

# SAFETY AND SUSTAINABILITY RESEARCH FOR UNIVERSITY SCHOOLS OF FINE ARTS.

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## I. Introduction

Designing new teaching programs for both undergraduate and graduate university studies involves integrating concepts and methodologies regarding quality, work safety and hazard prevention, and environmental protection. One of the challenges facing Spanish research within the realm of European Higher Education concerns health and safety issues in the Arts.

In the case of Fine Arts, student exploration is one of the fundamental pillars of the study program; therefore it is imperative that art studios be optimized. This optimization affects both designated resources (infrastructures, materials, equipment, etc.) and organization of the teaching force.

In this context, the aim of our research is to improve educational practices by designing quality measures that are both friendly to the environment and hazardous free. The aim here is to assure adequate art studio and laboratory management, and provide students with hazard free health and environmentally safe concepts that can be incorporated in their professional lives.

The school of Fine Arts at the University of Barcelona is part of a pilot program, where our experience in educational innovation and research is serving as a reference for the implantation of OSHAS 18001 norms.

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## II. Theoretical outline and objectives

The project initially intends to promote quality research on issues concerning health safety and environment sustainable procedures, art materials and products; this includes product use and handling, recycling and waste management in art school studios and laboratories. Latter on, at a second stage, these findings would be made extensive to the art community.

There is sufficient empirical evidence that a number of substances, products and materials frequently used in Fine Arts are either hazardous or suspected to be hazardous and can often cause health problems. It is no secret that Spain, in comparison to the rest of Europe, particularly the northern countries, has still a lot to improve in the realm of work safety, environment protection and sustainability. Despite insufficient funding and weak coordination, timid efforts are being made to progressively put into place measures aimed at subsiding these deficiencies in Spanish universities. As society and mass media become more sensitive to climatic changes and the effects of pollution on the environment, institutions from a wide range of areas must be ready to take on leading initiatives towards change.

These considerations stress the need to avoid further delays in getting university professors actively involved in health and environment issues, namely *clean* technologies, limited use and disposal of pollutants, fuel consumption reduction, etc. Worth mentioning here, is the line of action followed by the research team members: each has been developing relevant work at his/her faculty, resulting in innovative headway with measurable results at a university level. Some have even had repercussions at an industrial level, having an effect on the market by promoting more competitiveness and increasing the added value of materials or manufactured products that fulfill specific art needs, by applying procedures that lower consumption of materials, waste volume, and overall production costs.

Thus leading the research team to consider it essential to continue developing different research modalities, and look for effective alternatives. These alternatives aim at putting into place corrective measures that include possible substitution of one product for another, limited use of suspected hazardous products that cannot be substituted, introduction of procedure modifications, including environmental, safety and health hazard prevention measures, studies on sustainable resources, etc.

### Objectives:

- Develop different lines of research that can eliminate or reduce the use of hazardous products in professional and non-professional art studios and laboratories, as well as art schools and centers by offering alternative solutions to those traditionally or industrially applied: alternative innovative techniques and procedures that are friendly and respectful with the environment and our health.
- Develop alternative procedures that can replace or limit the use of those that are health hazards or ecologically unfriendly.
- Apply preventive criteria to our own research proceedings and establish occupational and environmental safety protocols, in order to lower health risks brought about by the use of hazardous substances present in some products, procedures or techniques used in the arts, including materials or procedures where no substitute has been found or alternatives that continue to have certain amount of risk.
- Study the application of new digital tools and technologies that are safer and friendlier to the environment than traditional art procedures in painting, sculpture, drawing, printmaking (intaglio), photography, design, restoration, etc. Among them, it is important to underline, digital image modeling procedures that are being highly demanded by artists today.
- Develop new approaches capable of satisfying artistic aesthetic needs and requirements for all those who use art as a means of creation and expression.
- In line with market demands and requirements, offer advisory support and know how to the industry so as to optimize the use of and obtain more competitive non-toxic environment friendly products and procedures, within a short or medium term.
- Develop and improve specific methodology and provide guidelines indicating characteristics and determining use of suggested materials that will allow us to modify educational systems in line with the creative discourse, beginning from primary schooling on to higher education.

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- Communicate research findings to the scientific, educational and industrial communities in order to maximize results and generate a multiplying effect that will, in turn, contribute to social welfare.

Our aim when designing competitive and quality methodology in artistic practices is directed towards achieving the following goals:

- a) Organizational improvement in teaching practices.
- b) Correct deficiencies observed in the design, planning and carrying out of practices.
- c) Adequate waste management
- d) Motivate respect and desire to protect the environment
- e) Improve work conditions in art studios and laboratories
- f) Eliminate health incidences and accidents.

The goals set in this project are based on the premise that research and implementation of hazard free procedures and materials for both health and environment in art activities constitute an *essential* and *viable* alternative in front of the hazardous procedures and materials being used today. Essential, because the opportunity for this type of development, under our current context, is unquestionable; and viable because its application mainly depends on the effort carried out by educators and professionals due to their prescriptive capacity and influence over other groups.

### III. Methodology and research proceedings

The methodology proposed includes both theoretical and practical aspects. Starting from known precedents on the subject we are studying, future actions in regards to hazard prevention and selection of alternative materials and procedures being developed by the various team members according to their specialization are determined and listed by priority in a consensual manner. Decision making includes factors such as: time span of the project, the need to elaborate and conclude safety protocols according to each of the art specialties with a given priority, the visibility and viability (economical and social) of suggested modifications over a medium term.

The line of action includes eight phases:

#### III.1 Reference sources and training

- 1.1 Compiling, reviewing and comparing bibliographical documentation on techniques and materials regarding the issues being studied.
- 1.2 Visits to specialized centers.
- 1.3 Training and information of the research team.
  - 1.3.1. Drawing studio
  - 1.3.2. Intaglio printmaking studio
  - 1.3.3. Mock-ups and modeling studio: Adaptation of methodology used in designing and constructing mock-ups and three-dimensional models with traditional materials to those necessary for the use of new technologies.
  - 1.3.4. Founding studio
  - 1.3.5. Painting techniques studio
  - 1.3.6. Photo lab

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**III.2 Initial Evaluation of the current situation** regarding safety, hazard prevention and waste management in studios, laboratories and class rooms in the Fine Arts Faculty.

- 2.1 Compile official guidelines and norms (legislation) regarding safety and hazard prevention as well as waste management.
- 2.2 Identify and select the implicated areas: educational centers and leading companies in the sector.
- 2.3 Spot and gather information on private and public companies that are specialized in handling and adequately disposing of waste products and residues generated in art studios and laboratories.
- 2.4 Evaluate and confront actual data obtained in studios and laboratories at the Faculty of Fine Arts with official norms and guidelines.
- 2.5 Determine weak points and deficiencies of art studio and lab infrastructures as well as review current models and procedures for handling waste products and residues.
- 2.6 Analyze and contrast current guidelines and protocols on environment sustainability, and occupational safety and personal hygiene to lines of action followed by educational, professional and business fields.
- 2.7 Make decisions according to results: how to proceed in each field, set up proposals by priority.

**III.3 Initial evaluation of hazardous materials and procedures** used in art practices, and selection of possible alternatives to be tried out and studied in the experimental phase.

**III.4 Experimental Phase.** Empirical development with new materials, procedures and techniques:

4.1 Drawing studio: Alternatives to fixture sprays.

4.2 Intaglio and printmaking studio:

Targets:

- Alternative plates: Metal plates (types of metals, procedures...), plastic plates (polyester, polystyrene, pvc, methacrylate plates, etc. and procedures, plywood y linoleum, and other adaptable plates. Analysis of viability and application.
- Less hazardous or toxic alternative materials: etching baths, varnishes, solvents, inks, resin, additives, etc.
- Photosensitive film in photo-engraving.

4.3 Mock-up and Model studio:

Targets:

- Adjustment of new technologies to formal and constructive needs.
- 2D drafts as design ideas or tools, using either traditional procedures or software (Alias, Free Hand)
- Virtual 3D model construction using Rhinoceros 4.0
- Obtainment of model.
- Transfer model to STL format.
- 3D printing.

4.4 Founding studio:

Targets:

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- Clasificación of patinas according to two types of procedures, the most customary in small to medium formats in unitary samples or limited editions.
- Clasificación of mixtures according to the degree of toxicity of their components, selecting those with limited risk index or whose importance in the procedure is determining.

#### 4.5 Painting techniques studio:

##### Targets:

- Painting agents: gums, resins y natural waxes, oils, glues, synthetic waxes and resins.
- Pigments: organic and inorganic, natural and synthetic.
- Solvents and environment friendly alternatives for oil painting techniques.
- Auxiliary materials.

#### 4.6 Photo lab: Spot and test alternative products, that are better for the environment and in line with prevailing norms, against those currently used in photographic laboratories.

##### Targets:

- Description and analysis of chemicals used in photographic procedures, stipulating their degree of toxicity.
- Description and analysis of photographic laboratory work procedures: black and white, color, toning, negatives, positives, past procedures, alternative procedures, etc.

### III.5 Result analysis

Analyze and evaluate the impact of innovations introduced in each of the art area studied.

- 5.1 Compare results and procedures in regards to creative expressiveness.
- 5.2 Compare results and procedures in regards to minimizing health and environmental risks.
- 5.3 Determine what procedures and products can be substituted and which cannot.

**III.6 Introduce innovations** regarding materials and techniques as well as making use of their creative and expressive potentials. The initial premise, contrasted with previously developed experiences, is that the creative result is maintained or improved with regards to traditional techniques.

### III.7 Prepare safety, health and hygiene protocols

- 7.1 Prepare safety, health and hygiene protocols for the arts, with special attention given to those products and procedures that don't have a less hazardous alternative. Minimize residues.
- 7.2 Prepare chemical management protocols of those examined in this study: acquisition, storage, handling and disposal of residues.
- 7.3 Create a database including images on findings rendered.

##### Targets:

- Design format for database
- Prepare images.
- Put together images and text.

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#### IV. Results and conclusions

Prepare documents, generate transferable knowledge and didactic documents to introduce innovations in education imparted in the Fine Arts Faculty at the University of Barcelona, and then project them to other universities and educational art centers.

- a) Publish a collection of guides on environment sustainability in the Arts.
- b) Mount art exhibits showing creative works that result from exploring new innovative products and materials.
- c) Mount exhibits of new innovative products and materials.
- d) Publish articles on progress, findings and conclusions of the project in specialized magazines.
- e) Edit and digitalize documentation and results in CD-Rom format for market publication.
- f) Organize international seminars aimed at educational centers, artists, art related industries and professionals, where information on innovative materials and techniques with proven effectiveness that can contribute towards relevant changes in art creation can be presented and discussed.

QUALITY MANAGEMENT SYSTEM DESIGNED FOR THE INTAGLIO STUDIO AT THE SCHOOL OF FINE ARTS IN THE UNIVERSITY OF BARCELONA

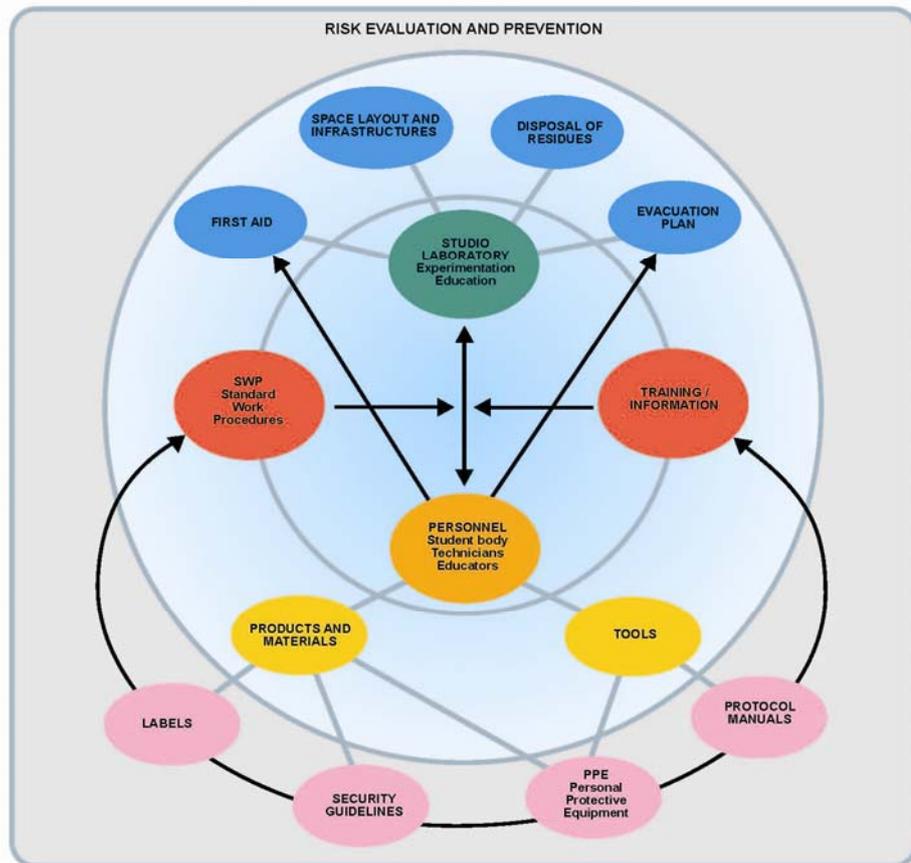


Figure 1: RISK EVALUATION AND PREVENTION  
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