Escala para medir actitudes de estudiantes de diseño gráfico hacia la investigación

Scale to Measure Attitudes of Graphic Design Students Towards Research

Escala para medir atitudes de estudantes de design gráfico em relação à pesquisa

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Resumen

El propósito del trabajo aquí reportado fue diseñar y validar una escala para medir las actitudes hacia el aprendizaje de metodologías de investigación y la producción de conocimiento entre estudiantes de diseño gráfico. Para ello, se utilizó un instrumento conformado de 45 ítems distribuidos en seis dimensiones relacionadas con la utilidad de la investigación para la profesión, valoración positiva y negativa hacia la investigación, entre otros. Para garantizar la confiabilidad del cuestionario, se le sometió a un proceso de validación por juicio de nueve expertos, se calculó la razón de validez de contenido mediante el estándar de Lawshe (1975) y la conveniencia global alcanzó un índice de validez de 0.85. Tras una primera aplicación piloto, se aplicó una segunda a 130 estudiantes y recién egresados de diseño, provenientes de dos instituciones públicas y dos privadas de la Ciudad de México y Toluca, y se obtuvo un alfa de Cronbach de 0.90, lo que confirma una confiabilidad muy alta. Los hallazgos obtenidos durante el segundo piloto ubicaron a los participantes en un nivel "neutro" hacia la investigación, un promedio de 3.53 para las universidades privadas y 3.64 para las homólogas públicas, esto es, por debajo del rango

"medianamente positivo", que requiere al menos cuatro puntos. Tras un análisis de género, se evidenció (con 20 décimas arriba) que las mujeres mostraron mejor actitud hacia la investigación que los varones y 75 % de los promedios más favorables fueron obtenidos por mujeres.

Palabras clave: actitudes, diseño gráfico, escala, investigación, validación.

Abstract

The purpose of the work reported here was to design and validate a scale to measure attitudes towards learning research methodologies and the production of knowledge among graphic design students. For this, an instrument made up of 45 items distributed in six dimensions related to the usefulness of research for the profession, positive and negative assessment of research, among others, was used. To guarantee the reliability of the questionnaire, it was subjected to a validation process based on the judgment of nine experts, the content validity ratio was calculated using the Lawshe (1975) standard, and the overall convenience reached a validity index of 0.85. After a first pilot application, a second one was applied to 130 students and recent graduates of design, from two public and two private institutions in Mexico City and Toluca, and a Cronbach's alpha of 0.90 was obtained, which confirms a very high reliability. The findings obtained during the second pilot placed the participants at a "neutral" level towards research, an average of 3.53 for private universities and 3.64 for public counterparts, that is, below the "moderate positive" range, which requires at least four points. After a gender analysis, it was shown (with 20 tenths above) that women showed a better attitude towards research than men and 75% of the most favorable averages were obtained by women.

Keywords: attitudes, graphic design, scale, research, validation.

Resumo

O objetivo do trabalho aqui relatado foi projetar e validar uma escala para medir atitudes em relação à aprendizagem de metodologias de pesquisa e produção de conhecimento entre estudantes de design gráfico. Para isso, foi utilizado um instrumento composto por 45 itens distribuídos em seis dimensões relacionadas à utilidade da pesquisa para a profissão, avaliação positiva e negativa da pesquisa, entre outras. Para garantir a confiabilidade do questionário, ele foi submetido a um processo de validação baseado no julgamento de nove especialistas, o índice de validade de conteúdo foi calculado pelo padrão de Lawshe (1975) e a conveniência geral atingiu um índice de validade de 0,85. Tras una primera aplicación piloto, se aplicó una segunda a 130 estudiantes y recién egresados de diseño, provenientes de dos instituciones públicas y dos privadas de la Ciudad de México y Toluca, y se obtuvo un alfa de Cronbach de 0.90, lo que confirma una confiabilidad muy alta. Os resultados obtidos durante o segundo piloto colocaram os participantes em um nível "neutro" em relação à pesquisa, uma média de 3,53 para universidades privadas e 3,64 para contrapartes públicas, ou seja, abaixo da faixa "moderada positiva", que exige pelo menos quatro pontos. Após uma análise de gênero, foi mostrado (com 20 décimos acima) que as mulheres mostraram uma melhor atitude em relação à pesquisa do que os homens e 75% das médias mais favoráveis foram obtidas pelas mulheres.

Palavras-chave: atitudes, design gráfico, escala, pesquisa, validação.

Introduction

Whether of a generative or formative nature, the practice of research in universities supposes a substantial activity of academic life that is increasingly mentioned as an indicator of institutional quality. Despite being a profession inclined towards project practice, by being part of the academic communities, the graphic design student faces the need to develop investigative knowledge, skills and attitudes. However, there are a series of disagreements (both at a practical and epistemological level) regarding the relevance or not of inserting this young career in the institutional canons of academic research, whatever the orientation of each university.

Papanastasiou (2005), one of the most cited authors in studies on attitudes towards this practice, has indicated that, in general, undergraduate students tend to view research methodology subjects negatively. Consequently, unfavorable attitudes towards research limit the development of scientific culture in general and in particular "can hinder learning" (Barrios and Delgado, 2020, p. 280), which is usually evidenced in the lack of interest in the subjects. of methodology and in the increasingly generalized tendency, in different latitudes and professional profiles, to evade the thesis and opt for any other degree modality accepted by the regulations of each institution (Obermeier, 2019).

Regularly, the areas of health sciences manage higher rates of acceptance towards research due to the internalization of science promoted by the institutions themselves and their teachers. This is demonstrated, for example, by the study by Rojas, Méndez and Rodríguez (2012), which explores the attitude of students in the clinical, engineering and architecture areas at five universities in Bucaramanga, Colombia. For this, the authors considered the dimensions: institutional context, quality of training and intrinsic motivations of the students. Among the results, they found a better predisposition in the clinical area as opposed to the other careers.

As a consequence of the above, the study of attitudes towards research shows a marked tendency towards exploring this line within the framework of hard sciences and health, leaving aside humanistic disciplines and those related to the arts. In particular, after an exhaustive review of the international literature on the subject, a shortage of approaches that include graphic design programs in their studies was detected and no instrument or scale was found specifically developed for the exploration of investigative attitudes among students of said professional profile.

Despite the fact that designers constantly apply design methodologies such as that of Bruno Munari, whose stages make implicit reference to the scientific method, there are some conditions that hinder the relationship between these professionals and research, namely: a) their recent professional formalization, b) the lack of epistemological agreements between the teachers themselves and c) their unquestionable professional mission of proposing solutions to graphic problems. This leads future designers into an environment of confusion that can lead to negative attitudes towards formal research in the academic space.

For this reason, this question was raised: what are the predominant attitudes among graphic design students towards learning research methodologies and the process of producing

scientific knowledge in their field of study? To respond, we worked with the following general objective: to design and validate a scale to measure attitudes towards learning research methodologies and the production of knowledge among graphic design students.

Initially, the instrument was built with 52 items distributed in six dimensions of interest for students of graphic design careers and equivalents: 1) "Usefulness of research for the profession", 2) "Usefulness of research and scientific knowledge for daily life", 3) "Interest and positive assessment towards research", 4) "Disinterest and negative assessment towards research", 5) "Influence of teachers on students" and 6) "Cognitive competence on methodology and models of graphic design research.

To guarantee reliability, the questionnaire underwent a validation process based on the judgment of nine experts. The content validity ratio was calculated using the Lawshe (1975) standard. Once the formula was applied, seven items were eliminated and 45 were kept. The overall suitability was established according to the Davis (1992) criterion, and it was 0.85, higher than the minimum required 0.80.

Finally, the scale was subjected to two pilot tests. The first included the participation of 25 Design and Visual Communication students from a private university in Mexico City, and yielded a Cronbach's alpha of 0.94. This means that the questionnaire has a very high reliability. 130 graphic design students and recent graduates from four institutions in Mexico City and Toluca, two public and two private, participated in the second pilot. In this exercise, Cronbach's alpha was 0.90, which indicates a very high reliability for the instrument.

During the data processing of the second pilot, it was found that the majority of graphic design students are "neutral" towards research and an upward difference of 11 tenths was detected between public universities (3.64) compared to private ones. (3.53). When computing the data and separating them by gender, it was found that women show a better attitude towards research than men and 75% of the most favorable averages were obtained by women.

Microsoft Office Excel was used to process the information.

University research and graphic design

Research is part of the substantive functions of every university. There is increasing consensus that the quality of higher education institutions is directly related to research activities within the academies (Restrepo, 2017). Hence, it is considered essential to promote

scientific culture and research skills among university students (Fernández, Garófalo and Hinojosa, 2018).

Given the current context of the knowledge economy, in recent years the scientific sphere has acquired great relevance. The connection between science, university and society is perceived as essential, since civilization itself is a direct consequence of the advances and scope of technoscience. Therefore, universities are emerging as hotbeds of useful knowledge that favors social development in a multidimensional manner. According to Cheetham (2007), higher education is based on research and this should be the foundation of the teaching itself.

Additionally, in terms of academic accreditation, scientific research activities are increasingly highlighted as indicators of quality in higher education (Aldana and Joya, 2011; Bullón, 2018; Méndez, 2007; Papanastasiou, 2005; Restrepo, 2017). This further evidences that the teaching and learning of research methodologies should be a priority within the framework of university education.

Likewise, it is considered that research enhances the metacognitive abilities of students (Aldana, Babativa, Caraballo and Rey, 2019). Therefore, beyond subjects specifically related to methodologies, research must be part of the transversal configuration that provides students with a series of skills for solving problems in their immediate reality. (Rizo, 2011).

However, not all careers are related in the same way to the knowledge, skills and attitudes that the academy demands in terms of research. Often the disciplines located in the family of hard sciences have a greater tradition and systematization in the universe of academic research. The social sciences, for their part, have faced a series of controversies that even question their category as sciences because they are substantially different from the natural sciences (Suárez, 2004).

The case of graphic design as a profession is more complex. On the one hand, it is a professional alternative with a few decades to go. Calvera and Tapias (2015) assert that this career "is very young on the map of socially recognized professions" (p. 118). On the other hand, there is no consensus within universities (neither practical nor epistemological) regarding the investigative scope of design.

From a more specific point of view, there is discrepancy on which faculty to locate the academic programs related to graphic design. Furthermore, authors such as Pontis (2009) urge to strengthen graphic design as a complex discipline that is backed by a robust

theoretical corpus; while others like Norberto Chaves (2021) are against referring to design as an academic discipline, since he considers that it is a profession at the service of the graphic needs of certain clients.

This is explained by the fact that graphic design began to appear in the academic spectrum as an independent career relatively recently (in some countries it became a branch of industrial design). Despite the fact that the Design Research Society was founded in 1966, from which countless international conferences have sprung, it was not until 1995 that communities of researchers began to organize in Anglo-Saxon academies who sought to scientifically approach design and Arts (Calvera y Tapias, 2015).

Specifically in Mexico, the first officially recognized degree in Graphic Design was opened in 1968 at the Universidad Iberoamericana. Thus, compared to other professions that have a much broader trajectory in the field of investigative activities, graphic design faces greater obstacles in the learning and practice of research, generative or formative, due to the youth of the programs. academics and another series of variables inherent to the career itself.

It should be noted that for art students in general, and also for graphic designers, there is often little clarity between what is understood as "research for creation" or "research on creation". Ballesteros and Beltrán (2018) state that in the 21st century there is a certain suspicion that hinders the integration between research and artistic-creative creation.

The most widespread proposal to locate the research site in the spectrum of plastic arts and design is that of Christopher Frayling (1993/4), who identified three possibilities:

- Research into art and design. According to Frayling, the simplest and most recurring, covers research with a historical, aesthetic or perception approach and from theoretical perspectives (economics, politics, culture, ethics, etc.).

- Research through art and design. It supposes that type of investigation that explores materials, methods and procedures for creation.

- Research for art and design. Considered by many to be of the lowest scientific hierarchy, it covers the strictly necessary inquiry process during the process to generate a product (or design).

Nowadays, professional diversification has shown that it is possible to conceive research, and therefore scientific training, beyond the hard and traditional sciences. Therefore, the generation of new knowledge has more outlets than just laboratories and

academic spaces (Vessuri, 2008, p. 121). The foregoing applies above all to careers such as graphic design, more closely related to methodologies such as research-creation that, from the perspective of Ballesteros and Beltrán (2015), function as a way to generate new knowledge in the spectrum of creative disciplines.

Graphic design students are left in the middle of all these discussions and face curricular plans that sometimes do not provide the theoretical and practical tools to develop scientific research projects. This scenario could have a negative impact on the configuration of attitudes towards research methodology and the eventual need to carry out academic papers, essays or articles throughout the degree.

Brief approach to attitudes and their measurement

Attitudes are related to the behavior of subjects regarding a specific idea, action or object and suppose a range of predispositions, learned or acquired, that can be modified. For Hernández, Fernández and Baptista (2006), attitudes are an indicator of behavior, and they even describe it as "a seed, which under certain conditions can germinate into behavior" (p. 341).

The concept of attitude has been pointed out from various approaches and perspectives. Strictly speaking, the first formal studies on attitudes derived from psychosocial approaches and date from the sixth decade of the 20th century. According to Echebarría (1991, cited in Méndez, 2007), three central lines of approach can be seen: a) definitions of a social nature, understood as an attitude or an individual reflection absorbed from group evaluations, b) behavioral definitions, which describe attitude as a predisposition to act or react in a certain way to a specific stimulus and c) cognitive definitions, which encompass cognitive patterns that intervene in the interpretation and assessment of an object or situation.

From the classical perspective, attitudes are usually approached through a trinity made up of the following components: 1) the cognitive-perceptive, which encompasses opinions, categories, attributes and concepts, 2) the affective-emotional, which refers to the emotionality that affects the judgments and evaluation, positive or negative/like or dislike, towards a certain object and 3) the conative or predisposition to act, that is, that inclination to behave in a certain way and that can arise as a consequence of the cognitive and affective components (Morales, 2006).

If instrumentalist positions are resorted to, attitudes only have cognitive and affective components and, in this sense, "they would act as utility expectations. The subject would associate some attributes or others to a social object, and would develop a certain attitude towards it based on the usefulness of said attributes towards specific objectives" (Méndez, 2007, p. 26).

However, as indicated by Gairín (1990), education as a topic of discussion carries within itself an implicit load of attitudinal processes, since attitudes are directly related to the effectiveness of the educational process. Attitudes in the educational field suppose those instances that generate a certain predisposition and directionality in particular regarding the contents, processes, experiences, subjects and educational context in general.

These instances are usually studied through scales that measure or value certain dimensions and indicators, which allows the objective observation of the predisposing factors in the face of certain topics or phenomena. For the purposes of this work, the approaches related to the position of graphic design students regarding the act of learning will be highlighted, especially with regard to science and research.

Among the most widespread and recovered studies on attitudes towards research among university students, Elena Papanastasou (2005) stands out. She proposes a scale made up of the dimensions mentioned below: a) usefulness of research in the profession, b) relevance of research in everyday life and c) feelings and affections towards research. It should be noted that these encompass the traditions of classical approach to attitudes such as the instrumentalist.

The Papanastasou scale (2005) has become a benchmark for various attitudinal studies in the university sphere. In this line, the work of Hussain, Qayyum, Akhter, Abid and Sabir (2016) stands out, who adapted the questionnaire for an application with a gender approach in a university in Pakistan, and the research of Alhaidar (2019), who also takes up the mentioned instrument and complements it with demographic dimensions and information on previous research experiences to address undergraduate students of medical sciences at the University of Saudi Arabia.

Among the main attributes evidenced by the measurement of attitudes, direction and intensity stand out (Hernández et al., 2006). The direction can be oriented towards positive or negative perceptions regarding the object of study, while the intensity shows how high or low an attitude is. A good example that explores both the direction and the intensity, in the subject

discussed here, is the Likert-type summative scale to measure the attitude of the university research professor towards the process of social scientific research developed by Blanco and Alvarado (2005), which was designed with five response options that measure attitudes from very positive to very negative (direction) and give a higher score (intensity) to positive options and a lower score to negative ones.

Tabla 1. Atributos para la medición de escalas de actitud hacia la investigación

Dirección de las actitudes				
Muy positiva	Medianamente positiva	Neutra	Medianamente negativa	Muy negativa
Valor asignado (intensidad de las actitudes)				
5	4	3	2	1

Fuente: Elaboración propia con base Blanco y Alvarado (2005)

Design and validation of the scale

This section details the procedure used in the development and validation of a scale to measure the attitudes of graphic design students towards learning research methodologies and the production of new knowledge. For the design of the questionnaire, an interval scale was used aimed at rating attitudes. In accordance with the proposal by Blanco and Alvarado (2005), a higher score was assigned to the positive response options and a lower score to the negative option responses. The above with the purpose of evidencing the sum of the intensity of the attitudes (see table 1). For its part, directionality was defined using a Likert-style balanced response design (with five response options: strongly agree, agree, undecided, disagree, strongly disagree) to highlight positive or negative perceptions regarding the object of study.

Regarding the construction of the items, we worked with six dimensions distributed under the theoretical-methodological logic shown in Table 2.

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Tabla 2. Congruencia teórico metodológica en la construcción de dimensiones

Sustento teórico metodológico	Adaptación para el cuestionario
Utilidad de la investigación para la profesión (Papanastasou, 2005)	Utilidad de la investigación para el diseño gráfico
Utilidad de la investigación para la vida diaria (Papanastasou, 2005)	Utilidad de la investigación y el conocimiento científico para la vida diaria
Emociones-actitudes positivas hacia la investigación (Papanastasou, 2005) Valoración positiva hacia la investigación (Barrios y Delgado, 2020)	Interés y valoración positiva hacia la investigación en estudiantes de diseño gráfico
Emociones-ansiedad (Papanastasou, 2005) Desinterés por la investigación (Aldana *et al*., 2019) Valoración negativa hacia la investigación (Barrios y Delgado, 2020)	Desinterés y valoración negativa hacia la investigación en estudiantes de diseño gráfico
Influencia de profesores Influencia institucional	Influencia de los profesores en los estudiantes de diseño gráfico.
Competencia cognitiva sobre métodos y estadística (Li, 2012)	Competencia cognitiva sobre metodología y modelos de investigación en diseño gráfico

Fuente: Elaboración propia con base en Aldana *et al*. (2019), Barrios y Delgado (2020), Gairín (1990), Li (2012), Maqsood, Huma, Riaz y Sardar (2019), Papanastasou (2005) y Rojas *et al*. (2012)

To be considered scientifically reliable, all research must have certain desirable properties such as reliability and validity (Frías, 2020); demonstrate before applying any

instrument that the items that comprise it have internal consistency, as well as content and criterion validity.

In this sense, the validation processes of collection instruments represent a quality criterion for any research, be it qualitative or quantitative. Therefore, to ensure the reliability and methodological rigor of the information obtained through questionnaires or scales, it is necessary to demonstrate the validity of the construct, the criterion or content (Galicia et al., 2017). And in order to ensure content validity, the initial version of the questionnaire presented here was subjected to a review by experts, through a quantitative opinion, which had the purpose of confirming the agreement between the theoretical foundations, dimensions and items of the instrument.

To comply with the above, Lawshe's methodology was used (1975, cited in Díaz, Durán and López, 2019; Galicia et al., 2017; Pedrosa, Suárez and García, 2014; Urrutia, Barrios, Gutiérrez and Mayorga, 2014), according to which the participation of a group of experts is required to review each item and classify it as either "essential", "useful but not essential" or "not necessary". Based on this methodology, the following criteria were taken to determine whether an item should be kept or eliminated (see Table 3).

Tabla 3. Criterios para evaluar la razón de validez de contenido

Número de expertos	Valor mínimo para conservar el ítem	Número de expertos	Valor mínimo para conservar el ítem
6	0.99	*9*	*0.78*
7	0.99	10	0.62
8	0.85	11	0.59

Fuente: Elaboración propia

The calculation was obtained by applying the following formula to each item (Galicia et al., 2017; Pedrosa et al., 2014), where RVC represents the content validity ratio, ne the number of experts indicating each item as essential and N the total number of evaluating experts.

$$RVC = \frac{ne - N/2}{N/2}$$

Initially, the questionnaire was built with 52 items. Once Lawshe's formula was applied, seven were eliminated, therefore, after calculating the content validity ratio in the opinion of nine experts, 45 items were kept. Tables 4, 5, 6, 7, 8 and 9 report the analysis of each item, as well as the average validity ratio of each dimension.. [1]

Tabla 4. Dimensión uno. Utilidad de la investigación para el diseño gráfico

	Ítem	Esencial		
		Sí	No	RVC
1	La investigación es útil para el desarrollo académico de los diseñadores gráficos	9	0	1.00
2	La investigación científica está relacionada con el diseño gráfico	9	0	1.00
3	La investigación debe ser indispensable para la formación de los diseñadores gráficos	8	1	0.78
4	Como profesional del diseño gráfico me será útil la investigación científica	9	0	1.00
5	La investigación es útil para todos los profesionistas	*6*	*3*	*0.33*
6	La investigación científica debe enseñarse a todos los estudiantes universitarios	9	0	1.00
7	Emplearé enfoques de investigación en el ejercicio profesional del diseño gráfico	9	0	1.00
8	Es importante tener conocimiento especializado en investigación para un mejor desempeño profesional	9	0	1.00
Promedio de RVC de la dimensión				0.88

Fuente: Elaboración propia

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[1] Al no alcanzar los mínimos requeridos, los ítems cuyos valores se observan con énfasis (itálicas) fueron excluidos.

Tabla 5. Dimensión dos. Utilidad de la investigación y el conocimiento científico para la vida diaria

	Ítem	Esencial		
		Sí	No	RVC
1	Utilizo la investigación en mi vida diaria	9	0	1.00
2	El pensamiento orientado a la investigación juega un papel importante en la vida diaria	*7*	*2*	*0.56*
3	Los resultados del conocimiento científico y tecnológico hacen más sencillo mi día a día	9	0	1.00
4	El conocimiento científico se encuentra constantemente en la vida cotidiana	8	1	0.78
5	Comprender el mundo desde el pensamiento científico ayuda a tomar mejores decisiones en la vida diaria	9	0	1.00
6	Es importante compartir el conocimiento científico con las personas que me rodean	*7*	*2*	*0.56*
7	Es pertinente que las sociedades comprendan desde un punto de vista científico el mundo que les rodea	8	1	0.78
	Promedio de RVC de la dimensión			0.81

Fuente: Elaboración propia

Tabla 6. Dimensión tres. Interés y valoración positiva hacia la investigación en estudiantes de diseño gráfico

	Ítem	Esencial		
		Sí	No	RVC
1	Me gusta la investigación	9	0	1.00
2	Disfruto cuando tengo que realizar proyectos de investigación	9	0	1.00
3	Me interesa mucho la investigación	*6*	*3*	*0.33*
4	Me resulta interesante investigar	9	0	1.00
5	Investigar fomenta mi creatividad	9	0	1.00
6	Hacer proyectos de investigación desarrolla la responsabilidad	9	0	1.00
7	Realizar proyectos de investigación fortalece mi pensamiento analítico	9	0	1.00
8	Participar en proyectos de investigación ayuda a mejorar la tolerancia a la frustración	*7*	*2*	*0.56*
Promedio de RVC de la dimensión				0.86

Fuente: Elaboración propia

Tabla 7. Dimensión cuatro. Desinterés y valoración negativa hacia la investigación en estudiantes de diseño gráfico

	Ítem	Esencial		
		Sí	No	RVC
1	Considero que en la universidad no deberían impartir materias de investigación	8	1	0.78
2	Considero que en los programas académicos de diseño gráfico no deberían de enseñar investigación	9	0	1.00
3	Pensar que debo ponerme a investigar me produce desánimo	9	0	1.00
4	Generalmente aplazo las tareas o proyectos relacionados con mis materias de investigación	9	0	1.00
5	Considero que hacer trabajos de investigación es aburrido	8	1	0.78
6	Me parece que hacer investigación no resulta una actividad interesante	9	0	1.00
7	Me parece que hacer investigación es difícil	9	0	1.00
8	Me estresa tener que realizar actividades y proyectos de investigación	9	0	1.00
9	La investigación me causa ansiedad	8	1	0.78
Promedio de RVC de la dimensión				0.84

Fuente: Elaboración propia

Tabla 8. Dimensión cinco. Influencia de los profesores en los estudiantes de diseño gráfico

	Ítem	Esencial		
		Sí	No	RVC
1	Los profesores de mi universidad exponen o comparten en clase sus propios trabajos de investigación sobre el diseño gráfico	8	1	0.78
2	Los profesores de mi universidad que imparten metodología de la investigación dominan el tema	8	1	0.78
3	Los docentes de mi universidad están bien preparados en investigación científica	9	0	1.00
4	Los docentes de mi programa académico me asesoran de manera adecuada durante la realización de investigaciones	9	0	1.00
5	Los profesores de mi programa académico me impulsan a publicar los resultados de mis investigaciones	9	0	1.00
6	Los profesores de mi programa académico me impulsan a presentar en eventos los resultados de mis investigaciones	9	0	1.00
7	La falta de apoyo por parte de mis profesores puede llegar a ser un problema al momento de hacer investigación	*7*	*2*	*0.56*
8	Es suficiente el acompañamiento de mis profesores de metodología al momento de realizar proyectos de investigación	9	0	1.00
Promedio de RVC de la dimensión				0.89

Fuente: Elaboración propia

Tabla 9. Dimensión seis. Competencia cognitiva sobre metodología y modelos de investigación en diseño gráfico

	Ítem	Esencial		
		Sí	No	RVC
1	Puedo aprender con facilidad tópicos relacionados con metodología de la investigación	*7*	*3*	*0.56*
2	Me resulta difícil comprender temas relacionados con ~~la~~ metodología de la investigación	9	0	1.00
3	Se me dificulta comprender el uso de conceptos estadísticos para aplicarlos a mis actividades y tareas de investigación	9	0	1.00
4	Me parecen fáciles de comprender los conceptos de metodología de la investigación	8	1	0.78
5	Considero que la metodología de la investigación es un tema complejo	8	1	0.78
6	Conozco los principales modelos teóricos sobre ~~el~~ diseño gráfico	9	0	1.00
7	Identifico con exactitud la diferencia entre un trabajo proyectual y uno de investigación	9	0	1.00
8	Puedo realizar fácilmente investigaciones proyectuales (para el diseño)	8	1	0.78
9	Puedo realizar fácilmente investigaciones científicas sobre el diseño	9	0	1.00
10	Tengo conocimiento sobre los estudios teóricos del diseño *(design studies)*	9	0	1.00
11	Me siento capaz de generar nuevo conocimiento en el ámbito del diseño gráfico	8	1	0.78
12	Puedo generar nuevas propuestas proyectuales en mi profesión	9	0	1.00
Promedio de RVC de la dimensión				0.84

Fuente: Elaboración propia

Once the validity ratio for each item was computed, the global content validity index (CVI) was estimated for the instrument in general, which was achieved after calculating the average content validity ratio of the items. evaluated. The global suitability of the instrument

was established based on the Davis criterion (1992, cited in Pedrosa et al., 2014), which requests to exceed 0.80; In this case, a global validity index of 0.85 was achieved, where the lowest dimension was dimension two ("Utility of research and scientific knowledge for daily life"), with an average content validity ratio of 0.81. .

Additionally, a measurement instrument is classified as "reliable" to the extent that it is error-free, that is, it has a desirable precision. Reliability can be analyzed from internal consistency, equivalence analysis or measurement stability. The most recurrent technique to measure the internal consistency of an instrument is Cronbach's Alpha reliability coefficient, whose calculation ranges between zero and one, where the minimum acceptable value is 0.7 and the maximum or perfect value is 1 (Frías, 2020; Quero, 2010; Tuapanta et al. 2017).

In order to guarantee the reliability of the questionnaire with which it is sought to measure the attitudes towards research among graphic design students, it was submitted to the validation process by expert judgment and, once the pertinent modifications were generated, a first pilot was applied. to evaluate the internal consistency of the instrument using Cronbach's alpha. Twenty-five students from a private university in Mexico City participated voluntarily in this first test. To calculate Cronbach's alpha, through the variance of the items, the following formula was used:

$$a = \frac{k}{k-1}[1 - \frac{\Sigma Vi}{Vt}]$$

In said formula: a = Cronbach's Alpha, K = Number of items, Vi = Variance of each item and Vt = Total variance of the instrument. As a criterion to interpret the reliability coefficient of internal consistency, the proposal of Ruiz (2002, in Santos Sánchez, 2017) was taken up under the criteria listed in table 10.

Tabla 10. Rangos de confiabilidad

Rangos	Número de ítems
0.81 a 1.00	Confiabilidad muy alta
0.61 a 0.80	Confiabilidad Alta
0.41 a 0.60	Confiabilidad Moderada
0.21 a 0.40	Confiabilidad Baja
0.01 a 0.20	Confiabilidad Muy Baja

Fuente: Elaboración propia con base en Ruiz (2002, en Santos Sánchez, 2017)

After applying the formula to the pilot questionnaire (for which Microsoft Office Excel was used) and subsequent analysis of the responses provided by the 25 participants for each of the 45 items, a Cronbach's alpha of 0.94 was obtained. This means that the questionnaire has a very high reliability. Subsequently, a second pilot was carried out with a sample of 130 graphic design students and recent graduates from two public and two private universities. According to the analysis of the application of the second pilot, a Cronbach's alpha of 0.90 was obtained. This value confirms that the questionnaire has a very high reliability (see reference in table 10).

The average attitude towards research obtained in pilot 1 was 3.72, which places it, according to the criterion of Blanco and Alvarado (2005), in a "neutral" directionality, since to reach the "moderately positive" range, requires obtaining a score of four (see table 1). Subsequently, when calculating the average of the attitude towards research in the second pilot application, a value of 3.59 was obtained. Therefore, according again to Blanco and Alvarado (2005), directionality is also "neutral". Despite the fact that the second sample was 0.13 below the first pilot, it is considered that there is consistency in the attitude averages obtained among graphic design students in general: they are positioned in a "neutral" range.

After data analysis, subjects from public universities obtained an average of 3.64 (direction of "neutral" attitude), that is, 36 tenths below the "moderately positive" range (see Table 1 for reference). On the other hand, they were placed 11 tenths above the subjects belonging to the two private institutions of CDMX (which reached 3.53 on average).

Of the 130 participants in the second pilot, none reached levels of "very negative" attitude towards research. Of course: 10% were in the "medium negative" ranges, 73% were "neutral", 17% were in the "medium positive" category. with scores ranging between 4.00

and 4.71, and only 0.76% demonstrated a "very positíve" attitude (see Table 1 once again for reference).

Additionally, 26.66% of the people identified with a better attitude towards research ("moderately positive") came from private universities. The rest of said fragment of the sample (73.34%) came from public universities (20% from CDMX and 53.34% from the University of Toluca).

Regarding the dimensions in which the instrument was organized, the results obtained are shown in Table 11.

**Tabla 11.** Promedio y dirección de actitudes hacia la investigación por dimensiones

Dimensiones	Valor máximo	Valor obtenido	Promedio obtenido	Dirección de la actitud
D-1 Utilidad de la investigación para el diseño gráfico	4.550	3,802	4,17	Medianamente positiva
D-2 Utilidad de la investigación y el conocimiento científico para la vida diaria	3.250	2,531	3,89	Neutra
D-3 Interés y valoración positiva hacia la investigación en estudiantes de diseño gráfico	3.900	3.105	4.00	Medianamente positiva
D-4 Desinterés y valoración negativa hacia la investigación en estudiantes de diseño gráfico	5.850	3.432	2.93	Medianamente negativa
D-5 Influencia de los profesores en los estudiantes de diseño gráfico	4.550	3.203	3.51	Neutra
D-6 Competencia cognitiva sobre metodología y modelos de investigación en diseño gráfico	7.150	4.952	3.46	Neutra
Total del instrumento	29.250	21.025	3.66	Neutra

Fuente: Elaboración propia

The left column indicates each of the dimensions in which the 46 items were grouped (D-1, seven items; D-2, five items; D-3, six items; D-4, nine items; D-5 , seven items; D-6, 11 items). The maximum value was calculated from five (maximum possible score for each item) according to the sample of 130 people. The final value was obtained with the sum of points actually awarded to each answer. The average indicates the intensity of the attitudes (minimum one, maximum five). The direction of the attitude (very positive, moderately positive, neutral, moderately negative and very negative) was defined according to the criterion of Blanco and Alvarado (2005).

On the other hand, from the global analysis, a slight fluctuation was detected in the attitude towards research according to school years.

Figura 1. Actitud hacia la investigación por año escolar
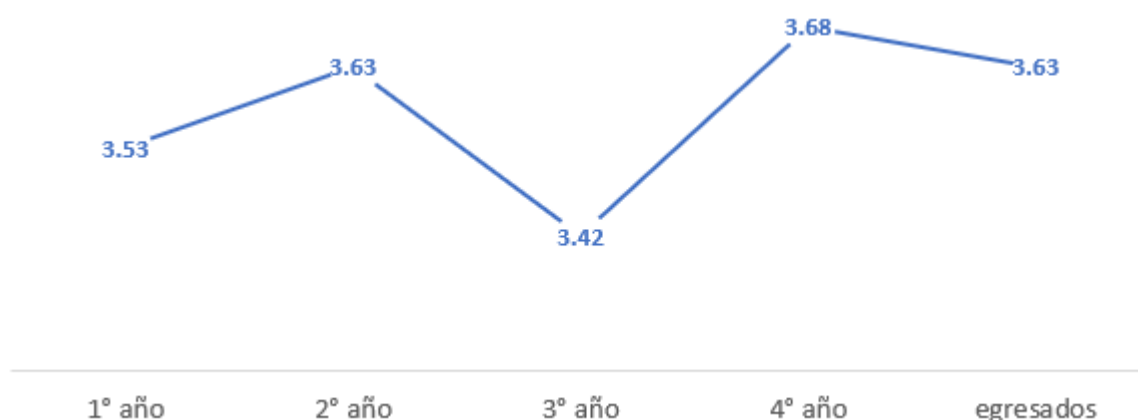
Fuente: Elaboración propia

As can be seen in the previous graph, the most favorable average was observed among the interviewees in the fourth year of the degree and the lowest in the third year. A certain continuity stands out in all the categories, since no average lower or higher than three was found, which confirms the trend of graphic designers towards a "neutral" attitude regarding research methodologies and the production of new knowledge.

Finally, the collected data were differentiated by gender (computing responses from men and women separately) and the following was obtained: the total average of the female fraction of the sample was 3.66 and the male 3.46 (20 tenths below), which places both groups in a "neutral" directionality towards research methodologies and the production of new knowledge. Of the 17% of the global sample that achieved "medium positive" scores

(4.0 and above), 75% were female. The person with the highest average (5.0) was a first-year graphic design student from a public university in Toluca.

Discussion

The attitude of university students towards research supposes a favorable predisposition or not with respect to participation in scientific activities. Studies around the subject tend to focus mostly on careers in the area of health and hard sciences and leave aside humanistic profiles, especially in disciplines prone to art.

One of the main studies regarding attitudes towards research among social science students, which has served as the basis for several subsequent works, including part of the instrument proposed in this article, is that of Papanastasou (2005). The author validated her scale with students from the University of Cyprus who were studying programs focused on education and showed that, despite favorably valuing the usefulness of research for the profession and daily life, the sample manifested anxiety factors and difficulties in carry out research on their own.

The application of the attitude scale reported here is consistent with the work of Papanastasou (2005), since in its first dimension it explores, through seven items, the usefulness of research for the graphic designer profession. The best scores were obtained in this dimension: an average of 4.17 ("moderately positive" attitude). However, despite this "favorable" evaluation, there were also difficulties in carrying out the work.

Likewise, Hussain et al. (2016) recovered the Papanastasou (2005) instrument, gave it a gender approach and measured the attitude towards research among 140 students of the Master's degree in Educational Technology at the University of Punjab, in Pakistan. In general, they found good attitude and insignificant differences between men and women. After data segmentation, in the exercise reported here, only a difference of 20 tenths was found in the general average of men and women. However, it stands out that 75% of the highest averages corresponded to women.

On the other hand, it should be mentioned that in Mexico the highest quality and quantity of research carried out within the academy is carried out in public institutions and is left behind by the majority of private universities (Rivas, 2004). Based on this data, it could be expected that the interviewees from public universities (one from Mexico City and the other from

Toluca) would be located in a "very positive" or at least "moderately positive" attitudinal direction. However, the measurements presented here show a "neutral" attitude both among students from public universities (3.64) and among those from private schools (3.53), with a difference of only 11 tenths.

Conclusions

After the analysis reported in this document, it is concluded that factors such as the recent professional formalization of careers in graphic design, the lack of epistemological consensus among the teachers themselves and the professional mission of proposing solutions for practical problems of a graphic nature could, indeed, lead designers into an environment of confusion regarding formal research in the academic space. Universities that teach graphic design careers are recommended to strengthen the socio-academic-research environment in which future designers are immersed.

It has become clear that among the main attributes used during the measurement of attitudes, direction and intensity stand out (Hernández et al., 2001), which were explored in this study. The following results obtained during the second pilot stand out: no tendency towards "very negative" attitudes was detected, 9.2% of the population reported averages tending towards a "moderately negative" directionality, with intensities from 2.0 to 2.8, 20% of the total sample showed "moderately positive" evaluations and 0.76% of the sample was located in a "very positive" attitude.

With the results presented here, it is possible to confirm the fulfillment of the objective that gave rise to this article: to design and validate a scale to measure attitudes towards learning research methodologies and the production of knowledge among graphic design students. For this purpose, the following actions were carried out: questionnaire design, assurance of construct validity, calculation of the global suitability of the instrument and calculation of Cronbach's alpha through two pilots, in order to confirm its reliability.

The application of the second pilot among a sample of 130 graphic design students and recent graduates allowed us to answer the research question: what are the prevailing attitudes among graphic design students when learning research methodologies and the production process? of scientific knowledge in your field of study?

Finally, it was confirmed that the prevailing attitudes maintain a "neutral" directionality with an intensity that exceeds 3.5 on average.

One cannot speak of a really unfavorable predisposition towards research among the designers who participated in the exercise, since "very negative" directionality or an excessively pronounced inclination towards the "medium negative" category was not found.

Future lines of research

The literature review that supported the proposed scale presented here showed that there is insufficient studies that explore investigative attitudes (particularly) in the humanities and arts. Due to the above, it is considered relevant to give continuity to this proposal and generate differentiated scales for the different fields of knowledge.

Finally, this scale could be recovered for further studies that require exploring among graphic designers themes related to attitudes towards learning research methodologies, as well as the favorable predisposition or not towards the production of works of a scientific nature. The design organized through dimensions allows the application of the scale by segments, for which it is recommended to ensure its validity by calculating some coefficient such as Cronbach's alpha.

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