Abstract

The instruction of science and inquiry-based activities have become a significant, central element in kindergarten curricula in the past few decades. In recent years, digital documentation has been integrated into kindergartens and schools and has become part and parcel of the learning process. Today, the two primary methods for documenting in kindergarten are drawing and digital photography. In the past, documenting in kindergartens was either conducted by staff members or overseen by them. More recently, this is done freely by the children (documenting areas in the kindergarten, documenting natural phenomenon in the yard, documenting activities such as building with Legos or building a bridge, and more). Previous research indicates that scientific drawing is crucial in kindergarten but sometimes does not reflect reality and therefore does not serve as an adequate support for describing and establishing understanding. This study investigates whether digital documentation combined with scientific drawing could contribute to recall and understanding of scientific experiences among kindergarten students. The study examined 40 children ages 5-6 in non-religious urban kindergartens in central Israel, of middle to high socioeconomic status. The sample was randomly divided into two groups: a test group and a control group. Each group numbered 20 children, with an identical number of boys and girls.

No significant differences were found between the score for the two groups on Raven’s Matrices. In other words, the subjects in both groups were similar in their average general intelligence score. During the study, the children watched a scientific experiment demonstrating the fermentation of yeast. For the experiment, two cups were placed alongside one another. In one cup, the researcher added water, yeast and sugar, and in the second cup she added only yeast and water. The sessions with the children were private and documented on video. The children’s prior knowledge was first checked and found to be similar in both groups. Later, the children documented the cups at two points in time – before and after fermentation. The test group documented by means of drawing as well as digital documentation (using the camera on a tablet computer). The control group documented only by means of drawing. Thus, at the end of the documentation process, the test group had two digital photos and two drawings, whereas the children in the control group only had two drawings. After the experiment, the children were asked to create a final project to summarize the activity. The test group created a film (using an app on the tablet) out of the photos and drawings, and the control group was asked to create an “exhibition” of their work, i.e., a verbal description of the experiment according to both drawings. Throughout the process, the children were asked questions pertaining to recall, understanding, transfer, and curiosity. At the end of the process, after generating the final project, a structured interview comprising ten questions was conducted.

Research tools used to investigate the research questions included: Raven’s Matrices, participant observation, an interview after creating the final project, a brief questionnaire on curiosity, and analysis of the projects according to a detailed guide.

Examining the quality of the projects and the children’s responses in the interviews that followed revealed four significant measures that indicated an advantage in favor of the test group over the control group in recall and understanding of the experiment. Two findings regarding recall and understanding arose from the final project, and two findings of recall and understanding arose from the interview that followed its production. Questions pertaining to transfer did not reveal significant differences. These findings indicate that integrating mobile technology and multimedia – digital photography and producing a digital film – support recall and understanding of a scientific experiment. Combining authentic photos (in addition to drawings) as well as the production of a video, which requires an additional cognitive/mental process, strengthens and contributes to the process of learning among young children, compared to documenting by means of drawings alone.

These findings indicate the importance of integrating digital technologies in kindergartens in learning contexts where these technologies can contribute to recall and understanding of complex processes such as a scientific experiment.