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Newspapers in Science Education: A Study Involving Sixth Grade Students

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Abstract

The purpose of this study was to explore the learning performance of sixth grade elementary school students using newspapers in science teaching. A quasi-experimental design with a single group was used in this study. Thirty-three sixth grade elementary school students participated in this study. The research instruments consisted of three questionnaires, a "Learning Attitude toward Newspapers in Education Scale" (29 items, Cronbach's $\alpha = .90$), a "Science Reading Attitude Scale" (15 items, Cronbach's $\alpha = .93$), and an "Attitude toward Science Scale" (27 items, Cronbach's $\alpha = .92$). All three questionnaires have good reliabilities. Furthermore, the validity of these questionnaires has been confirmed by three science educators. The results showed that the use of newspapers in education and multiple instructional strategies can (1) effectively enhance the sixth graders' learning attitudes towards the use of newspapers in science education and enhance their reading of science articles and involvement in science experiments; (2) effectively promote the sixth graders' attitudes toward science reading and enhance their science reading understanding; and (3) enhance the sixth graders' performance in scientific attitudes and significantly strengthen their science learning and interest. The research results showed that the use of newspapers in science teaching effectively enhances the science learning performance of the sixth grade students.

Key words: Attitude toward science, Newspapers in education, Science education, Science learning, Science reading

Introduction

Science teaching emphasizes conducting science experiments and inquiry activities and encourages explorations to assist elementary school students to recognize and explore natural science and verify scientific laws through science experiments. Lai (2012) pointed out that although the science textbooks for elementary schools are filled with new and novel science experiments, inquiry activities that encourage students to explore the historical facts of the natural sciences are limited. Therefore, it is difficult for students to deal with science concepts and develop their science understanding, resulting in some students rejecting science learning.

Along with the ever-increasing emphasis on national reading activities involving elementary school students, a number of teachers have already integrated science history, science readings, or science writing strategies into their teaching activities and have acquired relatively good outcomes (Chang, 2010; Chin, Yang & Tuan, 2010; Chiu & Koa, 2006; Chiu & Yu, 2005; Lai, 2006, 2008, 2009, 2012; Lai & Wu, 2010; Li & Wu, 2009; Lin, Cheng & Chang, 2009; Lo & Chang, 2004; Yang & Chin, 2006).

Reading literacy and scientific literacy are key capabilities required of students, and are basic qualities that need to be continually strengthened. The purpose of this study is to explore the science learning performance of sixth grade elementary school students based on the introduction of newspapers together with multiple instructional strategies in science teaching.

Literature Review

Newspapers in Science Education

Along with the increasing attention given to the evaluation of the results of PISA and reading education in science, it is becoming increasingly common to introduce newspapers in teaching science. Lee (2007) pointed out that this method uses newspapers as textbooks for students to learn new knowledge, and to enhance their reading capacity, verbal ability and civic literacy.

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Regarding the teaching and learning of science from newspapers and other media resources, the Ministry of Education in Taiwan published a Media Literacy Education Policy White Paper in 2002. The Ministry pointed out that modern citizen should have better understanding of the media and be able to highlight the role it plays in serving the social public affairs, and to strengthen and empower the public so as to develop a healthy media community (Ministry of Education, 2002).

Feng (2004) pointed out that, compared to book reading, there are several special features in reading newspapers. For example, newspapers offer the latest daily information, which can help students establish reading habits. Furthermore, newspapers are equipped with the latest information on a multitude of subjects, which can supplement the shortcomings of textbooks. Finally, the current news in newspapers can be used for discussion, which is conducive to cultivating media literacy and civic literacy.

Regarding the implementation of teaching based on newspapers in science education, Li & Lin (2005) pointed out that there are about 1,000 different newspapers that offer periodicals, which can be regarded as textbooks for 390,000 teachers in over 10,000 schools. For example, the New York Times offers daily teaching cases and a learning sheet, enabling teachers to directly spread the content from the New York Times to the Learning Network after integration with courses (the New York Times includes special notes as to which news items are suitable for students at a particular grade). In addition, Zhang (2005) pointed out that Japan is also actively promoting the use of newspapers in education, and that Japan expects Japanese children to be actively involved in learning from newspapers. Moreover, the results for using newspapers in education can enhance learning outcomes of students (Jarman & McClune, 2005; Kahveci, 2015; Kirikkaya & Bozkurt, 2011; Oliveras, Márquez, & Sanmartí, 2013; Tuten & Temesvari, 2013).

In summary, the use of newspapers in education is an important project and one which can cultivate media literacy. It is worthy to explore the integration of newspapers in education. Students are likely to acquire new knowledge from current news about scientific information in newspapers. They are also likely to enhance their reading capacities, verbal ability and civic qualities.

Science Reading

Along with the increasing attention given to the poor performance of Taiwanese students in PISA, the topic of science reading is becoming increasingly important. Lai (2006) pointed out that science reading refers to the adoption of science reading materials. These include popular science readings, science articles, science nursery tales and stories, and science paintings, all of which are used in teaching activities that will enrich the understanding of students about science topics and enhance the science learning outcome of students.

Thompson and Mixon (1996) pointed out that when readers with a positive reading attitude become involved in reading about certain topics, they will invest more attention and find the reading more significant because when readers are equipped with positive reading attitudes, they will acquire enjoyable reading experiences and active perceptions of reading behavior. As Ross and Frey (2002) explained, popular science books can involve topics from single science concepts, to more in-depth perspectives and interpretations. Popular science books can also provide for the different reading abilities of students, enabling them to choose their own books; popular science books can be less difficult and more interesting than other textbooks.

Secondly, science reading can explore science history or can enhance science concepts and the thinking abilities of students (Chiu & Koa, 2006; Lai 2008, 2012; Lai & Wu, 2010; Shiao & Hung, 2000). Science reading activities are conducive to the development of science concepts (Chiu & Koa, 2006; Lin, Cheng & Chang, 2009). In addition, the integration of the teaching of popular science readings can offer inquiry methods for teachers, help to enhance science concepts and promote the growth of problem-solving skills by teaching science laws. It can also provide surprises and wonder for the students. These activities enrich students' creative and thinking abilities (Chin, Yang & Tuan, 2010; Ediger, 1995; Lai, 2008, 2009, 2012; Lo & Chang, 2004; Nordstorm, 1992; Rice, 2002; Rice & Rainsford, 1996; Rice & Snipes, 1997; Scott, 1993; Short & Armstrong, 1993).

Inspired by the related researches on science reading, we can enhance the application of science reading into teaching. This study strongly believes that teachers can offer teaching that is more in-depth and rich in exploration and that will help to develop students' life-long learning through science reading, further enhancing elementary school students' learning performances in science.

Research Methods

A quasi-experimental design with a single group was used in this study. There were 33 sixth grade elementary school students who participated in this study. Regarding the teaching design of newspapers in education, based on the above-mentioned literature review, the key to using newspapers in education is to offer inspiring scientific inquiry learning together with the integration of multiple instructional strategies. This study mainly adopted reading, science experiments and group discussions utilizing newspapers in education, primarily the Mandarin Daily News. The important features of this study included: (1) the teacher photocopying science articles every day from the Mandarin Daily News for the whole class; (2) using hands-on science experiments based on published science experiments in the Mandarin Daily News, with students carrying out experiments once every two weeks; and (3) small group discussions and sharing in two sessions every week. In total, the teaching course was for 12 weeks.

The research instruments in this study consisted of the Learning Attitude toward Newspapers in Education Scale, the Science Reading Attitude Scale, and the Attitude toward Science Scale. Further information about the instruments is detailed below. (1) The Learning Attitude toward Newspapers in Education Scale: the aim of the design of the scale was to understand the ideas and attitudes of students towards the implementation of newspapers in education as teaching resources. This study adopted a five-point Likert-type scale, with a total of 29 items. The reliability of this scale, with a Cronbach's α of .90, indicates that this scale has good reliability. (2) The Science Reading Attitude Scale: the aim of the design of this scale was to explore the reading behavior and performance of students. The expectation was that students will become familiar with science reading after gaining access to the newspapers used in science teaching. This study adopted a five-point Likert-type scale with a total of 15 items. The reliability of this scale, with a Cronbach's α of .93, indicates that this scale has also good reliability. (3) The Attitude toward Science Scale: the purpose of this scale was to understand the students' attitude toward science after using newspapers in science teaching. This study adopted a five-point Likert-type scale with a total of 27 items. The reliability of this scale, with a Cronbach's α of .92, indicates that this scale has good reliability as well. The validity of these three research instruments was confirmed by three science educators. After having collected the research data, the SPSS statistics software package was used to perform t-tests to explore the learning performance of students in the experimental group on the pre- and post-test.

Results and Discussion

Performance on the Learning Attitude towards Newspapers in Education Instrument

Before and after the teaching of the students in the experimental group, the "Learning Attitude towards Newspapers in Education" scale was administered. A summary of the results of the t-test of this scale is shown below in Table 1.

Table 1 Table of t-test results of the Learning Attitude towards Newspapers in Education Instrument

	N	Mean	SD	<i>t</i>	<i>p</i>
Pre-test	33	121.121	14.133	6.110	.000***
Post-test	33	131.512	11.515		

*** $p < .001$

The results in Table 1 show that the outcomes of the Attitudes toward Newspapers in Education Instrument indicate that students did better on their post-test than on the pre-test ($t = 6.110$, $p < .001$). The research results show that, after using newspapers in science teaching, the experimental group students' learning attitudes towards newspapers in education showed remarkable advancement and growth.

After a further review of the teaching process, this study found that the students had always been interested in science articles featured in newspapers. The possible reason is that the content of the science articles in newspapers are usually vivid and understandable. In addition, in the past, students had lacked the opportunities for doing hands-on experiments. Even given such opportunities, these experiments in the textbooks were found to be less interesting for students. Consequently, students were indifferent towards the experiments. However, after implementation of the newspapers in science teaching, the arranged experimental activities were not only easy to conduct, but were also very interesting. Gradually, the students became more positive towards hands-on experiments and enjoyed a sense of accomplishment of their endeavors, indicating that the use of newspapers in

teaching not only strengthened the learning interests of students towards science experiments, but also changed their perspective towards the use of newspapers in teaching.

Performance in the Science Reading Attitude Instrument

This study adopted the “Science Reading Attitude” scale both before and after the use of newspapers in teaching for students in the experimental group, and the summary of the t-test results are shown as Table 2.

Table 2 Table of t-test results of the Science Reading Attitude Instrument

	N	Mean	SD	<i>t</i>	<i>p</i>
Pre-test	33	52.909	7.358	9.264	.000***
Post-test	33	60.606	6.950		

*** $p < .001$

The results in Table 2 show that the attitudes toward science reading indicate that students did better in the post-test than in the pre-test ($t = 9.264$, $p < .001$). The research results show that, after the use of newspapers in science teaching, the students in the experimental group enjoyed positive progress and growth in science reading attitudes. After a further review of the teaching process, this study found that the students had acquired positive attitudes towards science reading. At the same time, the students had enriched their knowledge and changed their opinions about science reading.

Performance in the Attitude toward Science Instrument

Before and after the teaching of the students in the experimental group, the “Attitude toward Science” scale was administered. A summary of the t-test results is shown in Table 3.

Table 3 Table of t-test results of the Attitude toward Science Instrument

	N	Mean	SD	<i>t</i>	<i>p</i>
Pre-test	33	108.060	8.951	7.327	.000***
Post-test	33	116.121	9.600		

*** $p < .001$

The results in Table 3 show that the outcomes of attitudes toward science instrument indicate that students did better in the post-test than in the pre-test ($t = 7.327$, $p < .001$). The research results show that after the use of newspapers in science teaching, the attitude toward science of the students in the experimental group had experienced significantly positive progress and growth.

Overall, after the newspapers in science teaching had taken place, the attitude toward science of the students had been transformed into a positive attitude, which is one of the main reasons why students favor the use of newspapers in science teaching. The learning achievements were the biggest motivation in support of their studies and also a source for their active learning. At the same time, the attitude toward science of the students was enhanced.

Conclusion

With the integration of the use of newspapers in science education and the implementation of multiple instructional strategies, this study found that the science learning performance of the sixth grade elementary school students had been promoted, including: (1) effective promotion of the learning attitude toward the use of newspapers in education and enhancement of the students in the reading of science articles and undertaking of science experiments; (2) effective promotion of the science reading attitude of the sixth grade elementary school students and improvement of their science reading understanding; and (3) effective promotion of the attitude toward science of sixth grade elementary school students and enhancement of their interest in science learning. The research results show that the use of newspapers in science teaching with sixth grade elementary school students can help to effectively promote the science learning of children of that age. This study further explored and found possible reasons for effective teaching. These include how the use of newspapers in education begins with the reading of the science articles. This study also involved the use of small group discussions and hands-

on experiments to assist the students. Therefore, it shows that this method can trigger the learning and interests of students and offer in-depth learning experiences. Through independent cooperative groups, the students can complete group reports and share them in class. Consequently, the use of newspapers in science education has proven to promote the science learning performance of students.

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