

The Impact of Incorporating Heritage Manuscripts into the Course of Symbolism in Design on Postgraduates Visual Learning and Creativity

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Abstract

Objectives: This study explores the impact of integrating heritage manuscripts into the Symbolism in Design course (DES 652) taught to postgraduate students in the Master of Design program at Yarmouk University in Jordan. The study also measures the impact of using heritage manuscripts as a visual learning resource on academic achievement, visual learning, and creativity among design students.

Methods: The study employs a mixed-method approach, using a quasi-experimental approach and the pre-post-test to compare the student's exam grades as academic achievements before and after integrating heritage manuscripts into the course. Additionally, an experimental method was used, employing summative assessment of the final practical project in the course, designed according to its objectives and standards, aiming to evaluate students' levels of visual learning and creativity after utilizing heritage manuscripts in their final projects.

Results: The study findings indicate that integrating heritage manuscripts into the Symbolism in Design course (DES 652) significantly impacts academic achievement, visual learning, and creativity for graduate students in the Master of Design program, by enhancing their awareness of cultural heritage value and by boosting their creative abilities in practical design projects within the course, such as designing visual identities for civilizations and city branding.

Conclusions: The study concludes that heritage manuscripts as valuable visual learning resources are crucial when integrated into design education to enhance visual learning and creativity for design students and to increase their awareness of visual culture. The study also recommends integrating heritage manuscripts into the curricula of other design courses.

Keywords: Creativity, design education, heritage manuscripts, symbolism, visual learning.

أثر دمج المخطوطات التراثية في مقرر الرمزية في التصميم على التعلم البصري والإبداع لدى طلاب الدراسات العليا

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ملخص

الأهداف: تستكشف هذه الدراسة أثر دمج المخطوطات التراثية في مقرر الرمزية في التصميم (DES 652) الذي يُدرّس لطلبة الدراسات العليا في برنامج ماجستير التصميم في جامعة اليرموك في الأردن. حيث تقوم الدراسة بقياس أثر استخدام المخطوطات التراثية كمصدر مرئي للتعلم على التحصيل الأكاديمي، التعلم البصري، والإبداع لدى طلبة التصميم.

المنهجية: وظفت الدراسة المنهج المختلط، المنهج شبه التجريبي باستخدام أداة الاختبار القبلي والبعدي لمقارنة التحصيل الأكاديمي للطلبة قبل وبعد دمج المخطوطات التراثية في المقرر. والمنهج التجريبي باستخدام أداة التقييم التلخيصي للمشروع النهائي العملي في المقرر، المصمم وفقاً لمعايير المقرر وأهدافه، وذلك بهدف تقييم مستويات التعلم البصري والإبداع لدى الطلبة بعد استخدامهم للمخطوطات التراثية في مشاريعهم النهائية في المقرر.

النتائج: أشارت نتائج الدراسة إلى أن دمج المخطوطات التراثية في مقرر الرمزية في التصميم (DES 652) يؤثر بشكل كبير على كل من التحصيل الأكاديمي، والتعلم البصري، والإبداع لطلبة الدراسات العليا في برنامج ماجستير التصميم وذلك من خلال تعزيز وعيم بالقيمة الثقافية التراثية ومن خلال تعزيز قدراتهم الإبداعية في مشاريع التصميم العملية في المقرر كتحصيل الهوية البصرية للحضارات والعلامات التجارية للمدينة.

الخلاصة: خلصت الدراسة إلى أن المخطوطات التراثية كمصدر بصري قيم للتعلم يعتبر دمجها في تعليم التصميم مهماً في تعزيز التعلم البصري والإبداع لطلبة التصميم وزيادة وعيم بالثقافة البصرية. كما أوصت الدراسة بدمج المخطوطات التراثية في مناهج مقررات التصميم الأخرى.

الكلمات الدالة: الإبداع، تعليم التصميم، المخطوطات التراثية، الرمزية، التعلم البصري



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1. Introduction

1.1. Background

Heritage manuscripts are valuable and indispensable tools for scholars, scientists, artists, teachers, and students. It is a rich visual resource for studying cultural heritage in different aspects, such as history, religion, language, philosophy, arts, geography, astrology, and science. "A manuscript is never a mere carrier of texts, musical notes, images, and so on, but forms a unit of content and its concrete physical instantiations" (Greve et al., 2020, p.179). These manuscripts vividly capture medieval life, making them crucial for historians exploring past societies and events, and illuminating religious practices and philosophical inquiries, offering a multidimensional understanding of history, culture, and human thought (Miller, 2017). However, the awareness of what manuscripts mean to heritage and history is not widespread among communities today, many scholars in their researches focussed too often on manuscripts' textual contents, and many academics did not develop an interest in manuscripts' social life and respective contexts (Greve et al., 2020). Therefore, studying primary sources and incorporating heritage manuscripts into new research methods provides direction for future studies in modern education and research (Mustafayeva, 2023).

Cultural heritage is primarily transmitted through ancient manuscripts, which significantly influenced educational systems in historical and cultural contexts (Cheriet et al., 2013). However, in arts and design education, where the process of teaching and learning relies on visual resources, heritage manuscripts are a good visual source to be used for enhancing students' visual learning and cultural awareness. Incorporating manuscripts as a learning tool into educational systems enhances the students' visual learning, critical thinking, cultural awareness, and a more profound comprehension of history. These manuscripts significantly affect design students learning by providing an opportunity to explore different perspectives and historical backgrounds (Education Materialised, 2021).

This paper reflects on the impact of incorporating heritage manuscripts into the design course syllabus on postgraduate design students' visual learning, and creativity. The Symbolism in Design (DES 652) course is one of the design courses for the master program at Yarmouk University in Jordan. The course is taught to provide postgraduate design students the necessary knowledge of symbolism in design, understand the history of symbols within different heritage cultures of most worldwide civilizations, understand the connotations and the meanings of symbols throughout ancient and modern times, connect symbols of each civilization with its political, social, cultural, and religious circumstances, and gain the necessary scientific and practical expertise to create the final course project at the end of the semester, which was creating a visual identity for each civilization from its symbols and based on what they have learned through heritage manuscripts.

1.2. Problem Statement:

As symbols are essential parts of our daily lives in helping us communicate visually, the role of designers is to understand the meanings and semantics behind symbols, and creatively apply them in real-life design projects based on human needs. On the other hand, designers can enhance their creativity with visual thinking to create concepts for design projects and to visually deliver them to the audience, and that is why design as a profession is known as visual communication (Maitin, 1967). Design as problem-solving based on human needs (NASAD, 2007-2008, p.91), where solving a design problem rely on creative thinking, visual learning and visual thinking are essential to enhance creativity of which problem-solving itself is a creative activity (Barnard, 2013).

The course syllabus of Symbolism in Design (DES 652), is a theoretical course where students gain knowledge about symbolism in design through studying the history of symbolism within different civilization and apply this knowledge in into practical design projects. These projects assessed based on students' creativity; visual learning and visual thinking. The course only provides traditional teaching materials such as variable materials of textbooks and articles, where providing visual sources is one of the instructor roles to enhance students' creativity. However, its revealed that traditional materials only present the course content to be covered, whereas contemporary materials present much more for the learning process (Posner, 2004), and "many studies show that students learn from courses that provide information in a visual format" (Raiyn, 2016). In addition, Heller (2015) asserted, that design instructors need to visualize the knowledge. On the other side, Greve et al. (2020) in their book "many academics did not develop a genuine interest in the social life of manuscripts

and their respective contexts” (Greve et al., 2020, p.203). In this study, the instructor of the course Symbolism in Design (DES 652) incorporates heritage manuscripts of civilizations as visual teaching materials in the course content to measure its impact on students' visual learning, creativity, and awareness of cultural heritage.

1.3. Objectives of the Study:

This research study aims to explore the impact of incorporating heritage manuscripts as visual learning materials into the course Symbolism in Design (DES 652) in achieving the course objectives through the following:

Measure postgraduate design students' academic achievement before and after incorporating heritage manuscripts into the course.

Explore the impact of using heritage manuscripts as a visual source of learning on postgraduate design students' visual learning and creativity performance.

1.4. Importance of the study:

The significance of this study relies on the importance of visual learning in design education, where visual learning materials are essential for design students' creativity enhancement. Heritage manuscripts, as valuable visual resources, will be incorporated into the course Symbolism in Design (DES 652) to explore their impact on design education, on students' visual learning and creativity, and to provide design students the opportunity to gain knowledge about heritage manuscripts to raise their awareness of the importance of heritage manuscripts and their role in transmitting culture.

1.5. Definitions of Terms:

Creativity: “the tendency to generate or recognize ideas, alternatives, or possibilities that may be useful in solving problems, communicating with others, and entraining ourselves and others” (Franken, 1994, p.396). In this research, creativity refers to postgraduates design students skills in solving design problem by creating the visual identity for a civilization through its symbols.

Design Education: “is the study and application of design principles across multiple disciplines. Designers learn how to communicate clearly and solve problems, and understand how to create visually appealing designs with aspects such as line, shape, color, typography, and much more” (Interaction Design Foundation, 2016). In this research, design education refers to the study of bachelor's and master's programs at the Department of Design and Applied Arts at Yarmouk University in Jordan.

Heritage Manuscripts: “any written text, from papyrus scrolls and illuminated books to paper documents produced by hand... refers to the books and other documents of pre-print culture. Handwritten scrolls, books, and pages (journals, notebooks, historical and personal accounts, etc.), letters, illuminated manuscripts, and so on fall into this category” (Hopkins, 2003). In this research, heritage manuscripts refer to the historical handwritten documents related to different civilizations starting from the Lascaux caves, passing through ancient Arab civilizations, and reaching our contemporary era.

Symbolism: “the art or practice of using symbols especially by investing things with a symbolic meaning or by expressing the invisible or intangible by means of visible or sensuous representations” (Merriam-Webster, n.d). In this research, symbolism refers to the course name that taught to the postgraduate design students in the Master of Design at Yarmouk University.

Visual Learning: “is the most complex of the theoretical constructs because it refers to both learning from visuals and research on designing visuals for instruction... In the past the terms "reading pictures" or "learning from pictures" were used to refer to a student's visual learning... Today, visual learning refers to the acquisition and construction of knowledge as a result of interaction with visual phenomenon” (Moore & Dwyer, 1994, p.107). In this research, visual learning refers to learning from heritage manuscripts as visual materials.

2. Literature Review

2.1. Manuscripts and Education:

The fundamental significance of cultural preservation and the study of historical items can be easily neglected in the quickly changing educational scene, where technology and modernity frequently dominate the debate. However, examining the rich past and embracing its cultural treasures has significant advantages beyond academia's borders. In this perspective, heritage manuscripts stand out as exceptional artifacts that span generational gaps and make important contributions to education. A bridge and direct link to the past is offered by heritage manuscripts because “this material nature of manuscripts that can be

essential in communicating meaning and transmitting contents in an unwritten form and beyond the texts contained” (Greve et al., 2020, p.179). For example, the Book of Kells, an illuminated Gospel manuscript from the 9th century, students can gain a glimpse into the artistic techniques and symbolic meanings of that era, by studying its intricate designs and illustrations. Engaging with such manuscripts allows students to step back in time and understand how people in the past expressed their beliefs and ideas (Mark, 2018). Also, it has been revealed by Zhalehpour et al. (2019) that using heritage manuscripts’ visual elements such as typographical objects related to the history of knowledge and information can help us better understand our cultural heritage, and extracting these visual objects help us understand and convey more information about history and culture. Such as illuminated manuscripts served as a tool for moral instruction and religious education, and in addition to being valuable for preserving nations’ heritage and knowledge, heritage manuscripts also play a significant role in many libraries that contain rare documents and manuscripts (Nizamoglu, 2010). Moreover, it effectively combines aesthetic skills with literary content, covering topics in literature, religion, science, and other areas (Aguilar et al., 2021).

Incorporating heritage manuscripts into the educational setting is important for the teaching and learning process. It may result in a paradigm shift in which students took an active role in their education, and positioned students as co-creators of insights and knowledge receivers. “Manuscripts as visual artifacts in all its messy glory may influence the textual imagination of the next generation” (Lied, 2019, p.28). The visual appearance of heritage manuscripts can appeal to readers, listeners, and viewers (Greve et al., 2020, p.179). Such as illuminated manuscripts, which are incredibly well-crafted documents, can show us how people in the past liked to make things look. They’re amazing examples of how skilled and dedicated artists and scribes were. With all their small, detailed parts, bright colors, and careful designs, these manuscripts prove how talented these creators were.

Heritage manuscripts as a visual source for learning is another way of moving away from rote learning and lower-order cognitive activities, encouraging students to move up the thinking hierarchy and engage in higher-order cognitive processes (Bedi et al., 2023). A Book by Mark Bland (2013) titled: *A Guide to Early Printed Books and Manuscripts*. Describes the way to look at manuscripts not only as texts but as “processes of communication in which meaning is made through the relationship between signs, structures, and materials” (p.1). Bland explained the methods and processes that are used to study and describe early printed books and manuscripts with many provided illustrations hoping readers to look at manuscripts and study how it was made, the processes through which they may have evolved, and their history as reflected through the archival records as well as the evidence of its use (Bland, 2013).

Bringing these manuscripts into classrooms, especially in art and design schools, allows students to understand the development of artistic styles and their broader societal significance, and it does not only enhance comprehension of art history but also inspires students to explore their creative potential (Oledzka, 2016), where creativity is required in design and art education.

2.2. Design Education:

Design is a broad concept, but the British Design Council (n.d) summarizes it as what happens when people use creativity to solve problems based on human needs. In more detail, design is defined as a visual language that aims to solve a problem and communicate a specific idea or message to the target audience through the use of visual components (Günay, 2021). Despite the various definitions of design education among authors and scholars, due to the differentiation of design fields such as graphic design, interior design, industrial design, and fashion design. Most of them such as Arnston (1988), Wilde, J & Wilde, R. (1991), Barnard (2005), Shaughnessy (2005), Neumeier (2006) Hembree (2006) agree that the primary goal of design education is to help students how to become creative problem solvers, visual communicators, and message makers.

In design education, the role of the design schools is to educate design students to take different views of problems (Lawson, 2005) and “good design education should equip designers with a wide range of skills. These include visual design skills: understand elements like color, typography, composition, and imagery” (Interaction Design Foundation, 2016). Such as, analytical thinking, visual thinking, and critical thinking are required from students in solving design problems, and all these types of thinking are recognized as a mindset for solving complex problems and explained by using visual thinking (Kim & Park, 2021). It was concluded in the paper titled (The Role of Visual Learning in Improving Students’ High-Order

Thinking Skills) that “Many studies show that students learn from courses that provide information in a visual format... visual learning tools increased students’ high-order thinking” (Raiyn, 2016, p.115). Nowadays, design students significantly rely on visual learning in their educational settings, as a result of its benefits in enhancing students’ learning and increasing their knowledge (Gizzi et al. 2019). Therefore, due to the concept of visual learning in design education, heritage manuscripts as a visual learning tool will significantly enhance design students’ learning.

2.3. The Course Symbolism in Design (DES 652)

The course Symbolism in Design (DES 652) is one of the taught courses in the master's program of design at Yarmouk University. A compulsory course that should be completed by postgraduate design students, before submitting their thesis proposals. It is taught as three theoretical hours per week for 16 weeks. The course is designed to provide postgraduate design students with appropriate knowledge about symbolism in design through studying the history of symbolism within different civilizations, starting from the Lascaux caves, passing through ancient Arab civilizations, and reaching our contemporary era. As listed in the course syllabus, there are two-course objectives (COs) and seven-course learning outcomes (CLOs) that focus on student's learning abilities. On the other hand, the course assessments are a set of tests and a final project of which the course instructor determines the subject of the projects. The following clarifies in detail the course objectives, course learning outcomes, and course final project:

Course objectives (COs):

- 1.CO.1: Understand the meaning and connotations of symbols of each era and connect these symbols to each era's conditions, such as economic, religious, social, and political conditions.
- 2.CO.2: Gain practical experience in symbolism in design and apply this experience to real-life design projects.

Course Learning Outcomes (CLOs):

1. CLO.1: Understand the difference between symbol and sign
2. CLO.2: Analyze the symbol's meaning and connect the meaning with its usability purposes
3. CLO.3: Create a design project based on symbols
4. CLO.4: Improve critical, analytical, and creative thinking skills related to design problem-solving
5. CLO.5: Improve research study skills to apply it in future research studies
6. CLO.6: Improve visual and verbal communication skills and writing skills for professional practice purposes
7. CLO.7: Improve teamwork and leadership skills through group activities.

Course Final Project:

The final project is solving a design problem related to visual communication. It is titled (Extracting Civilization Visual Identity) based on symbols. The project was designed based on the course objectives (COs) and course learning outcomes (CLOs). The final project requires postgraduate design students to create a visual identity for a selected civilization based on its symbols to be used as a reference and guideline in creating real design projects. The project required students to demonstrate a creative performance through (research, analysis, and creation) as follows:

- Research: Study and understanding of a civilization’s symbols (brief/problem/context)
- Analysis: Extraction of civilization’s symbols and connecting their meaning to civilization’s circumstances (cultural, economic, religious, and political)
- Create: Inferred the visual identity (color, shape) of civilization based on its extracted symbols.

3. Methodology

3.1. Research design:

This research study explores and measures the impact of incorporating heritage manuscripts in design education on students' academic achievement and creativity. More specifically, it measures the impact of incorporating heritage manuscripts as a valuable visual resource for learning in the course (Symbolism in Design - DES 652) on postgraduate design students' visual learning and creativity. This study sought to answer the following research questions:

1. Does incorporating heritage manuscripts into the course Symbolism in Design (DES 652) have a statistically

significant impact on postgraduate design students' academic achievement?

2. How does incorporating heritage manuscripts into the course Symbolism in Design (DES 652) impact postgraduate design students' visual learning and creativity?
3. To what extent does incorporating heritage manuscripts into the course Symbolism in Design (DES 652) achieve the course standards?

To answer research questions, the study applied a mixed-method approach of combining qualitative and quantitative methods to expand and strengthen the study's results and conclusions and therefore contribute to the published literature. A quasi-experimental approach, using the pre-post-test as an in-class written exam to compare the student's exam grades as academic achievements before and after incorporating heritage manuscripts into the course. An experimental approach, using a summative assessment of the course final project designed based on the course standards and benchmarks, to evaluate and reflect on students' visual learning and creativity levels after using heritage manuscripts in their works.

3.2. Participants

The participants of this study are second-year postgraduate design students in the Master of Design program at the Department of Design and Applied Arts at Yarmouk University in Jordan, who enrolled in the course Symbolism in Design (DES 652) during the spring semester of 2023. Based on class enrollment information, the number of enrolled students is 33, of which 84% ($n = 28$) are female students.

All of the participants in this study have gained a bachelor's degree in Design before enrolling in the program of Master in Design at Yarmouk University. Also, the participants enrolled in this course as an elective course, and they can write and read in the English language, and they also have graphic design skills such as creating a brand visual identity.

3.3. Instrument

The instruments of this study were developed based on the standards and benchmarks (COs) and (CLOs) of the course Symbolism in Design (DES 652). The first instrument is a pre-post test that measures students' academic achievements before and after incorporating heritage manuscripts into the course. The second instrument is a summative assessment that explores the impact of using heritage manuscripts as a visual source of learning on students' visual learning and creativity levels. Each instrument is clarified in detail as follows:

A Pre-Post Test

This instrument will measure postgraduate design students' academic achievements before and after incorporating heritage manuscripts into the course. The pre-test occurs during the first two weeks of the semester before heritage manuscripts are incorporated into the course. Thus, the instructor would know what level of knowledge students have about civilizations and their symbols covered by the traditional materials of the course, such as textbooks, articles, and verbal sources. The post-test occurs at the end of the semester after this incorporation has taken place into the course, so the instructor would know what level of knowledge students have reached through heritage manuscripts as visual sources of learning. Pre-posttest assessments were developed based on the main course objectives (CO.1 and CO.2) and based on three of the course learning outcomes (CLO.2, CLO.4, and CLO.6). All assessments will be written exams in worksheets and will be administered in the class. Students will complete all assessments independently. All assessments for the pre-posttests were distributed in three main questions about four of the different civilizations' symbols. All three questions (civilization's symbol identification, civilization's symbol usage in design, and civilization's symbol visual identity (color & shape)) reflect the student's level of learning. Each pre-test and post-test is worth a total of (100 points), and it will take (60 minutes) to be completed. Table (1) clarifies the pre-post-test assessment blueprint.

Table 1. Pre-posttest assessment blueprint

Questions Form	COs	CLOs	Question' Items	Item Propotion	Proportion
1. Civilizations symbol identification	CO.1	CLO.2	4	5%	20 %
2.Civilization's symbol usage in design	CO.1, 2	CLO.2, 4, 6	4	11%	44 %
3.Civilization's symbol visual identity (color, shape)	CO.1, 2	CLO.4, 6	4	9%	36%

Summative Assessment based on a design project

The purpose of summative assessment is to reflect what the students have learned in the past to evaluate their learning at the end of the course by comparing it to some course standard. In this study, summative assessment will be employed to reflect postgraduate design students' level of visual learning and creativity in the subject of civilizations' symbolism at the end of the semester after heritage manuscripts, as visual sources of learning, have been used by students in their works. This instrument will explore the impact of heritage manuscripts as a visual source of learning on postgraduate design students' visual learning and creativity by evaluating their final projects at the end of the course. Students will rely on heritage manuscripts for submitting their final projects. The final project (Extracting Civilization Visual Identity) is based on symbols. The project was designed by the course instructor based on the main course objectives (CO.1 and CO.2) and based on all course learning outcomes (CLO.1 to CLO.6). The summative assessment will reflect the evaluation of each student project based on project criteria and creative performance level. Table (2) clarifies the summative assessment blueprint.

Table 2. Summative assessment Blueprint

Assessment Criteria based on COs and CLOs		Creative Performance Level			
Criteria	COs/CLOs	Best	Good	Fair	Unacceptable
1. Research: Study and understanding of a civilization's symbols (brief/ problem/ context)	CO.1 / CLO.1, 5, 6	Evidence of high research, review of literature, and synthesis that demonstrates a deep understanding of the brief/problem and clearly informs its development	Evidence of a consciously selective research, review of literature, and synthesis that clearly informs the development of the brief/ problem	Evidence of a broad range of relevant information that informs the development of the brief/ problem	Evidence of a Limited collection of random information that does not inform the development of the brief/ problem
2. Analysis: Extraction of civilization's symbols and connecting their meaning to civilization's circumstances (cultural, economic, religious, and political)	CO.1, 2/ CLO.2,4,5	Demonstrate a high level of critical, analytical, and reflective thinking that extends the extraction of civilizations' symbols and connects their meaning and connotations with their circumstances	Demonstrate extensive critical, analytical, and reflective thinking that draws on the extraction of civilizations' symbols and connects their meaning and connotations with their circumstances	Demonstrate some critical, analytical, and reflective thinking that draws on the extraction of civilizations' symbols and connects their meaning and connotations with their circumstances	Demonstrate limited thinking and analysis of relevant knowledge that fails to extract civilizations' symbols
3. Creation: Inferred the visual identity (color, shape) of civilization based on its extracted symbols	CO.1,2/ CLO.2,3,4,6	Infer the visual identity of the civilization, based on the extraction of its symbols and their meanings and connotations, in a highly original, creative way to be applied in real design projects	Infer the visual identity of the civilization, based on the extraction of its symbols and their meanings and connotations, in a wide range of ways to be applied in real design projects	Infer the visual identity of the civilization, based on the extraction of its symbols and their meanings and connotations, in a range of ways to be applied in real design projects	Infer the visual identity of the civilization, based on the extraction of its symbols and their meanings and connotations, in limited and inappropriate ways to be applied in real design projects

3.4. Data collection

After the first two weeks of the course, where topics of civilizations' symbols were presented and discussed through reading materials, students were invited to take the pre-test in class. In the last two weeks of the course, after heritage manuscripts were incorporated into the course as a visual source of learning, students were invited to complete the post-test. Both pre-post tests were in written paper form. Students were given 60 minutes to complete pre-post tests. Assessment was done by the instructor based on the pre-posttest assessment blueprint. Furthermore, the instructor demonstrated the final project and its requirements at the beginning of the semester, distributed civilizations' names for the students to work on, each student selected one civilization, used its heritage manuscripts as a visual source to work from in their final project, and at the end of the course, students submitted their final project to be assessed. Assessment was done by the instructor based on the summative assessment blueprint.

4. Research Results and Findings

4.1. The Impact of Incorporating heritage manuscripts on academic achievement

A Pre-Post Test result

This instrument is used to answer research question number one: RQ.1: Does incorporating heritage manuscripts into the course Symbolism in Design (DES 652) have a statistically significant impact on postgraduate design students' academic achievement?

The results of the paired t-test, offer insights into the study's findings by including key statistics such as the t-statistic, and p-value.

Table 3. Paired Samples Statistics of pre- posttest of students ($n = 33$ students)

	Mean	N	Std. Deviation	Std. Error Mean
Pre-test	72.8485	33	4.79010	.83385
Post-test	87.5152	33	5.03811	.87702

Table (3) above displays descriptive statistics for the exam grades of the pre-test before incorporating heritage manuscripts into the course and exam grades of the post-test after incorporating the heritage manuscripts into the course. The mean exam score before the intervention (pre-test) was 72.85. On the other hand, the mean exam score after the intervention (post-test) increased to 87.52. These statistics provide a variability in exam grades within the paired samples. The increase in the mean grades after the intervention suggests a potential positive impact of incorporating heritage manuscripts on student academic achievements.

Table 4. Paired Samples Test

	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pre-test - Post-test	-14.66667	7.12683	1.24062	-17.19373	-12.13960	-11.822	32	.000

The reported p-value for 'Sig. (2-tailed)' in Table 4 is .000, indicating a highly significant difference between the paired samples. This means there are significant results between the pre-test and post-test regarding students' grades after incorporating heritage manuscripts into the course.

RQ.1 Answer: Based on the significant increase in mean group scores and the shift in students' ability from pre-test to post-test, the results indicate that the students learned the course content over the semester from the heritage manuscripts, as a visual material, more than learned from the reading materials. Overall, 33 students had significant improvement from the pre –to post-test. This provides evidence that incorporating heritage manuscripts into the course of Symbolism in Design – DES 652 positively impacts the academic achievement of postgraduate design students.

4.2. The Impact of Incorporating heritage manuscripts on visual learning and creativity

Summative assessments based on Design Project

This instrument was used to answer research questions number two and three:

RQ.2: How does incorporating heritage manuscripts into the course Symbolism in Design (DES 652) impact postgraduate design students' visual learning and creativity?

RQ.3: To what extent does incorporating heritage manuscripts into the course Symbolism in Design (DES 652) achieve the course standards?

- **Project # 1:** Best- level of creative performance

- **Project sub-title:** The Greeks' Civilization

- **Project Assessment:**

- **Research:** The student demonstrated evidence of high research about the Greeks' civilization, investigated its symbols, and questioned their origins and meanings (religious, political, cultural) through deep literature. The student also demonstrated a deep understanding of the brief and problem about the visual identity of this civilization and informed its development.

- **Analysis:** The student demonstrates a high level of critical, analytical, and reflective thinking that extends the extraction of civilizations' symbols and connects their meaning and connotations with their circumstances by distributing the most famous symbols that appeared in the Greek civilization in a table, identified their form with their names and their cultural, religious, political, and economic indicators, in addition to the meaning of each symbol, are listed

- **Creation:** The student Inferred the visual identity (shape and color) and created a pattern of the civilization, based on the extraction of its symbols and their meanings and connotations, in a highly original and creative table to be applied in a real-design project, as shown in Figure (1)






	Suggested Patterns based on Greeks Visual Identity	Inspiration
Lines Reputation Clear Lines Geometric abstraction and Proportions		
Colours Dark Red Dark Blue Purple Yellow		Inspired by "Precious Colors in Ancient Greek Polychrome and Painting: Material Aspects and Symbolic Values" by Harikleana Bercodaki (2014)
Patterns		

Figure 1: Visual Identity of the Greeks' Civilization

- **Project # 2:** Best- level of creative performance

- **Project sub-title:** The Middle Kingdom of Egypt' Civilization

- **Project Assessment:**

- **Research:** The student demonstrated evidence of high research about the middle kingdom of Egypt's civilization, the review of literature covered the civilization during the era of the eleventh dynasty until the fourth part of the thirteenth dynasty. The Students also demonstrated a deep understanding of the brief and problem about the visual identity of this civilization and informed its development

- **Analysis:** The student demonstrates a high level of critical, analytical, and reflective thinking that extends the extraction of civilizations' symbols and connects their meaning and connotations with their circumstances by distributing

the most famous symbols that appeared in the Middle Kingdom in a table, identified from statues, weapons, jewelry, clothing, and furniture, with their names and their cultural, religious, political, and economic indicators, in addition to the meaning of each symbol, are listed

- **Creation:** The student Inferred the visual identity of the civilization, based on the extraction of its symbols and their meanings and connotations, in a highly original and creative table to be applied in a real-design project, as shown in Figure (2).















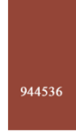

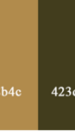

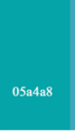









Shape														
Color														
	944536	986f4f	b18b4c	423d1d	8da82	05a4a8	3fa6b9	2f7790	32377b	444575	ae2b13	d15a41		

Figure 2: Visual Identity of the Middle Kingdom of Egypt' Civilization

○ **Project # 3:** Good- level of creative performance

○ **Project sub-title:** The Nabataean Civilization

○ **Project Assessment:**

- **Research:** The student demonstrated evidence of consciously selective research about the civilization, demonstrated a clear literature review covering the civilization era, and informed the development of the brief/ problem about the Nabateans' civilization

- **Analysis:** The student demonstrated extensive critical, analytical, and reflective thinking that draws on the extraction of civilizations' symbols and connects their meaning and connotations with their circumstances by distributing the most famous symbols in a clear table

- **Creation:** The student Inferred the visual identity of the civilization, based on the extraction of its symbols and their meanings and connotations, in a clear table to be applied in a real-design project, as shown in Figure (3).

					
					
f7c69d Color name: Peach	ad9781 Color name: Lion	624645 Color name: Rose ebony	b79a9a Color name: Rosy brown	a14d4d Color name: Redwood	
					
321318 Color name: Black bean		6d2b1b Color name: Caput mortuum	b05b39 Color name: Brown sugar	f2b066	

three summative assessments for three projects selected based on creative-level performance, two at the best and one at the good. However, no projects were found at the fair or unacceptable levels, indicating that postgraduate design students achieved good and best levels of creativity while using heritage manuscripts as a visual source for submitting their final projects in the course of design symbolism in design.

RQ.3 Answer: Through the results of both instruments, pre-post test and summative assessment, the result indicates that in incorporating heritage manuscripts into the course Symbolism in Design (DES 652) achieve the most course standards by covering the main course objectives (CLO.1) and (CLO.2) and six out of seven of the course learning outcomes (CLO.1) to (CLO.6), whereas the course learning outcome (CLO.7) was covered during the students' final presentations and discussions.

5. Discussion and Conclusions

This research study explored the impact of incorporating heritage manuscripts as visual learning materials into the course Symbolism in Design (DES 652) in achieving the course objectives by measuring postgraduate design students' academic achievement before and after incorporating heritage manuscripts into the course and exploring the impact of using heritage manuscripts as a visual source of learning on postgraduate design students' visual learning and creativity performance.

The study applied a mixed-method approach by combining qualitative and quantitative methods to expand and strengthen the results and conclusions. The results and findings of the study indicated that incorporating heritage manuscripts as visual learning materials into the course Symbolism in Design (DES 652) positively impacts postgraduate design students' academic achievement, visual learning, and creativity performance level.

The results of the pre-post tests indicated that the academic achievements for all 33 students significantly increased after incorporating heritage manuscripts into the course. This result of the student's academic achievements asserts what Bedi et al. (2023) revealed in the literature, that incorporating heritage manuscripts into education helps students engage in higher-order cognitive processes.

The summative assessments of the course' final projects indicated that while students using heritage manuscripts as a visual source during the process of creating their final practical project, their creativity performance has been increased; students had ample opportunity to creatively solve design problems through their final projects at the end of the course, all 33 projects were assessed as good and best levels of creativity, where no project was found at the fair or unacceptable levels, indicating that students gained a holistic understanding of cultural heritage, a rich design vocabulary, and practical skills. This result of the student's knowledge and skills asserts what Oledzka (2016), Lied (2019), and Zhalehpour et al. (2019) revealed in the literature, that incorporating heritage manuscripts into the classrooms, especially in art and design education, helps students to gain a better understanding of art history and cultural heritage awareness, increase their textual imagination skills, and enhance their creative potential levels in art and design practice.

The study has concluded that incorporating heritage manuscripts as a visual source of learning in the course Symbolism in Design (DES 652) led to achieving the most learning outcomes of the course. It helped stimulate critical and analytical thinking among postgraduate design students and enhanced their potential for creativity in visual thinking while working on practical design projects that required them to act as problem solvers, visual communicators, and message makers. Steven Heller (2012), the author of over 170 books on design and visual culture, revealed that students should gain visual thinking skills before they create their visual design projects, where the role of the instructor is to visualize the knowledge for their students. This conclusion asserts the scholars' definition of the primary goal of design education as helping students become creative in problem-solving, visual communication, and message-making.

This new approach of incorporating heritage manuscripts into design education is remarkable for enhancing design students' visual learning and awareness of heritage cultural values.

6. Recommendation

This research study recommended that heritage manuscripts are a valuable visual source of learning that must be considered in visual learning for postgraduate design students. However, further research is needed to explore the impact of incorporating heritage manuscripts on undergraduate design students

7. Limitations

It is important to note that this study has some limitations. The first is the difficulty of obtaining authentic printed manuscripts since these documents may be rare, delicate, or far away from students, limiting direct student involvement. Therefore, more methodologies should be considered for further studies. Second, the geographical restriction, this study was around one university in Jordan. Thus, more studies in other universities are needed for comprehensive insights. Third, the gender restriction, the sample of this study mainly comprised more female students, due to the large number of enrolled female students in the Master of Design at Yarmouk University.

8. Statement of Declarations

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Competing of Interest: The authors declare that they have no competing interests regarding the research.

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