

Videoconferencing in the Early Childhood Constructivist Classroom

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Videoconferencing is a communication tool that enables communication in which the participants are in different places, but are connected by audio and video links. In education, videoconferencing is like television, except it is interactive using a direct video connection between a classroom (or several classrooms) and a distant place (in this case, an aquarium or a zoo).

Through the medium of video conferencing, a graduate class of early childhood teachers was treated to a series of virtual aquarium and zoo experiences. These experiences opened horizons for the teachers, and they wanted to utilize the medium in their own constructivist classrooms and learn more about the possibilities of expanding the curriculum.

Both actual and videoconferencing virtual aquarium and zoo curriculum enhancement is readily available. Aquariums and zoos have resources beyond those of the typical classroom to offer early childhood students. Many of the aquariums and zoos of the world can be made available to all children via the Internet or videoconferencing. Pre-videoconference and post-videoconference classroom manipulative and constructivist activities are to reinforce the virtual experience and are available to classroom teachers.

Constructivist curriculum allows the child to initiate and direct developmentally appropriate learning activities by constructing their own meanings and understandings. Piaget (1973) believed that every healthy child was capable of constructing their own learning. Piaget and Inhelder (1969) held that development was not the result of internal maturation or external teaching. Rather, it is an active process where, through activities and experiences, children acquire differentiated and comprehensive cognitive structures. The children use reflective methods, discussion, collaboration, and negotiation to share meanings, multiple perspectives, and conclusions in an effort to come to a consensus about what they learned. (Brooks and Brooks, 1993). Research has shown that the use of videoconferencing technology in educational settings is constructivist in nature and increases student motivation and facilitates students' inquiry and critical thinking skills (Andrews and Marshall, 2000). It also allows students to work at a higher cognitive level than traditional teaching methods (Gernstein, 2000).

Aquarium Curriculum

Aquarium curriculum that accompanies videoconferencing is designed to facilitate children working at a higher cognitive level through activities and information relating to different marine habitats. The curriculum not only covers the areas of science and math, but also other interdisciplinary activities used in exploring marine topics. This virtual field trip is a field trip that takes place without leaving the local school. For example, videoconferencing lessons on coastal habitats include activities available in subjects ranging from crustaceans to fish reproduction in various environments. Specifically, the lessons are available in an overview format, with pre- videoconferencing activities, post videoconferencing activities, and other resources.

Most aquariums tailor their materials to the local school curriculum, which is usually mandated by a state education agency. Usually, the aquarium curriculum is collaboratively designed by teachers and aquarium education staff. (Takahisa and Chaluisan, 1995). Teachers have the option of using videoconferencing information and material in an aquarium to enhance or to develop new curriculum.

The Texas State Aquarium curriculum discussed in this study was constructivist in nature, as shown by the pre- videoconferencing activity. The activity included a scavenger hunt which enabled the teachers and children to explore the web site. This activity let the aquarium educator and the classroom teachers know what the children knew and what they did not yet know, and what they all wanted to know about marine life. The actual videoconferencing virtual visit to the aquarium yielded information that the children would have received if they had visited the aquarium in person. Some aquariums allow virtual visitors to manipulate and direct the remote cameras. This virtual technology allows children to direct the visual field of the observation camera at the distant aquarium.

A Virtual Aquarium Experience

In order to demonstrate the value of videoconferencing and to encourage early childhood teachers to integrate it into their curriculum, a series of virtual aquarium visits was arranged, linking a graduate educational technology class in El Paso, Texas, with the Texas State Aquarium in Corpus Christi, Texas. The Texas State Aquarium worked with a regional education center and teachers from four schools to create the initial nine programs (Carpenter, 2007).

For the initial virtual field trip, one of the authors went to the aquarium to be with the aquarium educator for the videoconference, while the other author was in a community college classroom equipped with videoconferencing technology. In the weeks before the videoconference, the graduate students took a virtual tour of the Texas State Aquarium through the aquarium's interactive website (<http://www.texasstateaquarium.org/index.cfm>). Students were divided into groups and asked to use the site map of the three levels of the aquarium to pick a specific exhibit area to explore. Each group brainstormed questions to ask the aquarium guide, when the videoconferencing was in session. Several early childhood teachers took the assignment to their own classrooms and their students generated the questions listed in Table 1 at the end of the article.

With their questions in hand, the "real" videoconferencing virtual tour began through a TCP/IP connection using an Internet address with an educator from the Texas State Aquarium. As students asked questions about stingrays, sea lions and turtles, the aquarium educator showed them appropriate sections using video cameras located throughout the aquarium, tanks, or shoreline. The aquarium educator mentioned some common questions that our teachers had not collected, such as those in Table 2 (Carpenter, 2007) which can be found at the end of the article.

Many members of the graduate class in El Paso, Texas, had never been to a beach. They not only enjoyed the virtual field trip, but several teachers from various districts arranged to provide a similar videoconferencing virtual tour for their early childhood classrooms. One kindergarten child was delighted to view the "scary creatures" like jellyfish, sharks, poison dart frogs, and sting rays from the safe distance of the videoconference. It also enabled him to see everything without being lifted up or having to climb up on the rails. Early childhood teachers were asked how and why they might use videoconferencing to enhance their classrooms. Their responses are included in Table 3 at the end of the article.

Videoconferencing Is A Vital Extension for Learning

The teachers who teach bilingual students (English-Spanish) also included translation exercises in their curriculum planning. The teachers collaborated to plan units in the most popular areas that interested their students. Those areas are listed in Table 4 at the end of the article.

Subsequent videoconferencing virtual field trips yielded comments from teachers and children. A teacher wanted to incorporate cultural diversity in her classroom by videoconferencing. She wanted to share her Hispanic classroom's culture with the rest of the world. She sought a sister class of another culture anywhere else in the world. The teacher stated that her class would be prepared for the future where videoconferencing will be a normal daily activity. Scholars state that technology can be utilized to help young children understand cultural diversity, as well as to strengthen cultural ties, and explore the cultures of the world (Meadows, 2004). Children enjoy discussing their families, their communities, and their own culture via computer with students around the world. Problem solving as well as new insights are provided through feedback from children of various cultures. Shade and Watson (1990) state that "Only when computers are integrated into the curriculum as a vital element for instruction and are applied

to real problems for a real purpose, will children gain the most valuable computer skill--the ability to use computers as natural tools for learning.”

A Virtual Zoo Experience

Since a zoo theme was a popular request, two elementary teachers in the educational technology class collaborated to teach their students about zoo animals. They connected to the San Diego Zoo where webcams showed pandas, polar bear, and monkeys in real time. They connected to the Smithsonian National Zoo's webcams to see otter cheetah, clouded leopards, ferrets fishing cats, flamingos, lions, and gorillas. The teachers also showed beluga and sea otters from the Vancouver Zoo as well as animal videos from the Toronto Zoo and Zoo Atlanta. (See Table 5 at the end of the article.)

Conclusion and Recommendations

The videoconferencing virtual field trip concept is a valuable addition to constructivist early childhood classrooms. World-wide aquarium and zoo holdings and curriculum can be available to any young child through a computer with Internet access. The virtual field trip, using an aquarium or zoo's website and webcam equipment for live experiences or through videoconferencing, offers a low-cost, low-maintenance solution to geographically or economically restricted students and classrooms. Videoconferencing is a contemporary way for aquariums and zoos to reach the international public that they serve.

Virtual curriculum can be developed by classroom teachers and molded to fit the instructional objectives of the videoconferencing lessons. Aquariums have already researched their displays and exhibits and are willing to provide materials to classroom teachers as a result of that research. Specifically, aquariums offer grade-level virtual field trips and provide grade-level curriculum that can be used with a website. They also offer curriculum that can be used before and after a videoconference. The zoo curriculum from the Smithsonian and San Diego Zoos has been developed and tested and found to be of constructivist quality.

In view of the contributions that videoconferencing can make to the early childhood constructivist classroom, the following curriculum observations are offered:

- Educators can engage the children's interest with live displays and experiments.
- Constructivist inquiry methods can be utilized by aquarium and zoo educators and volunteers.
- Experimentation can be directed by children and carried out by virtual educators.
- Classes can discuss and share solutions with other classrooms who are also engaged in the same videoconference.

The participating early childhood constructivist teachers stated that the learning opportunities for children are well worth developing curriculum using videoconferencing virtual aquarium and zoo experiences. Further, the teachers stated that the possibility of geographically unlimited videoconferencing aquarium and zoo visits and curriculum that could be available to all children, regardless of location, is indeed promising. Some of the new audiences reachable through videoconferencing can be those for whom distance, mobility issues, and geography are too challenging and therefore prevent them from participating in experiential constructivist programs. All teachers suggested that this videoconferencing technique be shared with the early childhood educational community so that the availability of expanded curriculum could be utilized by all interested teachers.

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Table 1. Questions from Students of Early Childhood Educators

1. What is it like to be an aquarium keeper?
2. What aquarium animals do you like best?
3. Will they hurt you?
4. How many fish do you have?
5. Can we touch the animals?
6. Do you have whales?
7. Will turtles bite you?
8. Can dolphins talk?
9. How do you feed the sharks?
10. Do sharks eat each other?
11. How often do you clean the aquarium?
12. Do fish get thirsty?

Table 2. Frequent Questions Children Ask of the Aquarium Educator

1. How often do you get to play with the dolphins?
2. What does a dolphin's skin feel like?
3. Can you swim with the dolphins?
4. Do the animals have names?
5. How old is the sea turtle you showed us?

Table 3. Reasons to Use Videoconferencing in the Early Childhood Classroom

I want my students to
• interact with an expert who might not be local.
• visit geographical locations that children's families would find very difficult, if not impossible, to visit.
• interact with a story teller who would help them understand about characters and setting
• demonstrate and relate their home culture to students in other cultures
• have a "sibling class" somewhere in the world so that my class could share their cultural similarities and differences.

Table 4. Preferred Curriculum Themes Utilizing Virtual Field Trips

Theme	Frequency
Marine Mammals/Dolphins	8
Various Sea Animals	4
Ocean Conservation/Environment	5
Oceanic Geography	2
Zoo Animals	6

Table 5. Comments on the Zoo Field Trip by Elementary Teachers

<ul style="list-style-type: none"> • The students always enjoy seeing animals. This is a good way to bring them into the classroom.
<ul style="list-style-type: none"> • This is so cool. Many of the students in this area have never been out of the ElPaso/Juarez area and through this technology the students get a sense of actually being at the zoo.
<ul style="list-style-type: none"> • I teach kindergarten and I know my kids would really enjoy this. It just isn't the same as reading from a book or magazine! It would be really neat for them to see the animals live.
<ul style="list-style-type: none"> • My second graders will love this when we start our animal unit in the spring!