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Cultivating curiosity by integrating art in science through photography

جامعة قطر
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Abstract

Arts-integrated science is a tantalizing educational approach that captures the attention of scientific learners through the lighter side of science. This study highlights the findings of a school-based applied research study conducted to develop public school students' curiosity and their aesthetic qualities by exploring scientific knowledge by using photography. This study incorporated photography as a learning aid in STEAM workshops for 386 high school students, including 220 males and 166 females from 19 schools, and tested methods for enhancing the curiosity or interest of students to explore the workshop context more deeply. The analysis of our methods discusses the results using pre- and post-method questionnaires and the evaluations of 816 scientific images captured by the students. The key aim of this research involves cultivating curiosity in students as they analyse captured images, which results in positive outcomes, such as increased engagement in scientific workshops, thereby inspiring them to more thoroughly explore the science behind each image.

Introduction

Curiosity is one of the necessary elements that plays an inevitable role in the mental and intellectual development of a child. Curiosity improves children's minds and encourages them to be active and innovative, thereby encouraging effective exploration of their surroundings (Barell, 2003). Starko (2013) defines curiosity as one's strong desire to know how things work. Starko (2013) and Sternberg (1999) considered employing creative processes to encourage inspiration and to stimulate curiosity in exploring new and broad areas for knowledge development. They also confide that a creative setting will aid in broadening a child's imagination and creativity, which is believed to be the positive outcome of bolstering curiosity in them. Scientific settings that inhabit inquiry culture have the capability of inducing a longing or craving to know more, to explore the meaning behind a data, and to find evidence and reason to support their claims (Lawson, 2009).

Our background study on the findings of Said et al. (2016) on the attitudes of Qatari students from grades 3 - 12 towards science disciplines indicate dismaying performance due to different catalysts, one of which is the teaching method. Therefore, we conducted research on students from high schools in Qatar by integrating an innovative approach of delivering information through STEM workshops. This innovative approach introduces photography as a teaching tool in attracting students to improve their outlook on science by unveiling the beauty behind the science.

Research Objectives

[1] To quantitatively analyze the results of the research from the students' opinion in the questionnaires provided through Al-Bairaq, scientific program, to observe the effectiveness of scientific photographs in inspiring students to visualize the beauty of science.

[2] To understand how art through photography can support inquiry in science education, research findings, rather than standards document

Methods

• **Methods:**

The research participants include a batch of 386 students from 19 public schools in Qatar (220 males and 166 females, from grade 10 and 11). This program implements STEAM workshops in schools where students are familiarized with scientific topics through hands-on activities. These activities were designed to follow STEM pedagogy, implementing photography to capture images of the same concepts, thereby infusing the 'Art' into STEM pedagogy. The data collected from the student's program includes questionnaires and photographs, creating opportunities for quantitative and qualitative analyses, respectively.

• **Research Experiment:**

The students are exposed to a scientific workshop program in STEAM. The program takes place for 3 months (a cycle) in each school and is designed in the following steps (Fig 1);

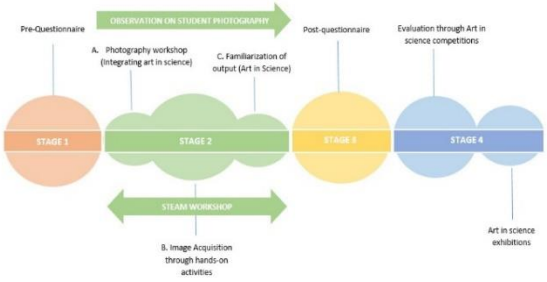


Figure 1. Flowchart of the research methodology

Results and Discussion

The students produced 816 images, which were placed evaluated as part of an art in science competition.

Figure 2. An emulsion from the extract of fruits used in dye sensitized solar cell activity

Figure 3. Simulation of drug release showcasing the dilution of colored alginate beads

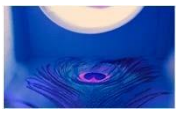


Figure 4. UV light source used in visualizing iridescence of peacock feather in the manipulation of light module

Figure 2a. Sample photograph collage from "dye sensitized solar cell" activity

Figure 3a. Sample photograph collage from biodegradable materials activity

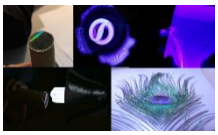
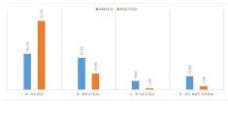


Figure 4a Collage of sample photographs from "Manipulation of light" activity

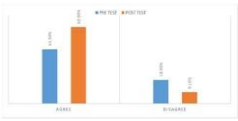
Figure 5. Art in science gallery in Katara

Analysis



Graph 1. Observing a scientific photo attract them to visualize the beauty of science (N = 386)

Graph 2. Observing scientific photos helps in learning faster & easily



Graph 3. I would like to join a scientific specialty in the university (n = 386)

Conclusions

Students successfully advanced through different STEAM activities, utilizing the ambiance, instruments, and surroundings to create curiosity-inducing photographs. This led to

- Increased agreement about the ability of photographs to foster students' awareness if the beauty of science, with 8 out of 10 students supporting the statement in the post-workshop questionnaire.
- 816 photos were captured, from which 44 photos were exhibited in a gallery in Katara, Qatar.

Thus, curiosity was radiating from the students to the community, inspiring them to investigate scientific subjects. Also, the students showed higher satisfaction in the program as they gained understanding, analysis, and evaluation skills.

Acknowledgments

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References

1. Al-thani N, Siby N, Ali R, Nabhan F (2020). Cultivating curiosity by integrating art in science through photography. Acad. J. Edu. Res. 8(1): 001-014.
2. Barell, J. (2003). Developing More Curious Mind. Alexandria: Association for Supervision and Curriculum Development (ASCD).
3. Starko, A. J. (2013). Creativity in the Classroom Schools of Curious Delight. New York: Routledge.
4. Sternberg, R. J. (1999). Handbook of Creativity. Cambridge: Cambridge University Press.
5. Lawson, A.E. (2009). Teaching Inquiry Science in Middle and Secondary Schools. Thousand Oaks, CA: Sage.
6. Said, Z., Summers, R., Abd-El-Khalick, F., & Wang, S. (2016). Attitudes toward science among grades 3 through 12 Arab students in Qatar: findings from a cross-sectional national study. International Journal of Science Education, 38(4), 621-643.