Hands-On Learning through Pattern Design: A Stereotype Printing Workshop in Higher Design Education

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Abstract

This paper examines the pedagogical potential of a stereotype-printing workshop conducted in the Reprography course of the Design degree at the University of Aveiro. The study explores how hands-on, tactile engagement with manual printing techniques can support the learning of contemporary technical content in the field of graphic production and encourage the development of more meaningful visual solutions. The workshop challenged students to design modules featuring abstract motifs, subsequently produced in MDF, and to generate patterns by combining them. Students followed the entire production process, from graphic conception and preparation of final artwork to two-color printing. This approach recreated the fundamental principles of letterpress printing using limited workshop resources. The research methodology combined participant observation, visual documentation, and informal conversations with participants [1]. The results suggest that this type of workshop-based practice consolidates specific technical knowledge and fosters creative exploration that departs from common digital assumptions. The study concludes that integrating workshop practices and artisanal printing technologies into higher design education strengthens practical know-how, technological understanding, and a critical relationship between traditional means and contemporary practices, even in resource-constrained academic contexts. The relationship between manual know-how and sensory learning, as discussed in Hands-On Type [4] and The Touching Charm of Print [3], further supports the relevance of this pedagogical approach.

Keywords: *stereotype printing, patterns, workshop education, graphic production, graphic design, know-how*

1. Introduction

Since the 1970s, movable type printing has been progressively replaced by offset, which was in turn reinforced by desktop publishing in the late 1990s, a technology that, while democratizing graphic design and production, simultaneously contributed to the homogenization of visual solutions. The resulting loss of the tactile dimension and the unpredictable character typical of analog printing processes has gradually narrowed the creative and sensory repertoire of contemporary designers.
In contrast, recent years have seen renewed interest in reintegrating these obsolete printing technologies into higher design education.
This paper documents and analyzes a stereotype printing workshop developed within the Reprography course of the Design degree at the University of Aveiro during the 2021/2022 academic year. The workshop invited students to design modules featuring abstract motifs, produced in MDF through laser engraving, and to combine them into two-color printed compositions, following the procedural logic of movable type printing.
The study seeks to demonstrate how direct engagement with hands-on printing practices, even in academic contexts with limited material resources, contributes to developing the technical, creative, and reflective skills that an exclusively digital environment cannot provide.

2. Teaching Reprography at the University of Aveiro

Within the Design degree at the University of Aveiro, the Reprography course, taught in the first semester of this study cycle, aims to develop students' ability to recognize the limits of reprographic technology as factors for enhancing the expressive and creative potential of design work.
In this course, reprography is approached within the broader scope of graphic reproduction devices, processes, and equipment, along a dual chronological and technological axis. The syllabus is organized around three archetypal systems—mask, stamp, and transfer—to which other printing systems that do not fit the preceding categories are added. A further objective of the course is to familiarize students with the sequence of processes leading from graphic conception to finished product, namely final

artwork, prepress, printing, and finishing. This approach is conducted through theoretical and theoretical-practical classes.
The high number of enrolled students (between 40 and 55 per year) and the limited course load of two hours per week pose a considerable challenge for carrying out printing workshop activities, all the more so in a context where the available material resources are scarce, comprising only a single intaglio press. Finding creative pedagogical solutions that reconcile the syllabus requirements with these constraints, therefore, becomes essential.

3. Framework

3.1 The Technological Context and Know-How

The gradual shift away from so-called hot metal (lead type) toward cold type (phototypesetting), later driven by the expansion of desktop publishing software, led to the contemporary reality that Dias and Meira describe precisely: "(...) the consequence of this evolution is a saturated market where results are increasingly homogeneous (...)" [4]. Graphic solutions have become predominantly predictable, stripped of the tactile dimension and the unexpected character that distinguishes techniques such as letterpress or risography.
Against this backdrop, such technologies are increasingly recognized as holding significant potential for training new designers, both for the material experience they offer and for the conceptual possibilities they open up.
Several higher education institutions maintain or have come to incorporate workshops using this kind of technology, giving students access to a more tactile practice that broadens the way they think about design.
To quote Dias and Meira once again, "these workshops have proven to be a contribution to training on several fronts," fostering an understanding of the typographic profession and of how technological change has shaped the current state of reprographic printing, while at the same time deepening sensory knowledge through direct contact with physical matter—movable type, ink, substrate—as opposed to the digital medium, creating a space of inquiry capable of exploring all the dimensions referred to above [4].
But how might this kind of knowledge find concrete application in design practice?
One possibility is offered by the example of designer Dafi Kühne, who "(...) taking advantage of proof-press printing (...) extends his palette of materials for producing printing forms to a myriad of materials and technologies (...), which he explores avidly, without fear or conservatism" [4]. His approach is not that of a traditionalist seeking to recover a lost craft, but that of a contemporary designer for whom analogue and digital are not opposed terms: the workflow moves continuously between computer and press, and the choice of printing form is determined by the requirements of each project rather than by allegiance to a particular tradition [4]. These experiments are incorporated into work that responds to real-world briefs, yet whose final product carries the expressiveness and tactility that the digital medium cannot reproduce. The pedagogical relevance of the workshop discussed in this paper is direct; the use of laser-engraved MDF matrices follows the same logic, transposed to a resource-constrained academic setting.

3.2 Learning Through Practice — Know-How

The very etymology of *aprender* (the Portuguese verb "to learn"), from the Latin *apprehendere*—"to hold, to grasp"—situates the origin of knowing in the gesture of the hand, inscribing the body at the heart of the act of knowing [5]. It is this lineage that the tradition of learning by doing reactivates: the conviction that there is a kind of knowledge which is not transmitted through statements, but built in action, in contact with matter, and through attentive repetition.
This conviction resonates with Tim Ingold, for whom the only way to truly learn something—to know it from within—is to discover it for ourselves, by our own means [5]. Knowledge does not precede the practice that would apply it: it emerges from it. Know-how thus resides in the gesture and in the direct relationship with matter—a dimension of knowledge that is difficult to verbalize and can only be acquired by doing.
In education, this orientation has a long lineage, and it is in typography itself that it finds one of its most telling examples. Beginning in 1920, Célestin Freinet introduced a typography workshop into the classroom, in which pupils composed and printed a school newspaper—a method in which the act of typographic making was, simultaneously, a means of production and an instrument of learning [5]. For

Freinet, materially composing a word by handling the type was equivalent to knowing it "from every angle" and to fixing it in visual memory more intensely than handwriting would [5]. The same conviction runs through the devices of Fröbel and Montessori, for whom the hand is the instrument of intelligence, and, closer to our own time, through the laboratories of Bruno Munari, in which one learns by designing and manipulating [5]. Today, this tradition is being reactivated in typography and risography workshops, such as the Charles Nypels Lab or Knust, which restore a tactile and experimental dimension to higher education [6].

In the specific field of design, Nigel Cross argues that design constitutes an autonomous form of knowledge—designerly ways of knowing—distinct from the sciences and the humanities and grounded in making, in inventing, and in solving ill-defined problems [7]. This is a knowledge produced within the action itself: in stereotype printing, each decision—the amount of ink, the pressure, the alignment of the matrices—is made, assessed, and corrected in the moment. As Frascara et al. maintain, design methods are means through which a transformative praxis, productive of knowledge, is embodied [8]. It is this quality that Beckloff captures concerning typographic composition:

"Letterpress composition and printing reinforces the fundamentals of art and design and introduces designers to a new rhythm and mode of visual communication. Students must plan the layering depth of a piece from the outset through scale, color, and value. As they mix the ink color, they work with the inherent transparency of printing inks and learn to respond to the previous layer and to the printed color. Ultimately, there is no 'Undo' as in their digital comfort zones. There is an improvised quality implicit in the work, a need to adapt and move forward. (...)" [2]

4. Workshop

4.1 Context and Objectives

This workshop was developed within the Reprography curricular unit of the undergraduate Design program at the University of Aveiro, during the 2021/2022 academic year. The class, with 39 students, was organized into 8 groups in order to streamline both the creative work and the printing process. The exercise, part of a broader set of assignments developed throughout the semester, aimed to introduce students to a printing technique of industrial origin (movable type printing/stereotype printing), transposed into a non-industrial context while preserving the classic stages of the process and the logic of printing multiples.

In a curricular unit that is predominantly theoretical, it becomes necessary to find strategies that give students access to practical contexts so that this technical knowledge can be incorporated more naturally into their design practice. This is precisely what the workshop aims to provide: an understanding of the technique, recognition of its creative potential, and the possibilities for including it in future work.

Managing a class with such a large number of students was also a challenge, requiring organizational strategies that would ensure everyone could print within a very limited time frame. Hence, the decision was made to work in groups, while still preserving the possibility of individual authorship as a part of the process.

4.2 Methodology

This case study adopts a qualitative research approach, grounded in a pedagogical framework that conceives of learning as an active, dialogic, and experience-based process. Drawing on Freire's critique of the banking model of education, in which students are treated as passive recipients of knowledge rather than active participants in its construction, and on his conception of praxis as a continuous cycle of action and reflection [9], this workshop was designed to position know-how as a mode of thinking and knowing. In this approach, although students are provided with guiding directives, it is through hands-on workshop practice and through trial and error that embodied knowledge is achieved.

For Frascara et al. [8], design methods generate not only responses to situations but also new knowledge, a premise that frames the workshop as a setting where students learn by producing knowledge of their own, rather than receiving it.

To document this case study, the following data collection methods were used:

— Participant observation: the learning process, students' engagement, the technical challenges, and peer interaction (particularly the mutual support among students) were recorded through notes gathered over the course of the workshop sessions, capturing significant moments, conversations, and relevant observations.

— Visual documentation: photographic records of the process and of the results obtained.
— Informal interviews: casual conversations conducted with students before, during, and after the workshop, aimed at exploring their expectations, learning experiences, challenges, and discoveries, as well as their perception of the value of learning through practice.

4.3 Workshop Proposal, Structure, and Development

The initial brief asked each student to design (individually, yet already within a group setting) a 40 × 40 mm matrix featuring an original graphic motif, intended to coexist with the proposals of the other members of the same group and to be used in one or more final compositions. These matrices were to have the particular feature of being arranged in different configurations, giving rise to distinct and varied graphic patterns.
To deepen students' understanding of the logic of modular composition, a demonstrative example developed by the instructor was presented.

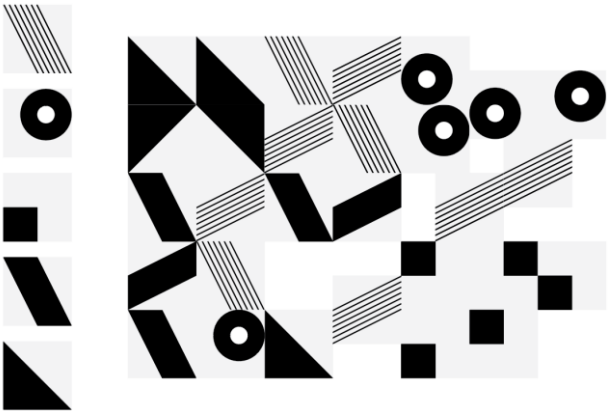

Fig. 1. A set of matrices (left) and one possible composition derived from them (right), developed by the instructor.

After each group had designed and selected its matrices, these were reproduced three-dimensionally, resulting in stereotype matrices, that is, matrices whose printing elements are in relief. Each group prepared a digital document with an engraving layout comprising a total of 35 matrices (5 originals × 7 repetitions), used for the laser engraving of the MDF. This process was carried out by the technician of the Department of Communication and Art workshop, with the students supervising.

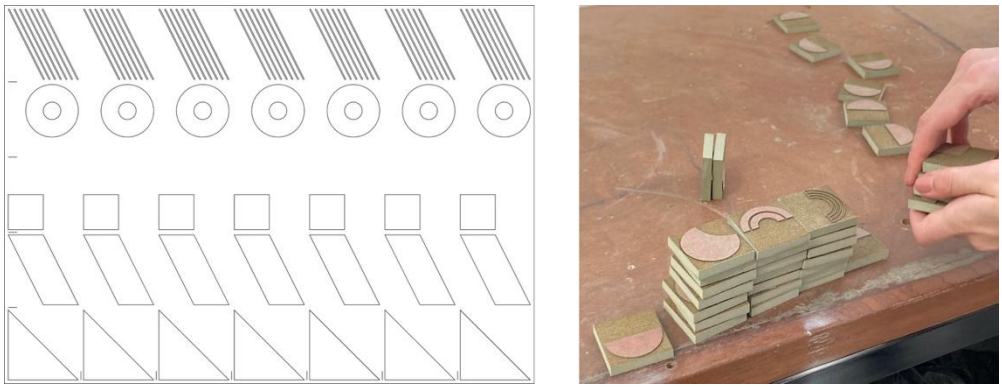

Fig. 2. Digital matrix layout and matrices produced in MDF.

Complementary material was developed to allow the printing layouts to be assembled. This material included a base (form) for fitting the matrices together and a set of blank, non-printing elements (of a lower height), whose function is to create the unprinted areas, keeping the composition contained within the selected format.

Fig. 3. Examples of the assembly of the matrices and the blank material on the base.

With the matrices available, each group designed a graphic composition to be printed in two colors in A3 format. This premise (printing in two direct colors) entailed assembling two distinct compositions that worked together, allowing the groups to take advantage of overlaps or (mis)alignments.

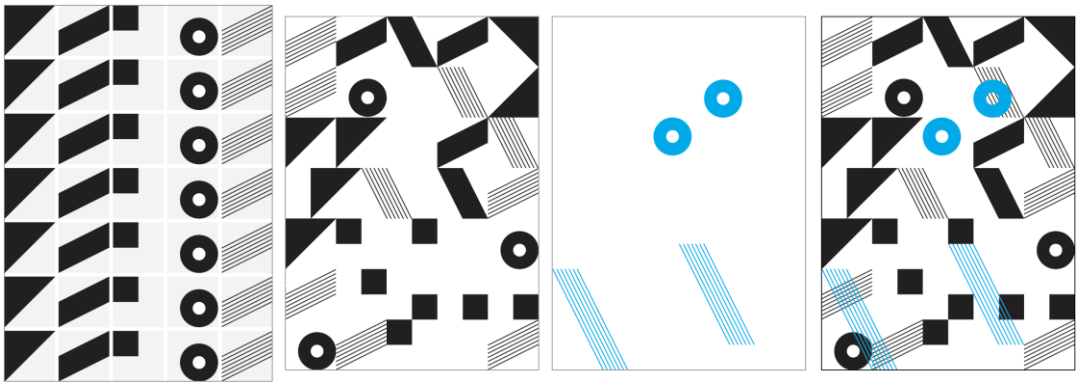

Fig. 4. Set of matrices, color separation (A and B), and a simulation of their overlay.

All of this work was considered preparatory to the printing session.
On the day of the workshop, each of the 8 groups had two hours to carry out initial experimentation and final printing, producing 10 copies in color A, 10 copies in color B, and 10 copies resulting from the combination of colors A and B. The choice of the paper type and weight to be used was the responsibility of each group. Some groups also experimented with printing on other substrates, such as papers of different weights and colors, cardboard and fabric, thereby creating complementary compositional solutions.

Fig. 5. Various moments of the printing process.

Fig. 6. Printed examples (1) of matrix, printed color separation and the result.

Fig. 7. Printed examples (2) of matrix, printed color separation and the result.

Fig. 8. Printed examples (3) of matrix, printed color separation and the result.

Fig. 9. Other printing substrates.

Groups were given the option of continuing to print outside the workshop setting, whether to pursue further experimentation or to refine the copies already produced.

The process concluded with an online presentation of the results obtained.

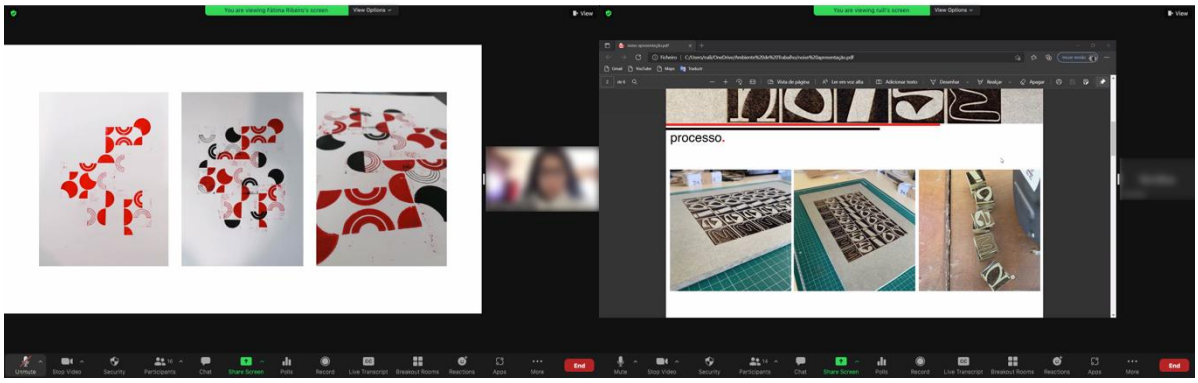

Fig. 10. Online presentations.

5. Discussion of Results

5.1 Technical Engagement with the Printing Process

The initial contact with the technology proved challenging for most students. The novelty of the process (assembling the matrices, preparing the base, managing the ink, and controlling the pressure on the printing press) gave rise to difficulties that were progressively overcome through repetition and growing familiarity with each stage. This learning curve, far from being an obstacle, was a meaningful pedagogical moment: the gradual overcoming of technical difficulties translated into a more conscious and informed command of the process.

The recurring cycles of inking, pressing, evaluating, and adjusting embodied what Freire describes as praxis: action and reflection oriented toward transformation [9]. Each misprint became an object of examination rather than a failure to be discarded, a variable to be identified (excess ink, insufficient pressure, a misaligned matrix) and corrected in the next attempt. In this regard, Beckloff's observation that "there is no 'Undo' as in their digital comfort zones" [2] acquires its full pedagogical weight: the impossibility of erasure compels students to think before and during the act of making, not only after it. The gap between digital simulation and printed result was thus not experienced as a deficiency but as the very ground of learning, consistent with the broadening of sensory knowledge that Dias and Meira identify in workshop practice [4].

5.2 Material Constraint and the Repositioning of the Digital

A particularly revealing dimension of the workshop was the way material constraints generated, rather than limited, creative possibilities. Several groups, having completed the initially planned compositions, extended the exercise on their own initiative, printing on cardboard, kraft paper, and fabric; deliberately misaligning the second color pass to produce unexpected chromatic interactions; combining matrices in configurations not foreseen at the design stage. These departures were not deviations from the brief but discoveries within it. Moments in which the fixed parameters of the medium (a 40 × 40 mm matrix, two ink colors, a single press) opened a creative space that the digital environment, with its infinite undo and its predictive simulation, tends to foreclose. This resonates with Cross's claim that designerly knowledge emerges from the situation itself, produced in the act of making [7].

The pedagogical intent of the workshop, it should be emphasized, was not to oppose the analogue to the digital, nor to propose a return to obsolete technologies. It was, more precisely, to displace the digital from its position as the unmarked default of design practice and to make it visible as one option among others. By encountering the assumptions that letterpress logic makes explicit (the fixed matrix, the sequential layer, the irreversibility of the printed mark), students gain a vantage point from which their common digital tools become legible as carrying assumptions of their own: about composition, about revision, about the relationship between intention and outcome. This estrangement is itself a pedagogical outcome, and one that aligns the workshop with the broader argument advanced throughout this paper.

6. Final Remarks

This study has shown that integrating hands-on printing practices into higher design education is not only feasible in resource-limited contexts but also pedagogically relevant and warranted. Direct engagement with analogue matrix-based printing technologies (in this case, stereotype printing) generates forms of knowledge that the digital environment cannot provide: embodied know-how, the management of unpredictability, an awareness of the sequential process, and an appreciation of the object produced. These results suggest that such experiences consolidate specific technical knowledge, stimulate creative exploration, and foster in students a more critical and informed relationship with the digital tools they use on a daily basis.

The apparent enthusiasm observed at the end of the workshop, expressed informally by students, suggests the pedagogical impact of an experience that demands presence, attention, and physical commitment to the process.

It is worth emphasizing that the model presented here is replicable in academic contexts that lack a printing press. The fundamental principle, adapting the logic of letterpress printing to matrices produced with accessible materials and technologies, can be transposed to different institutional realities, provided that the underlying pedagogical intent is maintained: to position making as a mode of thinking and knowing.

The main limitation of this study lies in the qualitative and informal nature of the data collection instruments used. The absence of more structured instruments, such as questionnaires or systematic assessment forms, limits the generalizability of the results. Future research could benefit from a more formal methodology, one that would allow results to be compared across different editions of the workshop or across different institutional contexts.

In a design education landscape increasingly dominated by the digital, the recovery of manual practices does not represent nostalgia, but a well-grounded response to the visual homogenization that characterizes the present. Integrating the analogue into the curriculum is, above all, a way of preparing designers who are more aware, more critical, and better able to inhabit the space between what technology allows and what creative intent demands.

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