session prior to the experiment, the researcher used an overhead projector to explain semantic mapping of a word using an example of the concept "dog," which in the example entailed approximately 20 nodes with their respective links, illustrating the following relations: class, attributes, and examples.

Ten students read a digital version of "*Flora y Fauna del Pacífico Colombiano*" (Flora and Fauna of the Colombian Pacific Region). The other 10 students read a printed version of the same text. Both groups were instructed to read the text attentively, at least twice. The reading time was not controlled. There were no restrictions on the exploration and use of the audio-visual resources such as videos, photographs, and audio. Immediately after they finished reading, they were given three blank sheets and requested to construct three semantic maps illustrating the following topic words: *birds, deer, and dolphin.* It was suggested that they include in the map as many words or associated concepts as they could, illustrating in the links the three types of relations presented in the instruction phase.

The resulting semantic maps for each word were scored as follows: three points if the three types of relations were included; one point was assigned for each word/node included in the map whose relations was appropriately described. The total score was the sum of the scores obtained across the three maps. The results reveal that semantic maps developed by readers of the digital texts were of higher quality as indicated by their statistically higher scores.

A possible explanation of these results would be in the structural similarity between the presentation of the digital text and a semantic map. Both represent a group of nodes interconnected through multiple links. It is possible that when readers read digital texts that emphasize the interrelations among concepts, they can perceive more clearly the relations and connections among the diverse concepts being discussed.

Experiment 3. Identifying important ideas. The purpose of the third study was to investigate whether competent readers would vary in their ability to identify the main ideas of textual content presented either digitally or in print. Finding main ideas has been argued to be an important dimension of reading comprehension because there is evidence that identifying the main ideas of texts explains a statistically significant proportion of the variance in measures of reading comprehension among elementary school students, even when differences in general intelligence and decoding ability were controlled (Baumann, 1985).

Participants in this third experiment were the same 20 children who participated in Experiments 1 and 2, with the treatment conditions (digital vs. printed texts) again reversed. Again, both groups participated in an instructive session about the concept of main idea as separate from the details in a text. Then, for the sake of practice, they each received a sheet with three texts and were asked to identify the main ideas. Participants provide their individual responses orally with an explanation of their respective selections.

The students assigned to the digital text read "*Geografía del Pacífico Colombiano*" (Geography of the Colombian Pacific Region). The other group read a printed version of the same text. Both groups were again told to read attentively the respective text at least twice, with no restrictions on time. When finished, the students received a sheet with blank spaces to write

10 important ideas of the text they had read. When they finished that task, they were presented with a sheet listing 49 ideas drawn from the experimental text, organized according to their order of appearance in the text. Each of the 49 ideas was preceded by a blank space allowing the student to indicate on a scale from 1 to 5 the importance of each idea. None of the ideas were drawn from the supplementary material available to readers of the digital version of the text.

To increase the validity and reliability of the measures, a group of six expert readers (three professors and three doctoral students), using a scale from 1 to 5, evaluated the importance of each one of the 49 unitary ideas of the text "Geography of the Colombian Pacific Region." Before rating the ideas, the experts read the text attentively, first in hypermedia version, and then in its printed form. Later, the *median* of the six scores given by the experts to each unitary idea was calculated, and then used as the standard for scoring participants' responses. The ideas with a median value between 3.5 and 5.0 were considered to be important ideas; those with a median value below 3.5 were considered to be details. The result was a total of 27 important ideas and 22 details.

The following procedure was adopted for scoring participants' responses: when the assessment given by a student to an idea coincided with that of the experts, or differed, two points were assigned; when the difference between a participant's scoring and that of the experts was 1 or 1.5, one point was assigned; when this difference was greater than 1.5, no points were assigned. The maximum score possible using this procedure was 98.

Results indicated that readers of the digital version statistically outperformed those reading the printed version on both measures of main ideas. There are several possible explanations for these results from a theoretical standpoint. For example, authors often leave certain rhetorical signs in their texts, by which they suggest what contents or segments have more relevance. A competent reader can use these signs or marks to find the most important information. The digital version of the text used in this experiment included a set of words highlighted in yellow that work as hypertext links, which changed to orange when a reader followed a link. By clicking on these links, some windows are opened up with specific textual and graphical information about the topic. Nonetheless, to make both formats comparable, all the information offered in these links was also presented in the printed version, including graphics and pictures.

However, most of the important ideas from the text "Geography of the Colombian Pacific Region" are related to topics that were provided in the highlighted links. It seems reasonable to suppose that the increased visibility of these words helped readers to identify more easily the important information. In the printed version, we did not highlight these words, which we might have done, and, if we had, it may have affected results.

Experiment 4. Capability to summarize. The purpose of this study was to compare and analyze the quality of summaries produced by participants after reading a digital or printed text. In this experiment, we also compared the performance of competent and less competent readers. A summary synthesizes the content of a text, indicating what is the essential information presented by a text (Perelman de Solarz, 1994). The production of a good summary implies text comprehension. It demands from the reader an analysis and selection of the most essential information, which implies the successful exercise of fundamental comprehension processes. According to Kintsch and van Dijk (1978), in order to derive, synthesize and organize the global meaning of a text, a reader employs several general rules that produce a macro-level understanding of a text. Thus, investigating whether digital texts affect competent and less-competent readers' ability to generate summaries seems to be an appropriate way to assess potential comprehension differences when compared to reading printed texts.

In this experiment, there were a total of 40 students, the same 20 children that were part of Experiments 1, 2 and 3, and the 20 children that obtained the lowest scores in the test "Evaluación

de Habilidades para la Comprensión Lectora (Reading Comprehension Skill Assessment) (Henao Alvarez, 2001). For the group of competent readers, the assignment to digital or printed text was again reversed. The 20 students classified as less-competent readers were randomly assigned to one of the two groups.

Participants were instructed on the concept of summary. By using an overhead projector and photocopies, three texts were presented individually to introduce and practice summarizing. Students had an opportunity to share their summaries orally, while others in the group could comment about them. The performance of these exercises convinced the researcher that participants had a clear understanding of how to summarize.

Both in the sub-group of competent readers and in the sub-group of less-competent readers, the 10 students read "*Usos del Agua*" ("Water Uses") as a digital text and 10 as a printed texts. Participants in the digital group were told to carefully read the text at least twice, completely reading the main body of the text and subsequently activating each of the link words. The reading time was not controlled, and there were no restrictions on the exploration and use of the audio-visual resources such as videos and audio. When the students indicated that they had read through all the text at least twice, they were given a blank sheet and were asked to write a summary of the text. They could review the text, if they considered it necessary. Likewise, they were recommended to write in the clearest possible way and to use complete sentences. The time for performing this task was not limited. Following the same instructions, group B of competent and low-skilled readers read a printed version of the texts and were asked to complete the same task with the same directions.

Following the procedures of the previous experiment, the same group of six expert readers evaluated the importance of the 64 idea units that comprised the text "Water Uses," generating 40 important ideas and 24 details. A researcher and another professor of reading and writing scored the summaries independently, using the idea units generated by the group of expert readers. Results indicated that the competent and less-competent readers reading the digital version of the text included statistically more of the important ideas in their summaries of the hypermedia than in the summary of the printed text.

These results might be explained by considering that generating a summary demands a process of selection, analysis, and synthesis of the most relevant information. The possible interpretation of the results in Experiment 3 regarding the identification of important ideas may have the same relevance in interpreting the results of the present experiment. The digital text used in the present experiment also presents a series of words that function as links, highlighted in yellow, and by activating them, they display other topical textual units on screen. In this case also, so that the reading in both formats was comparable, the printed text included the same textual and graphical information as the hypermedia. If most of the important ideas of the text "*Water Uses*" are related to these highlighted words, indicating links and their respective contents, it is natural to suppose that the highlighting of these links helped readers reading the digital text recognize more easily the important ideas, and thus led to participants including them in their summaries.

Experiment 5. Ability to recall information. The purpose of this study was to replicate Experiment 4 using recall of main ideas as the dependent measure, because researchers have considered the recall of textual information as evidence of comprehension. The subjects of this experiment were the same 40 students who participated in Experiment 4. The assignment to groups A and B was inverted for both competent and less-competent readers.

The 20 students of group A, skilled and low-skilled, read the hypermedia "*La Imprenta*" (The Press). Conditions were the same as in the previous experiments. When participants were finished reading, they were given a blank page with instructions to write everything they remembered from the text, using complete sentences and trying to write as clearly as possible. To lessen the

effects of short-term memory, each participant was asked to provide orally the name and description of the last TV program they had watched.

In accordance with Experiments 3 and 4, the same group of six expert readers evaluated the importance of the ideas units that comprised the text, thus generating a scoring template consisting of 18 important ideas and 10 details. Recalls were scored independently carried by a researcher and another professor of the reading and writing, based on the scoring template. Results revealed that both competent and less-competent readers who read the digital version of the text outperformed those reading the printed text at statistically significant levels.

In agreement with the assumptions of several authors such as Goldman (1996), Mayer and Sims (1994), and Stemler (1997), a possible explanation of these results lies in the interactivity that a hypermedia allows. The reader's choice of selecting, relating, and organizing the different contents of the text might positively affect recall of information. The rich audio-visual support in the digital text used in this experiment may be another factor that influenced amount of recall. Regarding this type of text, it has been indicated that the design quality of on-screen components can contribute to greater attention from the user, a more effective activation of previous knowledge, and a deeper processing of information (Stemler, 1997; Bagui, 1998).

The digital text that participants in this experiment read generated a data base indicating which links readers follow and how long they remain at the nodes accessed. Thus, it is possible to accurately establish how long the reader watches a video, looks at a picture or listens to an audio recording. Examining this information indicated that less-competent readers invested more time examining the audio-visual resources of the text than did competent readers. This finding could explain why the performance of the less-competent readers was better when they read the digital texts.

The results of this experiment on recall contrast with the findings of other previous studies. For example, Aust, Kelley, and Roby (1993) did not find statistically significant differences in recall of information when comparing information presented in a printed or a digital text. Likewise, Gordon, Gustavel, Moore, and Hankey (1988) found that participants in their study recalled more information in articles written in a conventional linear format when compared to articles written as hypertexts. In addition, Jakobson and Spiro (1993) found that students who studied using computerized drill-and-practice materials recalled more than those who studied hypermedia materials.

General discussion. The results of these experiments reveal that readers' comprehension of the digital texts designed for this research consistently surpassed readers of conventionally printed information. This conclusion held for less competent, as well as competent readers, at least in the experiments where this distinction was investigated. Thus, under the conditions of these experiments, the digital textual formats used might contribute to the improvement of reading comprehension among Colombian students, at least those in private schools.

Paivio's (1991) theory of dual coding offers one theoretical interpretation for the results observed in these experiments. According to dual coding, learning improves when the information is processed through two channels instead of one channel (visual and linguistic). This double processing generates several cognitive trajectories that a learner can use later to retrieve information from memory. Because the digital texts used in these experiments presented information codified in several symbolic modes (audio, graphical illustrations, pictures, and videos), this theory may explain the results obtained.

Other researchers have argued that digital texts make available to the reader the means and dynamic tools to actively construct knowledge representations (Bagui, 1998; Stemler, 1997). The wealth and variety of information that these textual formats offer configure new spaces and possibilities so students may achieve a more nuanced comprehension. Therefore, if these new textual formats foster the development of abilities required for comprehension and learning, the importance of their use in school as reading and study materials becomes evident.

CONCLUSION

In Colombia, a country actively involved in the process of economic globalization, the new digital technologies are reconfiguring the notion of literacy. The initiatives pursued by the various localities and education agencies in Colombia illustrate the importance of new digital literacies and how seriously they are being attended to in preparing Colombia's citizenry for the future. Such efforts must be supported by research that ideally provides guidance to the development of ICT technologies and their integration into Colombia's educational system and the sociocultural context it serves, but that also contributes to the literature seeking to clarify the role of digital texts in fostering reading comprehension. It is hoped that the experiments described in this chapter illustrate the potential in both of these domains.

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