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The New Horizon of Planography Practice in Bangladesh: History, Alternative Materials and Institutional Constraints in Plate Lithography

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Abstract

Lithography or planography was a commercial printing process and then became an art medium that was introduced into the Indian subcontinent. Although it has a long tradition in the printmaking community of Bangladesh, starting from Mohammad Kibria and Murtaja Baseer to the present day, it is still a small-scale activity amongst printmakers. The paper reviews the historic scenario, current situation and experimental potential of planographic practice in Bangladesh. It poses three questions: how lithography arrived in and flourished in the Bangladeshi art institutions, if cheap and available materials can broaden the expressive spectrum of Aluminium-plate lithography, and the reasons why students are not using lithography in art. Studying is a qualitative and practice-based study. It contains a critique of Bengali- and English-language literature, semi-structured interviews with six practicing lithographers, field visits at five fine arts institutions along with a brief questionnaire to thirteen Master of Fine Arts (MFA) students from Khulna University. Its core is a series of experiments undertaken in the studios around grained, and offset-exposed, aluminium plates. The materials tested were gum arabic resist drawing, offset positive remover gel, and ALU NET plate cleaner as well as nail polish remover, a gum arabic -phosphoric acid etch, carbon paper transfer, lipstick, oil pastel, combined tusche and glass marker and press ink thinned with Berger Robbialac Thinner T-6. Every material produced a printable image. A basic gum arabic and phosphoric acid solution (8.5 mL H_3PO_4 in 250 mL gum solution) was used as an inexpensive alternative to the traditional TAPEM etch. The questionnaire revealed that 53.8% of students of MFA do not practice lithography because they do not see many chances to continue their practice after graduation, and 84.6% of them consider lithography to be the most dangerous medium of printmaking. The findings from the perspective of diffusion-of-innovations and postcolonial art-education reveal that limitations of the medium in Bangladesh are not expressive but institutional and economic.

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1. Introduction

The oldest of the planographic printing processes is lithography. It is characterized by its image and non-image areas existing on the same plane and by the image and non-image areas separating by chemical action due to the mutual repulsion of grease and water, and not by relief or by incision (Antreasian & Adams, 1971). In 1796 - 1798, Alois Senefelder invented the process in Munich as an inexpensive method of reproducing music and theatrical text (Senefelder, 1911). Within twenty years it had become a major commercial technology throughout Europe. Its successor, offset print, has become the leading commercial printing technique. The path of lithography's evolution from a trade of reproduction to an artistic medium is gradual. The early lithographs lacked masterpieces, but the Romantic artists quickly improved the medium (Twyman, 1970; Weber, 1966), and Napoleon's support helped it advance quickly between 1804 and 1814. Lithography is also the most faithful to the gesture of the hand of the artist because the artist can make direct drawings on the stone or plate with greasy crayons and washes. It has been called the closest print to painting for this reason many times (Castleman, 1976). The lithographic printing process entered South Asia through colonial administration and missionary presses. It was first used for books, labels, posters and religious tracts (Guha-Thakurta, 1992). The oleographs created by the Ravi Varma Press in the 1890s showed the extent to which the process could replicate the properties of oil painting. Printers of Varma incorporated the German technique of varnishing to provide the prints with a painterly appearance (Neumayer & Schelberger, 2003; Pinney, 2004). Artistic lithography was introduced to what is now Bangladesh by artists who were educated at the Government School of Art in Calcutta. It established itself at the Dhaka art institute established in 1948 and subsequently evolved under Mohammad Kibria and his followers (Islam, 2004; Rokonuzzaman, 2017). The practice then extended to the University of Chittagong, the University of Rajshahi and, more recently, Khulna University.

Nevertheless, planography is one of the least practiced print media in Bangladesh. Very few private/commercial studios provide fine-art lithography and very few institutions make it much part of the curriculum. It is mostly difficult for many students to continue with the process after they graduate because they learn the procedure only within their degree programmes (Rokonuzzaman, 2017). There is also a lack of literature. Most writings on Bangladeshi printmaking are in Bengali, located mainly in institutional archives, and tend to focus on individual artists, and not so much on the processes and materials or any institutional conditions (Biswas, 2014; Jahan, 2008). Three gaps follow. No single writing has been found on the development of the medium in Bangladesh. There has also not been much experimentation with local alternatives to the lithographic material brought in from outside the country, as it is often costly and unavailable. There is a certain gap when all previous research is combined. International guides (Antreasian & Adams, 1971; Devon et al., 2008) describe lithography on stone and on commercially available plates, while more recent studies on safer printing in South Asia have concentrated on intaglio etching and studio waste rather than lithography on plates (Khan & Power, 2022). Throughout the field of Bengali-language based studies, artists and institutions are often recorded, while methods and materials are rarely documented (Biswas, 2014; Jahan, 2008; Rokonuzzaman, 2017). This omission leaves the medium's technical and institutional conditions largely unexamined. Addressing these three gaps together is the specific contribution this study claims. According to one study, no research has (a) followed the process by which lithography became a part of Bangladeshi university art institutions; (b) systematically tried out low-cost, locally available materials on aluminum plates in the context of Bangladeshi materials and university studio; or (c) linked students' motivations for denying the medium to material and institutional limitations. This research aims to address that overlap, and the remaining chapters are organized around these three topics. The study increases knowledge in three ways in addition to recording existing information. First, it provides the first attempt to link Bangladesh's institutional history of lithography in a single table (Table 3) and to comprehend it in the context of post-colonial art-education concepts and domestic spread of innovations. Second, it offers unique experimental evidence: eleven inexpensive materials that were bought from local shops nearby were methodically tested within the constrained setting of the

institutional studio in Bangladesh, and it was discovered that all of them could produce printable images, some of which had a distinctive mark (Table 4). These consist of a two-ingredient gum arabic-phosphoric acid etch that may be substituted for the more costly TAPEM. Third, it generates insights into the reasons why students do not utilize the medium (Figure 9), which are subsequently converted into educational suggestions based on evidence (Section 6.2). The past, present, and experimental possibilities of planographic practice in Bangladesh are explained in this study, along with strategies for its revitalization. It first describes how lithography came to South Asia and became a component of its artistic institutions, before documenting the standard aluminum plate process employed in such institutions in Bangladesh. Based on this, it studies whether affordable, locally accessible materials, such as aluminum plates, can produce printable pictures and develop new visual languages, as well as the philosophical questions of reproducibility, medium, and authenticity addressed by these experiments. At last, it identifies the institutional, financial, and health-related barriers that restrict the medium's adoption. There are three research questions presented: Why art students are not using lithography (RQ3); how lithography originated and developed in Bangladeshi art institutions (RQ1); and if using locally accessible materials may expand the spectrum of expression of aluminum-plate lithography (RQ2).

2. Literature Review and Theoretical Framework

There is a lack of written sources on planography in Bangladesh, and most of it is unpublished or stored in a university library. This review will therefore be based upon four collections of work: international histories and technical manuals of lithography, histories of printmaking in colonial India, philological work on printmaking in Bengali, and philosophical work on reproduction, medium and authenticity.

2.1 Origins and international development

It was Senefelder himself who, working with a solution of gum arabic and acid, discovered that a drawing made in greasy ink on Bavarian limestone could be etched, inked and printed (Senefelder, 1911). The period that followed can be divided into the following four stages: invention and early experimentation; regular commercial and artistic use; the advent of the offset press; and a twentieth-century revival of hand lithography, often on metal plates (Twyman, 1970; Weber, 1966). The milestones most relevant to this study are summarized in Table 1.

Table 1. Selected milestones in the development of lithography

Year	Milestone	Significance
1796–1798	Senefelder develops chemical printing from stone in Munich	Establishes the grease–water principle of planography
1803	*Specimens of Polyautography* published in London	First artists' lithograph portfolio in Britain
1816	Godefroy Engelmann opens a lithographic press in Paris	Draws Romantic painters such as Géricault and Delacroix to the medium
1818	Senefelder publishes his complete manual; zinc plates proposed	Codifies technique and anticipates metal plates
1825	Goya's *Bulls of Bordeaux*	Landmark of painterly crayon-and-scraper lithography
1830s–1870s	Daumier's caricatures in *La Caricature* and *Le Charivari*	Lithography as mass political commentary (over 4,000 prints)
1850s–1890s	Colour poster lithography (Chéret, Toulouse-Lautrec)	Commercial and artistic practice converge
1890s	Aluminium plates introduced; Ravi Varma Press in India	Metal plates and oleographs spread the medium to South Asia
1945–1950s	Picasso at the Mourlot workshop, Paris	Revival of experimental hand lithography
1960	Tamarind Lithography Workshop founded, Los Angeles	Professional training of artist–printer collaborators

Sources: Antreasian and Adams (1971); Castleman (1976); Senefelder (1911); Twyman (1970); Weber (1966).

This history matters to the present study for two reasons. First, the medium has always moved between the commercial and artistic domains, and each new commercial technology, whether

zinc plates or offset presses, has found its way into artistic practice. Second, the medium became much more portable and inexpensive when the stone plate was replaced by the metal plate, a process aided by the Tamarind workshop that helped to professionalize it (Antreasian & Adams, 1971; Devon et al., 2008). It is this modernization which makes plate lithography possible in Bangladesh despite the lack of litho-stones.

2.2 Lithography in colonial India and Bengal

The Europeans introduced lithography in India for administrative, commercial and missionary printing, at places such as Serampore, Bombay and Madras (Guha-Thakurta, 1992). Woodcut, engraving and lithography were taught as trade skills in the School of Industrial Art (Government School of Art in 1866) which was established in Calcutta in 1854. It gave birth to commercial lithographic presses which published illustrated books and popular religious printing (Guha-Thakurta, 1992). Illustrated lithographic Bengali books came on the scene in the 1840s. The Ravi Varma Press, established in Bombay in 1894, introduced mass produced painted pictures in ordinary homes through oleographs (Neumayer & Schelberger, 2003; Pinney, 2004). Artistic, as distinct from commercial, lithography developed later. Printmaking was among the subjects taught at Santiniketan since the 1920s. Lithography and etching were revived systematically in the late 60s and the graphics department became a hub of experiment under the leadership of Somnath Hore, who was holding summer workshops (Das, 2011). Indian practice has influenced Bangladeshi lithography in every stage as most of the founding generation of Bangladeshi artists were trained in Calcutta and many of the artists who later practiced lithography, studied at Santiniketan or Rabindra Bharati (Rokonuzzaman, 2017).

2.3 Planography as an art medium

Printmaking first gained popularity as a technique for duplicating documents, and then only slowly used as a means of personal expression (Hults, 1996) . Lithography was the same way, but notably the product was used in large numbers as the same surface could be used numerous times. Critics have contrasted commercial production that caters to the tastes of the market over art which personalizes the moods of the artist into a form (Islam, 2004). Kibria's biographer argues that artistic worth ought to be based in the subjectivity of the artist, not on the medium. In this vision only when an artist applies lithography to his/her own mode of expression can it be considered a type of art (Islam, 2004). The communicative nature of an art form still influences what an artist can say. The same theme presented in various media means something different, and the visual language creates the uniqueness of each piece (Rokonuzzaman, 2017). In printmaking, especially, unintended results become the source of feedback in the intent of the artist (Rafi, 2023).

2.4 Innovation in Bangladeshi planography

The use of stone was replaced by metal plates, which opened new avenues for Bangladeshi artists. The sketch-like line created using glass markers and the use of tusche washes to create watercolor effects which can deceive the viewer as to the medium used are documented by Rokonuzzaman (2017). From about 2004 he has been using a locally available lacquer thinner, Berger Robbialac Thinner T-6, as a wash-out solution, instead of toxic turpentine. There are other recent variants such as waterless lithography, which is being developed at the University of Chittagong by Nityananda Gaine (N. Gaine, personal communication, December 5, 2023). However, there has not been any systematic study on the performance of locally available commercial and domestic materials on aluminium plates. Nor has any research considered the reasons for not using zinc and copper plates in Bangladesh as much as pre-sensitized (PS) offset plates.

2.5 Alternative materials, safer practice and constraints in art education

The experimental and institutional elements of this work are framed by two recent bodies of work. The former deals with other materials that are safer and alternative to use. General printmaking manuals have also been gradually recording safer and more conveniently sourced

alternatives to lithography as a fixed set of specialized chemicals (Grabowski & Fick, 2009), although this approach has continued to be described as lithography in standard manuals. This question has only been empirically researched in South Asia recently. Khan and Power (2022) constructed an electro-etching apparatus out of low-cost local materials in Pakistan, where acids and chemicals are commonly employed in art and design tertiary education, and discovered that it could create high-quality intaglio prints as a safe and cost-effective substitute of acid. Together these works establish a regional precedent for low-cost, safer studio methods. This study extends that logic from intaglio and stone to aluminium plate lithography. Lithography variants that operate with low matrices, including wood lithography (mokulito) and waterless lithography, are moving in the same direction: they retain the grease water principle but substitute expensive stones and chemicals. No such studies, however, have been done of everyday commercial and domestic material on aluminum lithographic plates.

The second school of thought is related to the circumstances in which art students can maintain a medium. Past records of colonial art schools in Calcutta, Bombay, Madras and Lahore indicate that they were modeled after the South Kensington system and initially prepared students to work in industry and trade, not to express themselves (Kantawala, 2012; Mitter, 1994; N. O. Tarar, 2022). In Pakistan, printmaking was not initially recognized as an art form but was introduced into schools as a reproductive trade before being re-established as an art medium (Guha-Thakurta, 1992; Sengupta, 2012), and it was not until a press and a roomy studio were available that printmaking became a specialization at the National College of Arts (S. M. Tarar, 2020). Surveys of creative professions contribute to that creative and cultural work is commonly precarious (Comunian & England, 2020), that the field of fine art is one of the least vocational creative fields, meaning that graduates tend to establish portfolio careers (Carey, 2015), and that most young artists are financially insecure in their initial years out of school (Mangset & Kleppe, 2025). These conditions are particularly weighty on a medium that requires presses, plates and chemicals. The gap that the current study is addressing is that the lithography in Bangladesh is yet to be applied to this literature.

2.6 Diffusion of innovations and postcolonial art education

The study relies on the diffusion-of-innovations theory to explain the interpretation of the historical and institutional results. Rogers (2003) describes how innovation is diffused via a social system as a process of the perceived attributes (relative advantage, compatibility, complexity, trialability and observability) of an innovation, the channels of communication through which it passes, and the change agents that propagate it. In the case of lithography, the medium of innovation is the medium, the social system is the network of art institutions, the channels include teacher training and alumni movement, and the agents of change are artist-teachers like Kibria and Rokonuzzaman. This is supplemented by a postcolonial reading of art education that demonstrates that the channels themselves were made by colonial institutions and by the subsequent attempt to transform colonial trade into a nationally-owned art (Kantawala, 2012; N. O. Tarar, 2022). Combining the two views, it becomes feasible to test H1 and explain the reason why the medium is not spread uniformly. The correlations between institutional restraints, material access, student perception and further practice that is a result of such a structure are explained in Figure 10 (Section 5.5).

2.7 Philosophical framework: reproduction, trace and the medium

The analysis of lithography as art is framed by three philosophical positions. First, Benjamin (1968) argued that mechanical reproduction erodes the aura of the unique artwork. Printmakers have responded by saying that a small, hand-pulled edition does not involve any copying of a missing original: every impression is a true realization of the matrix. The second concept is that of the trace by Derrida (1976). Each print bears the imprint of the matrix and of the process which made it, thus repetition is a state of meaning and not of loss of it. The description of the artworld by Danto (1964) implies that it is not the material or technique of an object that decides whether it is art or not, but rather its position in a theory and institution of art. Kant's (2000) separation

of aesthetic judgement from interest is helpful here in distinguishing between commercial lithography and planography as art; Pop Art, on the other hand, was able to make no such distinction, instead hoping to rub out the boundaries of high and popular images. Together, these positions suggest a working hypothesis: the medium itself does not determine artistic value. What is relevant is whether the artist takes advantage of the properties of the medium to communicate something which could not be achieved by means of any other medium.

3. Methodology

3.1 Research design

The research is a qualitative, practice-based design with a small descriptive survey. Practice-led research views the studio practice of the artist as a form of inquiry: the knowledge generated is in part the works of art and in part in the written account of how the works were created (Candy & Edmonds, 2018; Gray & Malins, 2004; Smith & Dean, 2009). This method is appropriate to the second research question of the study, which involves what other materials can do on a lithographic plate and can only be answered by printing. The historical and institutional questions (RQ1 and RQ3) are covered by the documentary, interview and survey methods. Data was collected between June and December 2023. The choice of a qualitative approach was done on purpose. The three research questions are not about the amount of use of a practice, but rather the how and why of a practice development and persistence, and the number of people who practice lithography in Bangladesh itself is small. The student questionnaire thus does not represent a sample of a larger population but is a census of the entire 2023 MFA printmaking cohort at Khulna University, which consisted of 13 students, and the six interviewees are the most active lithography teachers in the country's university departments. In this context, depth and convergence of evidence outweighed sample size: the data from the interviews was analyzed thematically (Braun & Clarke, 2006) and only findings that were supported by the documented interview, survey and studio evidence were accepted. Convergence across three independent data sources was therefore the main test of reliability. Where sources diverged, the divergence itself was recorded and discussed. The limits of applicability imposed by Generalization are analytical (to the framework in Figure 10) not statistical, the latter are given in Section 5.6.

3.2 Documentary research

Books, journal articles, monographs, unpublished theses and exhibition catalogues in English and Bengali were read. Rokonuzzaman's (2017) research on the status quo of lithography and its future in Bangladesh, Biswas's (2014) research on the continuity of printmaking at the Dhaka fine arts institute and Jahan's (2008) survey of 50 years of Bangladeshi printmaking were key Bengali language resources. Biographical and stylistic information were taken from the monographs on Mohammad Kibria, Murtaja Baseer and Safiuddin Ahmed published by the Bangladesh Shilpakala Academy (Hye, 2004; Islam, 2004; Zaman, 2002) .

3.3 Field sites

The University of Dhaka's Faculty of Fine Arts and its seminar library, Bangladesh Shilpakala Academy in Dhaka, the Institute of Fine Arts at the University of Chittagong, the Faculty of Fine Arts at the University of Rajshahi, and the Fine Arts School at Khulna University were the five locations that were visited for observation and library and studio visits. The researchers also surveyed presses, plates and stones found at each site, the holdings in collections of lithographs, and the teaching of this medium.

3.4 Interviews

Six practicing lithographers and printmaking teachers were selected purposefully for having continued involvement with lithography and having institutional positions (Table 2) and were interviewed. A guide for conducting interviews included 15 open questions. They talked about lithography as a language of art, its potential and limitations, possibilities of mixing techniques (plate lithography with offset or wood lithography), the independence of lithography from painting, the impact of new technologies, Mohammad Kibria's influence, lack of studios and

exhibitions, and what might attract a new generation of artists. Where required, the responses were translated and analyzed thematically.

Table 2. Interview participants

Participant	Affiliation and practice
Sheikh Mohammad Rokonuzzaman	Professor of Printmaking, University of Dhaka; stone, plate and wood lithography
Swapan Kumar Sana	Lecturer, Department of Printmaking, University of Dhaka
Kamruzzaman Sagar	Assistant Professor of Printmaking, University of Dhaka, multi-plate colour and offset lithography
Md. Ashraful Alam Rana	Lecturer, Printmaking Discipline, Khulna University; woodcut and lithography
Shantwana Shahrin	Assistant Professor, Printmaking Discipline, Khulna University; plate and stone lithography
Dr. Nityananda Gaine	Associate Professor, Fine Arts, University of Chittagong, waterless lithography

3.5 Student questionnaire

All 13 students of the MFA, from the 2023 cohort of the Printmaking Discipline at Khulna University were administered a short questionnaire. The two closed questions were: What was the primary reason for not using lithography as a major medium in the MFA? (Four responses) and do you believe lithography to be the most dangerous print-making medium for health reasons? (Yes or no). The responses were tabulated in frequencies and percentages. Because only one small group is being counted, the conclusions of the census are descriptive and do not involve statistical generalizations.

3.6 Studio experiments

The experiments were conducted on grained aluminium plates as well as on pre-exposed offset (PS) aluminium plates in the lithography studio of the Fine Arts School, Khulna University. One of the alternative materials was added to the standard plate lithography procedure outlined in Section 4.2: graining, drawing, gumming, etching, wash-out, rolling up and printing in each experiment. The materials were selected because they are easy to obtain and affordable from the common stationery shops, cosmetics shops, hardware shops and printing shops in Khulna and Dhaka. Arpita Mitra and Eshrat Zahan Esha, both BFA students, did similar experiments on lipstick and carbon paper. Three criteria were used to evaluate each print: printability (i.e., whether the etched and washed-out plate accepted ink and produced an acceptable print), stability (i.e., whether the non-image areas remained clean, without scumming, throughout an edition), and expressive character (i.e., the unique mark, texture, or tone the material produced compared with conventional crayon, tusche, and glass marker).

3.7 Ethics

The interviewees agreed to the use of their name and the quotation of their speech. The questionnaire was filled out anonymously by the students. The limitations of the study are discussed in detail in Section 5.6.

4. Results

4.1 Historical development of lithography in Bangladesh

Commercial beginnings: The major history of Bengali printing traces movable-metal-type printing to Charles Wilkins in 1777–78, whereas research on lithography dates its arrival in South Asia to the 1820s (M. H. Khan, 1976).

Institutional roots in Dhaka: The pioneers of the East Bengal artists, including Zainul Abedin, Safiuddin Ahmed, Quamrul Hassan, Shafiqul Amin and others, got training from the Government School of Art in Calcutta. After 1947 they shifted to Dhaka, and in 1948, formed the Government Institute of Arts. Printmaking was among four original courses of the institute; Safiuddin Ahmed taught the course, assisted by Sheikh Anwar, a Calcutta-trained pressman. Following the transfer from Segunbagicha to Shahbag after 1956 lithography and dry point were introduced in the curriculum of the woodcut. Lithographic printmaking was taught in the second year of the BFA

course until the curriculum changed in the 1970s, when it became an elective. In 1977, there were five students in the BFA programme and Rokeya Sultana was studying printmaking.

Pioneers: Mohammad Kibria is the most successful lithographer in the country (Islam, 2004; Figure 1). He studied printmaking in Tokyo from 1959 to 1962. Earlier pieces like Portrait of a Boy (1956) depict a stylised, semi-cubist figuration. In Japan he moved towards colour abstraction, as in Composition in Black and Blue (1961), constructed using light and dark, crayon line and overpainting. Kibria never liked to use more than one medium and had to insist that a lithograph was a lithograph; the limitation of the medium, he thought, was the origin of its beauty (Islam, 2004). In lithographs such as *After Bath* (1958), Quamrul Hassan rendered his folk-inspired patua idiom and cast women as fertility icons. In Lithographs such as Self-Portrait (1959), Murtaja Baseer displays a Western, Picasso-inspired line (Hye, 2004). Lithographs were also produced by Rashid Chowdhury and Qayyum Chowdhury (both trained in Belgium), Mizanur Rahim and Abdus Sattar (who worked at Santiniketan in 1973) and Syed Abul Barak Alvi, although for most of them it remained a secondary medium. Works by two later practitioners, discussed below, are shown in Figures 2 and 3.



Figure 1. Mohammad Kibria, *Two Flowers* (1960), lithography.

Today's practitioners: A second generation has developed the medium technically. Santiniketan-trained Sheikh Mohammad Rokonuzzaman developed plate and wood lithography with local tools and introduced a safer wash-out with lacquer-thinner (Rokonuzzaman, 2017). Nityananda Gaine of the University of Chittagong is engaged in waterless lithography on existential themes. Pursuing his study of lithography at Rabindra Bharati University, Nihar Ranjan Singha says he aims to address social needs and desire through reversal. At Khulna University, Md. Nadimuddaula, Associate Professor in the Printmaking Discipline, has made a significant contribution to experimental planography; his extensive plate-lithography experiments on Banbibi, the forest deity of the Sundarbans, bring local folk narrative into the medium. Hira Sobahan at Rajshahi is experimenting with 'mokulito' and Kamruzzaman Sagar at Dhaka is working with stone, plate and offset plates, at times more than 15 in a single print on climate change.

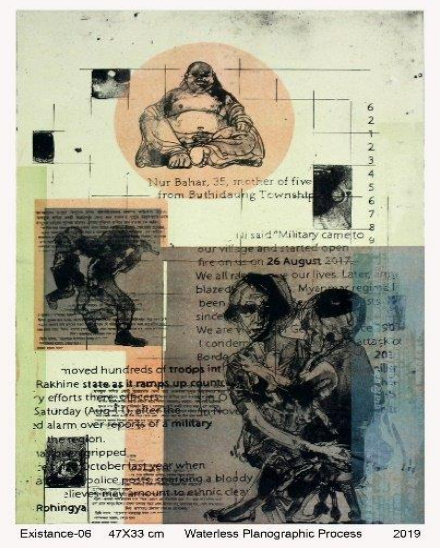


Figure 2. Nityananda Gaine, *Existence-6* (2019), waterless planographic print.



Figure 3. Sheikh Mohammad Rokonuzzaman, *Untitled* (2012), lithography.

Beyond Dhaka: After 1971, the fine arts department of the University of Chittagong started, but printmaking began only after 1976 and there was no press for years. After acquiring litho-stones and a press cheaply from a supplier to the Surma Lithography Press, the daily Azadi donated a second litho-press in 1996. In 1993-1994, printers there started to add talcum powder to the printing ink to lower the stickiness in the wet climate. Shashibhushan Pal established an industrial school in Khulna in 1904, which changed its name to the Fine Arts School of Khulna University in 2010. Since 2015, lithography has been taught there, and in 2019, the Bengal Foundation provided a lithography press. Each institution therefore acquired the medium only after a press and a trained teacher were both in place. This pattern is consistent with the diffusion model set out. Table 3 provides a summary of these institutional paths. The University of Rajshahi's founding dates and equipment records were not found in institutional documents or interviews conducted during fieldwork; these cells are designated as undocumented, and the lack of documentation is considered a constraint (Section 5.6).

Table 3. Institutional development of lithography in Bangladesh

Institution	Printmaking established	Lithography equipment	Distinctive practice
Faculty of Fine Arts, University of Dhaka	1948 (course); 1977 (BFA department)	Stones and presses from old-Dhaka printers; Japanese press 1996	Stone and plate lithography; multi-plate colour and offset hybrids
Institute of Fine Arts, University of Chittagong	After 1976	Stones and press acquired after 1992; press donated by *Azadi* 1996	Waterless lithography; talc-modified inks
Faculty of Fine Arts, University of Rajshahi	1982(Affiliated to the university);1994(Announced as a department under Arts and Humanities faculty); 2015(August,2015 established as a individual faculty)	In this context, Rajshahi University's printing practice has not yet greatly increased its use of lithography. Wood-litho was common in the early days for a while. Plate litho is now performed on a very modest scale, and only until 2022 or 2023.	Wood lithography (*mokulito*)
Fine Arts School, Khulna University	2010 (as university school); lithography after 2015	Press donated by Bengal Foundation 2019	Experimental plate lithography with alternative materials

4.2 The standard aluminium plate process

Institutional observation revealed that the plate lithography on aluminium has substituted the stone, since it is heavy, scarce and difficult to transport (S. Shahrin, personal communication, December 4, 2023). The usual procedure practiced at Khulna University has seven stages, described below. Graining is the first step in the process. After agitating the plate for 25 to 35 minutes in an electric graining tray filled with sand and marbles and adding water and sand as needed, the plate is cleaned, submerged in mild phosphoric acid (8 to 10 drops per gallon of water), rinsed, and dried. A glass marker, tusche wash, press-ink chalk, or litho-crayon are then used to draw the image. The initial gumming involves spreading a thin, smooth layer of gum arabic solution that is thicker than that used on stone, buffing it with cotton or similar soft fabric, and leaving it for four to eight hours in hot weather and eight to twelve hours in cold weather. Etching comes next. To avoid scumming, EC fount solution mixed with gum arabic is applied around the image instead of on it for two to four minutes. Depending on how dark the image is, the image areas are etched for 15 to 40 seconds using TAPEM, a mixture of phosphoric acid (H_3PO_4), gum arabic, and tannic acid ($C_{76}H_{52}O_{46}$). After that, the plate is re-gummed and dried with a hair drier or fan. The drawing material is removed with Berger Robbialac Thinner T-6, a thin layer of lacquer is applied and polished, and the ghost image is washed off using a bitumen and thinner solution, leaving an ink-receptive ground. In order to roll up, the plate is moistened with a viscose sponge and inked three times with a rubber or leather roller until the picture is completely charged. Lastly, a scraper-bar lithographic press is used to print the plate; an etching press can be utilized, but the quality would be worse.

Every alternate material was tried against this sequence.

4.3 Experiments with alternative materials

All eleven materials made a printable image on aluminium but, their stability and type of mark varied. The individual experiments are described below with the results summarised in Table 4.

Table 4. Alternative materials tested on aluminium plates

Material	Source and approximate role	Function in the process	Printability and stability	Expressive character
Gum-arabic (brush-applied)	Standard lithographic gum	Water-receptive resist drawn directly as image	Good; clean whites	Reversed, relief-like image with solid blacks and brush marks
Offset positive remover gel ("deleter")	Offset press shops	Removes coating from exposed PS plate to create whites	Good; risk of accidental removal	Relief-like image on deep, even black
Sandpaper	Hardware shops	Abrades plate to create texture	Good	Directional scratched textures
ALU NET PR2071 paste	Offset plate cleaner	Lightens or fades inked areas	Controllable with short contact; skin irritant	Soft fading and tonal reduction
Nail polish remover	Cosmetics shops	Removes local scum	Partial; weaker than ALU NET	Minor lightening
Gum arabic + phosphoric acid etch	8.5 mL H_3PO_4 in 250 mL gum solution	Substitute for TAPEM and EC fount	Good with longer etch (about 5 min)	Neutral; cost-saving
Carbon paper	Stationery shops	Transfers greasy wax line to plate	Good	Fine, etching-like pen line
Lipstick	Cosmetics shops	Greasy drawing medium	Good	Smooth, polished, painterly tone
Oil pastel	Art and stationery shops	Greasy drawing medium, rubbed by hand	Good; brittle, high ink uptake	Charcoal-like tonal rubbing
Tusche + glass marker	Lithographic and stationery supplies	Combined wash and wax line on one plate	Good; tusche lifts if over-rubbed	Transparent wash with opaque line
Press ink + Berger Thinner T-6	Offset ink (Toka, Peony) and lacquer thinner	Brushed wash drawing	Good; fragile when wiped	Wash with accidental, weathered-wall textures

Gum arabic used as drawing medium: The gum is water-soluble, and thus will not take grease where it is applied. The image was brushed in gum on a new grained plate after Rokonuzzaman noted: "In plate lithography prints are created primarily from the top of the lacquer" (S. M. Rokonuzzaman, personal communication, November 27, 2023). The gum was allowed to dry and the remainder of the plate was then lacquered, and the gum washed out, which left the areas as paperwhite. The effect achieved is similar to a woodcut, but with a more solid, jet black ground than relief printing would provide and with brush strokes rather than gouge marks (Figure 4).



Figure 4. Shafin Imtiaj Shihab, *Zebras* (2023), plate lithograph drawn in gum arabic resist on aluminium.

Offset positive remover gel: The offset plate can be made by scraping the needs, razor or blade in part to get the image, as mentioned by Rokonuzzaman (2017). Further to this, the commercial 'deleter' gel-based product normally used for the removal of scum in press shops was applied with cotton buds to the blue coating on a fully exposed PS plate and subsequently carefully removed. This plate was then gummed and printed in the normal manner of any offset plate. The gel must be used carefully, or the unwanted white is produced if there is any unintended contact. If relief printing can be done it reads relief in effect again, but now on velvety black.

Sandpaper and ALU NET: Sandpaper rubbed on the grain to create a directionality that might create narrative surfaces. The highly absorbent offset plate-cleaning paste ALU NET PR2071 was able to remove excessively dark areas and to lighten certain areas, for example a face (Figure 5). The fading will occur as a function of time, i.e., the longer the image is in contact with the paste the more fading will occur; therefore, contact time must be brief and monitored. Pastes are skin irritants and gloves should be worn.

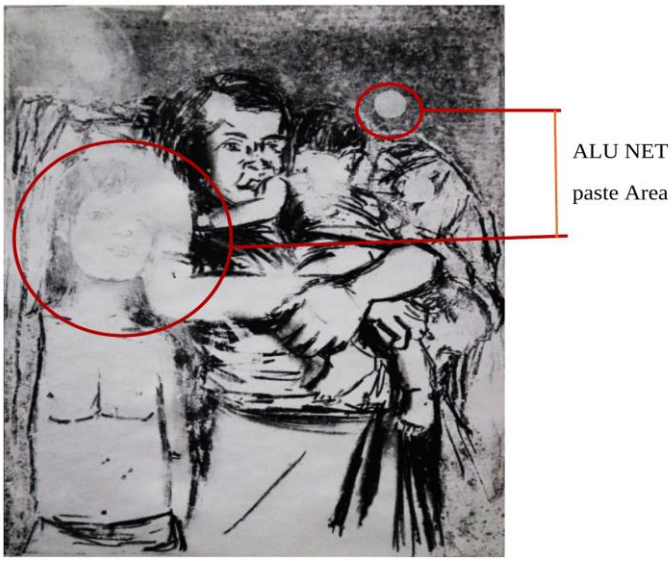


Figure 5. Selective fading of a face with ALU NET paste.

Nail polish remover and a low-cost etch: When a plate dries during the process, scum is hard to get off. Some light scum was removed with acetone-based nail polish remover, but not as well as with ALU NET or remover gel. The more important was an alternative to the two conventional etches, EC fount (60 seconds run round the picture) and TAPEM (15-40 seconds on the picture). A solution of 8.5 mL phosphoric acid in 250 mL gum-arabic was applied around the image for about 5 minutes and to dark and light area for graded times, and comparable results were obtained. Kamruzzaman Sagar, who employs this method, noted that it simplifies "the complexity and high cost of making TAPEM materials" (K. Sagar, personal communication, November 28, 2023).

Carbon paper: Drawing with carbon paper leaves a light layer of wax and carbon on the plate. The line is similar to an etched pen line. However, it can be distinguished from intaglio in that it does not stand up on the paper surface, but is embossed into the dampened paper surface (Figure 6).



Figure 6. Eshrat Zahan Esha, *Buffalo* (2023), plate lithograph drawn through carbon paper.

Lipstick: Lipstick combines waxes, oils and pigments, and on a grained plate its grease settles into the grain like crayon. Instead of the granular tooth of crayon or glass marker, it produced a smooth, slightly polished tone that approaches painting (Figure 7).



Figure 7. Arpita Mitra, *Lipstick* (2023), plate lithograph drawn in lipstick.

Oil pastel: Oil pastel was directly applied to the plate and rubbed by hand as prompted by Shahid Kabir's pastel studies of the brick kilns at Amin Bazar (2015). This yielded charcoal-like passages of tone which increase the painterly quality of lithography. Control in fine realism is difficult and oil pastel is brittle and absorb more ink.

Tusche with glass marker: Tusche overprint on glass marker (Figure 8): Mohammad Eunus creates texture through the layering of multiple plates. In this case the combination of tusche and the glass marker was used on one plate. The water-soluble greasy medium, tusche can be thinned with hot water and brushed over as a clear wash; the wax-based glass marker leaves a cloudy stripe. The two layers were to produce a transparent atmosphere, and a strong drawing was to pierce this atmosphere. As tusche is water soluble, wiping it on with a soft brush is not too hard, as this will cause wash to be picked up.



Figure 8. Mohammad Eunus, *Plate-Lithography* (2014). Collection: Faculty of Fine Arts, University of Dhaka.

Press ink thinned with Berger Thinner T-6: Berger Robbialac Thinner T-6 was used to thin the offset press ink (Toka or Peony brand) and applied to the plate, inspired by Kibria's oil-based washes in his stone lithographs. The fast evaporating thinner resulted in a wash that did not pose any drying issues. The areas that were partly dry were picked up with a damp viscose sponge, resulting in accidental textures reminiscent of weathered stone or old plaster walls.

Commercial offset as an artistic tool: Interviewees were inconsistent about the use of offset plates. Some people felt that photographically exposed plates using a halftone dot were not different from digital printing (K. Sagar, personal communication, November 28, 2023). For others, the visible plates were an opportunity to save the time-consuming process of colour plate separation. According to Ashraful Alam, "it takes a lot of time to make a colourful lithograph from a sketch, but this whole thing can be simplified if the initial plates are offset" (M. A. Alam, personal communication, December 3, 2023). Sagar said, "he had used over 15 plates in a single work, with his combination of offset and hand drawing".

4.4 Constraints on practice

The questionnaire, interviews and field visits reveal a similar array of barriers. The most frequent response to not selecting lithography, given by 13 MFA students, was that there would be limited opportunities to continue working in lithography after graduation (7 of 13 students, 53.8%; Figure 9). An additional 23.1% referred to the lengthy and complex procedure and another 15.4% to the problem of getting materials.

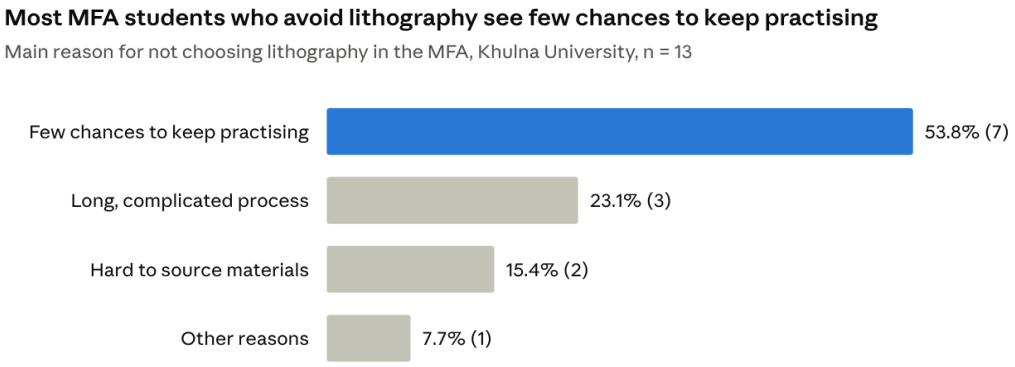


Figure 9. Student questionnaire, Printmaking Discipline, Khulna University, 2023 (n = 13).

Almost everyone had health concerns, with 11/13 students (84.6%) indicating that lithography was the most dangerous medium for printmaking, and citing acids, solvents, bitumen and inadequate safety equipment in studios. Similar concerns about acids and solvents have prompted research on safer methods in Pakistani art and design education (Khan & Power, 2022). Health concerns therefore reflect both real hazards and gaps in studio safety training. The two causes cannot be separated from the questionnaire data alone. Research on career sustainability in creative areas is the best way to interpret the 53.8% statistics. Fine art is arguably the least vocational creative discipline, so its graduates frequently build portfolio careers outside the core art field (Carey, 2015); many young artists experience financial instability before they achieve any stability (Mangset & Kleppe, 2025); and creative and cultural work is widely acknowledged as precarious (Comunian & England, 2020). Lithography is a particularly dangerous specialization because, unlike painting or sketching, it requires press, plates, and chemicals to practice (S. M. Tarar, 2020). After graduation, studio access is anticipated to be lost. According to Rogers (2003), students assess the medium's relative advantage in dissemination terms based on both its expressive capabilities and its sustainability in the post-university environment. These replies, together with the 23.1% who said the process's duration and complexity and the 15.4% who mentioned material access, corroborate H3: none of the explanations mentioned the expressive range of the medium.

Institutional explanations were added by the interviewees. The primary reasons cited by Gaine for students losing interest in lithography are the lack of teachers interested in lithography and inadequate set-up of studios (N. Gaine, personal communication, December 5, 2023). Sana emphasized visibility: "If the medium is not promoted enough, then there are less practitioners and less knowledge can lead to misconceptions about a medium, that's why more workshops, exhibitions or art talks can influence its development" (S. K. Sana, personal communication, November 27, 2023). No country-wide exhibition focusing on lithography was found during the study. There are other issues with stone lithography. Institutions, except for the University of Dhaka and the University of Chittagong, have few or no litho-stones (K. Sagar, personal communication, November 28, 2023). Shahrin said that "hard work" in use and transport of stones for lithography can be a discouraging factor for the practice of stone lithography" (S. Shahrin, personal communication, December 4, 2023) . Rokonuzzaman put these conditions in perspective by referring to the golden era of lithography in France, which was funded by the state under Napoleon: "patronage also was a key element in the development of a medium" (S. M. Rokonuzzaman, personal communication, November 27, 2023). Lastly, the tedious work involved in the process and frequent failed proofs in early practice discourage students who are impatient with the process.

5. Discussion

5.1 A borrowed lineage, locally reworked

The historical findings confirm that Bangladeshi lithography is a part of a tradition that originated in Calcutta and Santiniketan, which in turn developed from colonial commercial printing (Guha-Thakurta, 1992; Rokonuzzaman, 2017) . They also show how each generation has modified its inheritance. Through Kibria's contact with Japanese practice, lithography became a medium for abstraction (Islam, 2004). Rokonuzzaman's domestic solvents and wood lithography, Gaine's waterless process and Sagar's offset hybrids are all localisations of the medium. This parallels the international history outlined in Table 1, in which all commercial innovations, such as zinc plates and the offset press, were ultimately transferred to the realm of art. Such an interplay of commercial and artistic function is therefore not a medium's Achilles heel, but one of its prime sources of revival. Examining postcolonial art education history reveals that this lineage is not impartial. Lithography entered colonial art schools as a trade skill (Guha-Thakurta, 1992) before being revalued as a fine-art medium at Santiniketan and in post-Partition institutions. These schools were modeled after the South Kensington system and trained students for industry rather than individual expression (Kantawala, 2012; Mitter, 1994). According to the diffusion-of-innovations theory (Rogers, 2003), the medium then spread through a network of educators and former students. As Table 3 illustrates, each Bangladeshi school adopted lithography only once a press and a qualified instructor arrived, not before. H1 is supported by this pattern. The same pattern appears in India and Pakistan, which strengthens the institutional argument. In all three countries, presses and trained teachers preceded artistic interest. A similar conclusion may be drawn from comparisons with neighboring nations. According to Sengupta's (2012) analysis, printmaking in India evolved from colonial and bazaar printing to art institutions and eventually to regional hubs like Santiniketan. In Pakistan, the Mayo School of Arts in Lahore had a photolithography department that produced posters during the colonial era. However, printmaking did not become a specialty at the National College of Arts until after a workshop and press gift in 1967. A dedicated printmaking department and studio followed in the mid-1980s (S. M. Tarar, 2020) (N. O. Tarar, 2022). In all three nations, presses, skilled teachers, and specialized studios were more important than artistic interest, supporting the thesis that the limits highlighted here are institutional. During this investigation, no published scholarship on lithography in Nepal was found, therefore that comparison will be left for future research.

5.2 Alternative materials as a source of new visual language

The experiments provide a positive answer to RQ2. Each of the materials tested yielded a printable image, with several materials also yielding marks that conventional lithographic materials did not. Gum arabic resist and remover-gel drawing produces relief-like images that cannot be duplicated in woodcut for density of black. Lipstick provides a smooth, neat finish, while oil pastel provides a rubbed, charcoal-like finish. Carbon paper creates a line that resembles etching, only when viewed up close. Pressing and inking out creates a weathered, accidental surface. These findings echo the experimental plate-lithography practice of Md. Nadimuddaula at Khulna University, whose sustained experiments on the theme of Banbibi show how continuous experimentation can widen the expressive range of planography. The results are also suggestive of the contrast with the painting in Section 2.3. Some of these new marks, such as lipstick and oil pastel and thinner wash, push lithography towards painterly effects. Others, like gum resist, remover gel and carbon line, do adopt the visual conventions of relief and intaglio printing but are physically planographic. In lithography, its identity is therefore not in anyone’s appearance, but its chemistry: any greasy mark on the water-receptive ground can become an image. This openness makes the media especially receptive to improvised materials, an asset in settings where specialized supplies are costly or unavailable. It takes place at the same time as the shift to safer and more readily available printmaking materials in current practice (Grabowski & Fick, 2009; Khan & Power, 2022). These results support H2. The experiments therefore answer RQ2 in the affirmative and refine it. They show that the medium's openness is chemical rather than stylistic. Of more practical significance is the gum arabic–phosphoric acid etch. TAPEM does need

tannic acid and proper preparation, and EC fount is a commercial product. A two-ingredient etch that gets the job done, albeit slightly slower, helps reduce both cost and complexity, which were two of the reasons students cited. It requires systematic testing on plate types, climates and edition sizes before it can be recommended as a standard.

5.3 Medium, reproduction and artistic value

The philosophical analysis underpins the working hypothesis presented in Section 2.7. Participants continually denied that reproducibility was a threat to the status of a print. Rokonuzzaman noted that "print never loses its expression because of its reproducibility… its medium can never be an obstacle in the selection of good and bad in the field of art" (S. M. Rokonuzzaman, personal communication, November 27, 2023). This perspective is in line with Derrida's (1976) analysis of repetition as a part of meaning, and with Danto's (1964) institutional theory of art. It also addresses Benjamin's (1968) questions about the loss of aura: every impression in a hand-pulled edition will contain the mark of the matrix and the fingers that inked it. It is in the debate over offset plates that the line is drawn. Now artists do not mind commercial plates, provided the halftone dot doesn't erase the hand. In some cases, where the exposed plates are used in combination with drawing, like in Sagar's multi-plate pieces, the commercial tool becomes part of an artistic process. The difference is, however, not between commercial and fine-art technology, but between mechanical transcription and authored expression; that is, between what Kant (2000) calls a disinterested and an interested judgement. Each theoretical position can be related to particular discoveries. The results in Table 4 address Benjamin's (1968) worry about lost aura: lipstick, oil pastel, and thinner-wash plates generated markings that differ from impression to impression and cannot be produced by any other matrix, thus each print carries the unique trace of a hand-made plate. Derrida's (1976) concept of the trace takes physical form in carbon-paper and gum-resist plates, where the printed image is the remnant of a previous mark transferred to or resisted on the plate. Danto's (1964) institutional theory explains why the offset plate split interviewees: the same commercial PS plate counts as art in Sagar's multi-plate works since it is part of an authored process and shown as art, but as mere reproduction when used for halftone transcription. Kant's (2000) difference between disinterested and interested judgment also contributes to the student replies in Figure 9, since the reasons students provided for avoiding lithography were interested, practical judgments concerning professions and health, rather than esthetic judgments about the medium. The working hypothesis in Section 2.7, that artistic worth is found in the use of the medium's features rather than the medium itself, is therefore supported by experimental data rather than simply claimed.

5.4 Constraints are institutional, not expressive

The challenges to lithography in Bangladesh lie almost entirely outside the medium. Lithography was not rejected by students as not having expressive range. They rejected it because they could not see a way to continue practicing it, because it is laborious, because materials are not readily available and because it is perceived as dangerous. These issues are related to infrastructure, economy and pedagogy. This fact is confirmed by history. As far as lithography has prospered, from Napoleonic France to post-war workshops like Tamarind in the United States it has been sustained by patronage and devoted collaborative studios (Devon et al., 2008; Twyman, 1970). In Bangladesh, there is no national lithography workshop, no regular lithography exhibition and after their graduation most of the students have no access to lithography presses. Patronage and shared studios, not talent or interest, are the missing ingredients. This conclusion follows directly from historical and survey evidence. The health finding deserves particular attention. It is partly justified: lithography can be among the most hazardous print media, since acids, bitumen and solvents can indeed be dangerous if not used in the proper manner with the proper ventilation and protective equipment. It also partly reflects inexperience. Use of lacquer thinner instead of turpentine, use of a less complex phosphoric acid etch and the use of commercially formulated plate chemicals all indicate safer procedures. Such protocols, clearly communicated and studios properly equipped, can have as profound an impact on student perceptions of curricular change as on the product itself.

5.5 An integrated conceptual framework

Figure 10 summarizes the findings. The historical dissemination path (RQ1) defined the final locations of presses, stones, and qualified teachers, as well as the institutional limits that students presently confront. These limits, along with restricted access to imported chemicals and insufficient health and safety standards, influence student perspective (RQ3): low predicted viability after graduation, a lengthy and complex procedure, difficulties getting supplies, and a high sense of risk. Perception, in turn, determines whether lithography is chosen as a main medium and pursued after graduation. The treatments explored in this study target points along the chain: low-cost local materials and simpler etch (RQ2, Table 4) minimize material reliance and procedural complexity, whilst safer procedures and shared studios address perceived danger and post-graduation access. The framework is based on a single cohort and a small number of institutions, and it should be viewed as a collection of links to be evaluated in bigger research rather than a validated causal hypothesis.

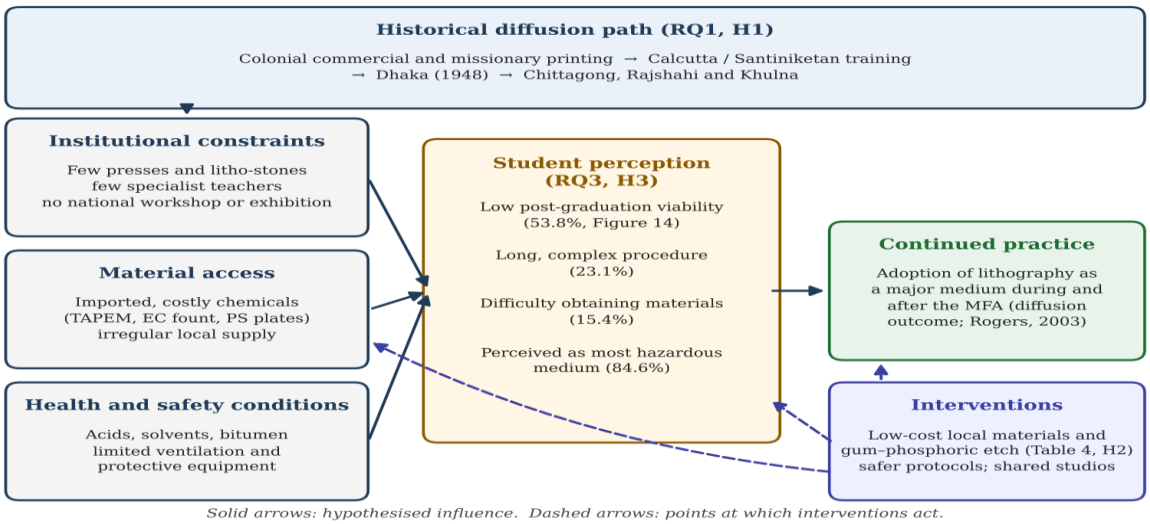


Figure 10. Conceptual framework linking institutional constraints, material access, health conditions, student perception and continued practice of lithography.

5.6 Limitations

The findings should be interpreted in light of many serious limitations. First, the studio experiments were exploratory: they were conducted by a small group in a single studio at Khulna University, without controlled conditions (temperature, humidity, plate batch, etch timing), and without replication across sites, so the results in Table 4 reflect what is possible rather than what is reliably repeatable. Future trials should record temperature, humidity and etch time to allow direct comparison. Replication at other institutions would test whether the results hold beyond Khulna. Second, the student survey only includes one cohort of 13 MFA students from one university; while it is a complete census of that cohort, the numbers in Figure 9 are descriptive and cannot be generalized to other institutions or years. Third, the participants were chosen specifically for their engagement with lithography, which may have overrepresented positive attitudes of the medium. Fourth, institutional records were incomplete: the University of Rajshahi's establishment dates and equipment histories could not be validated (see Table 3), and other historical data are based on single sources or oral tales. Finally, published literature and exhibition records on lithography in Bangladesh are few, and no similar study on Nepal could be found. Future study should duplicate the material tests in controlled environments at many institutions, poll students from different universities and years, and consolidate institutional archives.

6. Conclusion

This study aimed to explore the past, current state and experimental prospects of planography in Bangladesh. It concluded that the medium came via Calcutta-trained artists and colonial commercial printing as the answer to the first question. In Dhaka, it became an art form through Mohammad Kibria and its peers, and has now grown to Chittagong, Rajshahi and Khulna, where a second generation has taken it and reworked it into local issues and materials. In the second question, eleven of the low-cost materials obtained from the stationery, cosmetic, hardware and printing shops produced workable images on the aluminium plates, with several materials producing distinctive visual languages. A simple etch using gum arabic and phosphoric acid proven to be a feasible and cost-effective alternative to TAPEM. On the third issue, the impediments to practice were institutional, economic, and health-related rather than expressive: students claim they don't practice lithography because they can't conceive of a means to continue doing it and it's unsafe. The evidence therefore points to institutional reform rather than to any weakness in the medium. The medium's expressive range was never in question among practitioners. The paper's core message is that the capacities of lithography in Bangladesh are not yet fully revealed. It is open in the sense that it will accommodate any grease mark on a water-receptive surface and thus is particularly suitable for improvised use of local materials. Offset plates can be woven into authored artistic practice, if the example of this long history of absorbing commercial technologies is followed. What the medium lacks is not potential but studios, patronage, safe protocols and public visibility.

6.1 Theoretical applications

The study has three theoretical implications. First, it demonstrates that the diffusion-of-innovations theory (Rogers, 2003) can explain the uneven spread of an artistic medium, rather than just technologies: the institutional history in Table 3 shows adoption following the movement of trained teachers and presses, with each institution adopting lithography only when both were present. Second, when combined with postcolonial histories of art education (Kantawala, 2012; N. O. Tarar, 2022), the findings imply that the constraints on lithography in Bangladesh are the result of the medium's colonial entry as a capital-intensive trade, which helps explain why similar patterns appear in India and Pakistan. Third, the tests in Table 4 provide empirical evidence for the philosophical thesis that the worth of a print is determined by how an artist exploits the medium's properties: eleven non-standard materials all generated printable pictures, and seven marks that no ordinary substance does. The conceptual framework in Figure 10 converts these ideas into testable linkages for future study.

6.2 Practical applications

The findings also result in specific suggestions. Because 53.8% of MFA students avoided lithography due to a lack of post-graduate opportunities (Figure 9), institutions and agencies such as the Bangladesh Shilpakala Academy should establish at least one shared, open-access lithography workshop with a press where graduates can continue to work, as well as hold regular lithography exhibitions to increase the medium's visibility. Because 23.1% cited the length and complexity of the process and 15.4% cited material access, curricula should begin teaching lithography with low-cost, locally available materials that performed well in Table 4 (such as lipstick, oil pastel, carbon paper, and gum resist) before moving on to conventional materials and should use the gum arabic-phosphoric acid etch for teaching once its performance has been confirmed across plate types and seasons. Because 84.6% thought lithography was the most dangerous print medium, departments should publish written safety protocols, provide ventilation and protective equipment, and replace turpentine with lacquer thinner, as Rokonuzzaman (2017) did; safer procedures of this type have been developed in Pakistani art education (Khan & Power, 2022). Finally, combining offset plates with hand sketching, as shown in Sagar's multi-plate works, helps shorten color separation and allows pupils to print bigger quantities. These measures would together address the three barriers the survey identified. They are modest in cost and can be implemented within existing institutional structures.

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Data availability
The corresponding author can provide questionnaire responses and studio records upon reasonable requests.

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