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Testing the Awareness of Hazardous Nature of Printmaking Materials among Printmaking Instructors in Traditional and Non-toxic Printmaking Programs

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Abstract: In art education, printmaking is one area that mostly deals with toxic materials that are hazardous to human health. This study investigated printmaking instructor awareness of hazardous printmaking materials. A questionnaire was designed for printmaking instructors and was mailed to a 20 instructors from the non-toxic printmaking programs and 20 instructors from traditional printmaking programs. The questionnaire sought information on demographic characteristics of respondents and the awareness of instructors of the hazardous nature of printmaking materials. A total of 23 printmaking instructors responded to the survey instrument. The sample was drawn from 10 liberal arts colleges and universities in the United States, United Kingdom and Canada (5 universities for the safe printmaking program and 5 for the traditional program). Information collected from the questionnaire was coded and entered into a computer for statistical analysis using the SPSS program. It was found that all printmaking instructors in both traditional and non-toxic programs were highly aware of the health effects of toxic printmaking materials and the T-test analysis indicated no significant difference in the awareness between instructors in either program. This indicated that much emphasis was put on awareness of the hazards of art materials in all types of art programs among instructors.

Key words: Non-toxic, traditional, awareness, instructors, printmaking, program

INTRODUCTION

Since World War II and with the technological advances in the 20th century, a new generation of chemicals was born and many more materials are used in art products than in Ramazzini's time^[1]. While many of the art materials and processes have remained the same, artists were introduced to new chemicals such as new plastics, lacquers, solvents, acids, aerosol sprays and dyes, which increased the hazardous products to which a person can be exposed in the course of daily life. When the environmental hazards are combined with the new chemicals that have appeared, results can be destructive to the artist's health^[2].

As numbers of people exposed were increased to new toxic materials in art, reports of health problems began to appear. According to McCann^[1], Robert Mallery, a New York sculptor, directed the first warning in an article to the art community in an Art News article in 1963 warning that some new materials might be toxic. Mallery described how after working for 15 years with polyester resins, epoxy resins, other plastics, spray paints and a variety of solvents, he developed repeated episodes of a flu-like illness and he was diagnosed as having kidney

and liver damage caused by exposure to solvents and plastics resins^[1].

Since the appearance of Mallery's (1963) study, the question of the hazards of art materials has received serious attention and a pattern of illness associated with art materials has begun to emerge. These include various problems such as: mercury poisoning in a mural painter, several cases of lead poisonings in stained-glass craftspeople, chlorine poisoning in several people making Dutch mordant, severe aplastic anemia from benzene in a well-known lithographer, severe respiratory allergies in users of fiber-reactive dyes and metal fume fever among welders^[1]. In addition to illness, there also have been numerous numbers of deaths caused by exposure to art materials. Some of these cases have been disproved, some cannot be supported and others are well proven^[3]. Among the supported cases are the deaths of a California weaver in 1976 as a result of working with yarn contaminated with anthrax; several cases of bladder cancer from exposure to benzidine dyes among Japanese silk kimono painters; and a furniture refinisher using methylene chloride paint stripper who suffered a fatal heart attack^[1,4]. Furthermore, the National Cancer Institute conducted a study of the causes of death of artists. Death certificates were

obtained for 1, 598 artists and their causes of death were compared to the causes of death for all United States men and women. The study found that artists had a statistically significant greater number of deaths from heart disease, leukemia and cancers of the brain, kidney, bladder, colon and rectum^[5]. This study proves that there is a statistical relationship between being an artist and developing these diseases.

The real concern and the beginnings of active programs pertaining to health hazards in art materials emerged in 1974, when Dr. Bertram Carnow of the University of Illinois School of Public Health and Gail Barazani, a Chicago artist, started offering educational programs focused on health hazards in art materials^[6]. Carnow warns about environmental contaminants of which arts materials are only a small part and he argues that human kind is succumbing to diseases related to the way people live, the environment in which they live, their habits, their diets and their occupations^[7].

The non-toxic printmaking program is a process of making and experimenting with art which replaces the unnecessary toxic chemicals with adequate substitutes that can be used in a normal studio environment, without special ventilation, masks, goggles, or anxiety. In such an environment, imagination is liberated to the point where it is most important in printmaking^[3]. Non-toxic approaches in printmaking can contribute to the overall development of printmaking students because it presents challenges to their abilities, allows for the exploration of new and various methods of printmaking and enhances the students' imagination, inventiveness and creativity^[8].

The aim of this study was to compare the awareness of printmaking instructors to the hazardous nature of printmaking materials in traditional and non-toxic printmaking programs

MATERIALS AND METHODS

This research was carried out in two parts. Part one was done prior to the collection of data and it involved contacting the directors of the printmaking departments by e-mail. The researchers explained to the participants the nature and purpose of the study and described potential benefits of the research. This was done in order to gain access to the institutions that were selected to participate in the study and to request their permission to send the questionnaire to the printmaking instructors under their supervision. The participants' privacy and confidentiality of all the information obtained from them were assured. From a sample pool of 10 liberal arts colleges and universities in the United States and Canada, a questionnaire was prepared for printmaking instructors.

Table 1: Questions used in the questionnaire

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1. How frequently do you request the purchase of safe art materials for students' use?
 2. How often do you request that students use protective equipment?
 3. How often do your students eat or drink while working in the studio?
 4. How much do you print/work at home?
 5. How frequently do your students engage in different printmaking techniques that require the use of different chemicals and solvents in the same room?
 6. Do you take special precautions against chemicals effect in the case of pregnant women students?
 7. Who do you feel is responsible for the students' health and safety in the work place?
 8. How important do you consider researching safe materials in printmaking?
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The questionnaire was mailed to a 20 instructors from the non-toxic printmaking programs and 20 instructors from traditional printmaking programs. The questionnaire sought information on demographic characteristics of respondents and the awareness of instructors of the hazardous nature of printmaking materials and processes. A total of 23 printmaking instructors responded to the survey instrument. Instructors were asked to answer 8 questions listed in Table 1.

Statistical analysis: Information collected from the questionnaire was coded for the purpose of entering it into a computer for statistical analysis (SPSS Program). Data collected helped in calculating the frequency distribution, means, standard deviations and percentages in order to provide a descriptive analysis of the responses. Demographic information was reported to describe the sample of printmaking instructors in traditional and non-toxic programs. T-test and crosstabs tests were applied to compare between traditional and non-toxic printmaking methods.

RESULTS

The demographic characteristics of instructors in both traditional printmaking and non-toxic printmaking programs are presented in Table 2A and B.

To test the awareness of the hazardous nature of printmaking materials among printmaking instructors in both traditional and non-toxic printmaking programs, instructors were asked to answer 8 questions in a questionnaire that provides information about awareness (Table 1). The first six questions were combined together into one variable called awareness. The scale for the six questions were from 1 to 5, where 1 indicates not aware and 5 indicates very aware. The instructors' scores in the six questions were added together to constitute one score, which converted the scale from (1 to 5) to (6 to 30), where 6 indicates not aware and 30 very aware. A

Table 2A: Demographic characteristics of instructors

Characteristics	Traditional		Non-toxic		Total in both programs	
	n	(%)	n	(%)	n	(%)
Program type	13	56.5	10	43.5	23	100.0
Gender						
Male	9	56.3	7	43.8	16	69.6
Female	4	57.1	3	42.9	7	30.4
Major						
General	7	53.8	7	70	14	60.9
Printmaking						
Lithography	3	23.1	2	20	5	21.7
Intaglio	3	23.1	1	10	4	17.4

Table 2B: Demographic characteristics of instructors

Characteristics	Traditional		Non-toxic		Total in both programs	
	Mean	SD	Mean	SD	Mean	SD
Age	45.00	9.94	50.90	9.24	47.56	9.89
Work Exp (Y)*	22.46	9.57	23.50	8.88	22.91	9.08
Teaching Exp (Y)	12.92	9.67	11.50	6.94	12.78	8.41
Studio size/ft ²	4353.84	4099.9	1733.40	517.86	3214.52	3323.04

n=23, *Exp= Experience, Y= years

Table 3: Comparison of means for the level of awareness of printmaking instructors in traditional and non-toxic printmaking programs*

Variable (awareness)	n	Mean	SD
Traditional	13	24.38	2.6
Non-toxic	10	25.20	3.3

*Scale based on level of awareness: Low awareness = 6 to 9, moderate awareness = 10 to 20, high awareness = 21 to 30

Table 4: T-test for equality of means for the level of awareness of traditional and non-toxic printmaking instructors

Variance	T-value	df	2-tailed significance (p)
Equal	-.668	21	0.511
Unequal	-.648	16.92	0.525

comparison of means and T-test was computed for this variable (awareness) to investigate whether or not there was a difference between the traditional and non-toxic printmaking instructors' responses regarding their awareness of hazardous printmaking materials. The results are reported in Table 3 and 4.

Regarding question 7, dealing with the responsibility for student safety in the studio, a crosstabs and chi-square test were performed to determine whether there is a difference between the traditional and non-toxic printmaking instructor's responses regarding awareness of hazardous printmaking materials and processes. The results are reported in Table 5 and 6.

Question 8 dealt with the importance of researching safe materials in printmaking. The scale for this question was from 1 to 4, where 1 indicates students' safety in the studio is not important (not aware) and 4 indicates it is urgent (very aware). A comparison of means and a T-test was computed and results are shown in Table 7 and 8.

DISCUSSION

This study was conducted to explore the new non-toxic approach to printmaking at a university level and compared it to the traditional printmaking programs in terms of the faculty awareness of hazardous art materials. It was found that all printmaking instructors in both programs were highly aware of the health effects of toxic printmaking materials.

Results in Table 3 show that in the traditional printmaking program, where, n = 13, the instructors scored a mean of 24.38 for their awareness with a standard deviation of 2.6. In the non-toxic printmaking program, where, n = 10, instructors scored a mean of 25.20 with a standard deviation of 3.3. These findings suggest that instructors in both traditional and non-toxic printmaking programs were highly aware of the hazardous nature of printmaking materials since both scored a mean higher than 21. The T-test results of $p > 0.05$, as shown in Table 4, indicate there was no significant difference between traditional and non-toxic printmaking instructors' awareness of hazardous printmaking materials and processes.

Regarding question 7, results in Table 5 show that 61.5% of the traditional printmaking instructors believe the safety of their students in the studio is a shared responsibility between university, department, instructors and students, while 60.0% of the non-toxic printmaking instructors believe the same. This result indicates that instructors in both programs are aware of their responsibility towards their students' safety while working with hazardous materials. Table 6 indicated

Table 5: Crosstabs for the responsibility for students' safety in the studio

	Question 7					Total
	University	Department	Instructor	Student	All of them	
Traditional count	2	1	-	2	8	13
%	15.4%	7.7%	-	15.4%	61.5%	100.0%
Non-toxic count	-	2	2	-	6	10
%	-	20.0%	20.0%	-	60.0%	100.0%

Table 6: Chi-square test for the responsibility for students' safety in the studio

Chi-square	T-value	df	Significance
Pearson	6.33	4	0.175
Likelihood ratio	8.55	4	0.073
Mantel-Haenszel test for linear association	1.876	1	0.100

Table 7: Comparison of means for the importance of researching safe materials in printmaking

Variable (q8*)	n	Mean	SD
Traditional	13	3.30	0.480
Non-toxic	10	3.60	0.516

*q8: Question 8

Table 8: T-test for equality of means for the importance of researching safe materials in printmaking

Variance (q8)	T-value	df	2-tailed significance (p)
Equal	-1.401	21	0.176
Unequal	-1.387	18.742	0.182

that there was no significant difference on the responses of question 7 between the instructors in the traditional and non-toxic programs. Curtiss *et al.*^[9] showed that the safety of instructors and students in the art studio is a multifold and ongoing task shared among instructors, students, administrators and the university. Instructors have to inform themselves, their students, their colleagues and the administrators of their schools about coping effectively with art hazards. Administrators must recognize that it is in the best interest of the university to implement health and safety programs to avoid any future hazards^[9].

Regarding question 8, the results in Table 7 show that the traditional printmaking instructors scored a mean of 3.30 and a standard deviation of 0.48, while non-toxic printmaking instructors scored a mean of 3.60 and a standard deviation of 0.51. These results suggest that instructors in the traditional printmaking program agree that researching for safe printmaking materials to replace the hazardous ones is an important matter, while non-toxic printmaking respondents felt it is an urgent matter. These results are other indicator of the instructors' awareness. Although a T-test done to investigate the difference between the two means showed $p > 0.05$, there is a slight significant difference in the mean between the instructors in the traditional and in the non-toxic program for question 8.

The hazardous arts material has received serious attention and, as a result, many researchers wrote about it. McCann^[7] and Rossol^[2] indicated that the increasing number of people exposed to new materials in art and reports of health problems and deaths, raised the question of safety and warned that some of these art materials might be toxic. This resulted in the creation of many educational programs all over the world. Centers were established for the purpose of providing the most current information on the hazards of art materials and the different methods for precaution on and preventive measures. This may explain the high level of awareness of the hazards of printmaking materials among instructors found in the study.

In conclusion, present results show that printmaking instructors were aware of the hazardous nature of printmaking materials and methods, without taking into consideration their program type. There was no difference between the level of their awareness. This indicated a great deal emphasis on awareness regarding the hazards of art materials in all printmaking materials of art programs.

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