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Examining the level of perceived achievement of complex thinking competency in health sciences students and its relevance to the graduate profile

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ABSTRACT

This article presents the findings of a study conducted on health sciences students in their last semester of training regarding their perceived achievement of the complex thinking competency and its sub-competencies. The objective was to gain insight into how these students perceive the cognitive competencies and skills acquired during their university career as relevant to meet the challenges of their future professions. This study contrasts the perception of achievement of complex thinking competence by gender of the participants, as well as compared to students from other disciplines, with the intention of identifying significant differences. This competency's selection lies in its relevance to decision-making when facing problems, which is fundamental for any contemporary professional. This study relied on a representative convenience sample of graduating candidates from a university in western Mexico. Methodologically, the researchers used descriptive analyses and a validated instrument. The results indicated that the sample students' perceived achievement was very high and balanced, i.e., no significant differences existed by gender or the perception of their sub-competencies. This study revealed a significant difference compared to other disciplinary areas; the medical and health sciences graduate candidates' perceived achievement of competency development was higher.

Introduction

There is no doubt that good decision-making has become increasingly relevant for contemporary professionals, especially to face challenges working in an uncertain and constantly changing world (Alkhatib, 2019). Their decisions impact not only their professional development but also the interests of their clients, especially in disciplines such as health sciences, where the lives and well-being of patients are at stake. Thus, the acquisition and development of decision-making and problem-solving skills are necessary and suitable competencies to foster in all university students (Stein et al., 2022).

In this sense, complex thinking is a macro-competency that includes several relevant cognitive elements when facing problems or making decisions: systemic thinking, critical thinking, scientific thinking, and innovative thinking. These sub-competencies enable professionals to address the challenges of their work realities integrative with better intellectual tools (Pineo, Zimmermann, & Davies, 2020). Therefore, educational institutions increasingly pay more attention to their students acquiring and developing complex thinking, considering it a valuable professional tool regardless of their study disciplines (Vázquez-Parra, Alfaro-Ponce, Guerrero-Escamilla, & Morales-Maure, 2023). See Table 1.

Specifically, for the health sciences, complex thinking is directly linked to the complicated, multifaceted nature of human health, which requires professionals in this discipline to develop a vision that considers the various elements of a biological system so that they can make decisions and diagnoses from a deep, interrelated, and comprehensive understanding of all these implicit factors (Bachrach, Robert, & Thomas, 2019). Complex thinking allows healthcare professionals to understand the interconnectedness among variables and factors that influence a health problem, considering the breadth of what is involved in the well-being of individuals and the psychological, social, and economic

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Table 1
Sub-competencies of complex thinking.

Critical thinking	Distinguishes between evidence and opinions, considering interdisciplinary perspectives to facilitate decision-making in real contexts (Bandyopadhyay & Szostek, 2019). This sub-competency involves the ability to question assumptions, identify biases, and evaluate the consistency and coherence of arguments, considering multiple perspectives before deciding to solve a problem (Hapsari, 2016; Cui et al., 2021).
Systemic thinking	This theoretical-practical competence is related to the interaction that individuals have with their environment which allows them to perceive themselves as part of a system of dynamically interacting elements (Khammarnia et al., 2017). This sub-competency implies that problems are not isolated; they require analyzing the connections and interactions that integrate and synthesize all their possible elements (Hiver, Al-Hoorie, & Larsen-Freeman, 2021).
Scientific thinking	Is the ability to analyze and evaluate information objectively to reach conclusions based on evidence, in addition to recognizing and assessing the validity and reliability of data. Clear and accurate communication of information is also an essential part of this sub-competency, as it is helpful for decision-making, critical evaluation, and complex problem-solving (Koerber et al., 2015; Suryansyah, Kastolani, & Somantri, 2021; Koerber & Osterhaus, 2019).
Creative/Innovative thinking	Focuses on creative processes and finding successful, feasible, and objective solutions through the unconventional association of ideas and exploration of multiple solution possibilities. This type of thinking uses divergent cognitive processes and combines seemingly unrelated elements to produce creative and effective solutions (Zhou, 2021; Saienko, Olizko, & Cunha, 2021).

factors that may affect patients' abilities to manage their condition. By addressing medical challenges holistically, health professionals can provide better health care and improve patient outcomes (Huaca, Gomez, Castillo, Gordillo, & Espinel, 2020).

Based on the above, this article presents the results of a study focused on measuring the perceived achievement of complex thinking competency and its sub-competencies in a sample group of students who are candidates to graduate from health sciences programs at a university in western Mexico. The intention of this study is to identify not only the level of development perceived by the participants, but also whether there are statistically significant differences by gender or in contrast to students from other disciplines. This article lays the foundation for future studies on the relevance of complex thinking competency for health studies as a transversal skill that transcends the technical and disciplinary knowledge of professional careers.

Theoretical framework

Complex decision-making in the health sciences

Health sciences are the disciplines associated with studying the human body, health, and disease, including medicine, pharmacology, psychology, epidemiology, biology, and physiology (Abdull, Akim, & Jaafar, 2022). Scholars in these areas seek to understand how the human body functions in a healthy state, how diseases develop and are treated, and their impact on the body at different stages of life. Health sciences not only consider the health-disease balance of individuals but also consider aspects such as nutrition, emotional health, lifestyle, environment, and genetic factors (Kenate, Workie, & Damtew, 2023).

At a formative level, professionals in this discipline must recognize that their work, although based mainly on scientific evidence and clinical experience, also relies on their professional judgment, which implies that, in addition to having up-to-date knowledge of their specialty, they must have integrative information management skills to make informed, reliable, effective, and objective decisions (Oubdier, Spaai, & Timmermans, 2022). The decision-making process is of great importance in the health sciences because it can directly impact the health and well-being of patients (Marewski & Gigerenzer, 2022). In addition, although it is not always the case, many decisions made by health professionals become critical, implying that they must consider multiple elements, with information that is not always accurate, to act in a minimal time. Therefore, having appropriate cognitive skills is of utmost relevance for the training of these professionals (Elsayed et al., 2022).

In this sense, it is increasingly common for educational institutions, in addition to the theoretical disciplinary training of health sciences students, to consider the importance of students acquiring and developing competencies that, beyond their specific professions, provide them with skills that help them in processes such as communication, dealing with people and, of course, decision-making (Caron et al., 2023). Competencies such as ethical and citizenship training, social intelligence, and complex thinking allow them to consider information, factors, or elements of the environment not always valued in a medical history, allowing them to obtain information that can be determinant when deciding (Horn, Scheffelaar, Urias, & Zweekhorst, 2022).

Specifically, complex thinking allows health professionals to develop an integrative vision of their patients' realities, improving the objectivity of their decisions and reducing the natural uncertainty that derives from human interactions (Ma & Zhou, 2022). Thus, complex thinking and its sub-competencies are valuable skills every health professional should consider.

Complex thinking and its sub-competencies

Competency-based education is a pedagogical approach that focuses on developing specific skills, knowledge, and attitudes relevant to a particular task or function. In contrast to traditional education, which focuses primarily on acquiring knowledge, competency-based education emphasizes the practical application of acquired knowledge to solve real-world problems. Therefore, competencies are not always limited to a particular discipline but also include social, communication, negotiation, and other cognitive skills necessary for professionals in their fields (Becker et al., 2021; Woodcock et al., 2021; Micabalo et al., 2021). For universities, it is crucial to identify and evaluate the competencies that their students acquire during their training, as this provides them with greater certainty about the skills developed, which is a significant indicator of the quality of their academic programs (Cruz-Sandoval, Vázquez-Parra, Carlos-Arroyo, & Amézquita-Zamora, 2023).

Specifically, the competency of complex thinking refers to a set of cognitive skills that enable integrative and creative thinking to address problems in the environment holistically and based on evidence (Vázquez-Parra, Castillo-Martínez, Ramírez-Montoya, & Millán, 2022). This competency involves seeing the parts of a problem as a whole, understanding how the elements interact, and paying attention to the whole and not just the individual components (Tobón & Luna, 2021). Given its broad cognitive scope, complex thinking is considered a macro-competency that includes several sub-competencies, such as critical thinking, systems thinking, scientific thinking, and innovative or creative thinking (Castillo-Martínez, Ramírez-Montoya, & Torres-Delgado, 2022).

Although in all disciplines it is possible to find challenges associated with complex problems, the health sciences bring a pressing need because the integrated management of information can impact the health and well-being of people (Vázquez-Parra, Alfaro-Ponce, Guerrero-Escamilla, & Morales-Maure, 2023). Considering this, persons with highly developed complex thinking possess cognitive skills that allow them to understand their environment, recognizing the complexity that exists in the natural, economic, cultural, and social systems and phenomena in which they find themselves (Ramírez-Montoya, Castillo-Martínez, Sanabria, & Miranda, 2022).

Health professionals must make complex decisions in environments that are not always certain, so they must make the best choices when making a diagnosis, deciding on a treatment, or managing a medical condition. Thus, good complex thinking can be a determining element for graduating students (Drake, Cimpean, & Torrey, 2009).

Method

Participants and procedure

The objective of this article is to report the results of a study focused on the measurement of the perception of achievement of the complex thinking competency and its subcompetencies in a sample group of students who are candidates to graduate from professions associated with the health sciences at a university in western Mexico. The intention is not only to identify the level of development perceived by the participants, but also whether there are statistically significant differences by gender or in contrast with students from other disciplines.

In this sense, a random convenience sample of 832 students from the last semester of a technological university in western Mexico was taken. These students comprise the six disciplines offered as part of this institution: Humanities and Education, Social Sciences, Health Sciences, Art and Design, Business and Engineering. Table 2 shows more information about the characteristics of the sample.

The data were collected during a specific week, April 20-24, 2023, during an orientation course for graduation candidates, organized by the Center for Professional Life and Development of the Campus. The evaluation was conducted through a self-administered questionnaire digitized on the Google Forms platform, to which students responded voluntarily. All participants gave their authorization for their data and responses to be used for academic and research purposes.

Given that this exploratory study involves human beings, its implementation was supervised and approved by the Interdisciplinary Research Group R4C, and had the technical support of the Writing Lab of the Institute for the Future of Education of the Tecnológico de Monterrey.

Instrument and data analysis

In this study, we applied the validated e-Complexity instrument to measure the participants' perceived mastery of the complex thinking competency and its sub-competencies. This instrument has undergone a three-stage validation process: theoretical validation, content validation with experts, and validation by means of a structural equation model. The theoretical validation was based on the analysis of other instruments that measure complex reasoning competence and its sub-competencies, revealing the lack of an integrative instrument. The design of E-Complexity was based on the conceptualization of complex reasoning competence and its subcompetencies (Castillo-Martínez et al., 2022). As for content validation with experts, three criteria were used: clarity, coherence and relevance (Escobar-Pérez and Cuervo-Martínez, 2008). Experts were asked to rate the items according to these criteria. The results showed high scores on all three criteria, with scores above 60 %, indicating a high level of validity (3-4). Finally, a validation was performed by means of Partial Least Squares Structural Equation Modeling (PLS-SEM), which allowed confirming that the instrument is statistically valid and reliable, both for its educational contribution, and in terms of its ability to measure the perception of achievement of the Complex Thinking competency and the relationships between its subcompetencies, showing a greater impact by Systemic and Scientific Thinking (Vázquez-Parra et al. 2023).

Table 2
Sample characteristics.

Discipline	Men	Women	Total
Humanities and education	10	21	31
Social sciences	6	19	25
Health sciences	17	38	55
Art and design	34	64	98
Business	107	125	232
Engineering	281	110	391
Total	**455**	**377**	**832**

The instrument comprised 25 items divided into four subcompetencies: systemic, scientific, critical, and innovative thinking (Table 3). Each item on the questionnaire was rated by the students on a five-choice Likert scale, where 1 means "Strongly Disagree," 2 means "Disagree," 3 means "Neither Agree nor Disagree," 4 means "Agree," and 5 means "Strongly Agree."

Concerning data processing, we used SPSS Version 21 (Statistical Package for the Social Sciences) computer software for a multivariate descriptive statistical analysis.

The results section will first present the results of the scores obtained in the e-Complexity test, which reflect the perception of achievement of the complex thinking competency and its subcompetencies of university students belonging to the discipline of Medicine and Health Sciences, differentiating them by gender. Subsequently, comparisons will be presented between the data obtained in the sample of the present study and the e-Complexity scores obtained in groups of students belonging to other professional disciplines, also considering the gender of the participants.

Results

As a first result, Table 4 shows the means resulting from the application of E-Complexity to the group of health sciences students, differentiating the means according to gender and considering the means of the general competency and its subcompetencies.

The mean obtained for complex thinking in the e-Complexity test for the total group of health sciences students was 4.49 (SD = .389). Among the sub-competencies, critical thinking had the highest mean (4.56

Table 3
Items from the e-Complexity instrument.

Items
1. I have the ability to find associations between variables, conditions, and constraints in a project, challenge, or problem I face.
2. I identify data from my field and other areas that contribute to solving problems.
3. I participate in projects that need to be addressed using inter/multidisciplinary perspectives.
4. I organize information to solve problems.
5. I enjoy learning different perspectives of a problem.
6. I lean towards strategies to understand the parts and the whole of a problem.
7. I have the ability to identify the essential components of a problem to formulate a research question or hypothesis for its solution.
8. I am familiar with the structure and formats for creating research reports used in my field or discipline.
9. I identify the structure of a research text used in my field or discipline.
10. I identify the elements to formulate a research question or hypothesis.
11. I design clear and coherent methodologies or processes to solve issues in my profession.
12. I formulate and test hypotheses when facing a problem or challenge.
13. I tend to use scientific data to analyze problems.
14. I have the ability to critically analyze problems from different perspectives.
15. I identify the foundation of my own and others' judgments to recognize false arguments.
16. I self-assess the level of progress and achievement of my goals to make necessary adjustments.
17. I use reasoning based on scientific or theoretical knowledge to make judgments in the face of a problem.
18. I make sure to review the critical guidelines of the projects I participate in.
19. I appreciate critiques in the development of projects to improve them.
20. I am familiar with the criteria for determining a problem.
21. I have the ability to identify variables from various disciplines that can help answer questions.
22. I apply innovative solutions to various issues.
23. I solve problems by interpreting data from different disciplines.
24. I analyze problems considering the context to create solutions.
25. I tend to evaluate solutions derived from a problem with a critical and innovative perspective.

Table 4
Medicine and health Sciences' e-Complexity scores by gender.

Gender		Total	Critical	Systemic	Innovative	Scientific
Female	Mean	4.51	4.56	4.51	4.51	4.48
	Std. Deviation	*.390*	*.407*	*.423*	*.433*	*.498*
Male	Mean	4.45	4.55	4.42	4.51	4.33
	Std. Deviation	*.396*	*.316*	*.506*	*.416*	*.622*
Total Sample	Mean	4.49	4.56	4.48	4.51	4.43
	Std. Deviation	*.389*	*.378*	*.447*	*.424*	*.538*

points, SD = .378); scientific thinking scored the lowest (mean 4.43 points, SD = .538). By gender, females had higher means than males in the overall competency (4.51 vs. 4.45, respectively). This trend was similar in the complex thinking sub-competencies; women's means were higher than men's, except for innovative thinking, where the mean was the same for both genders. Table 4 shows the averages and standard deviations for complex thinking (total score) and its sub-competencies of systemic, scientific, critical, and innovative thinking, differentiated by men and women. Likewise, Fig. 1 graphically displays the sample's e-Complexity data by gender for complex thinking.

Fig. 2 graphically the values of the sub-competencies of critical, systemic, innovative, and scientific thinking, differentiated by gender of the group of health sciences students. Note that scientific thinking had the lowest values in both genders with much variability; critical thinking had the highest scores, also in both genders. Another notable difference concerns systems thinking, where women performed better than men. The graph shows that the performance of innovative thinking was the same in both genders.

To determine whether the gender differences were statistically significant in the results of the group of health sciences students, we performed an independent samples Student's t-test by gender for the total score (complex thinking) and the four sub-competencies. Table 5 indicates no statistically significant difference between genders.

Now, seeking to address the second part of the objective of this study, which is to demonstrate possible differences between the perception of competence and its subcompetencies between the health sciences group and groups of students from other disciplines Table 6 differentiates the e-Complexity by the professional disciplines of different groups: Humanities and Education; Social Sciences and Government; Medicine and Health Sciences; Architecture, Arts and Design; Engineering and Science; and Business. Regarding the total score (complex thinking), Medicine and Health Sciences had the highest mean (4.49) (SD = .38); on the other hand, Architecture, Arts, and Design attained the lowest mean (4.22, SD = .51).

Regarding gender differences, women had higher means in four of the six disciplines analyzed: Humanities and Education, Medicine and Health Sciences, Architecture, Arts and Design, and Business. However, in Social Sciences and Government, and Engineering and Science, men scored higher means. Considering all disciplines, women in the Medicine program had the highest mean (4.51, SD = .39), and men in Humanities and Education attained the lowest (4.15, SD = .46). On the other hand, the lowest score for all disciplines corresponded to scientific thinking, except for the profession of Medicine and Health Sciences, which had the lowest mean in innovative thinking.

Table 6 also displays a statistical comparison between men and women of the total scores obtained in the e-Complexity instrument for each professional discipline using the Mann-Whitney U test. This table shows that statistically significant differences ($p < .05$) by gender only appeared in the Business discipline, where women presented higher values than men.

To close this section, Fig. 3 shows a box plot with the total scores obtained by men and women from the different disciplines (Humanities and Education, Social Sciences and Government, Medicine and Health Sciences, Architecture, Arts and Design, Engineering and Science, and Business). The graph shows that men and women in Medicine obtained the highest values. Although these differences were not statistically

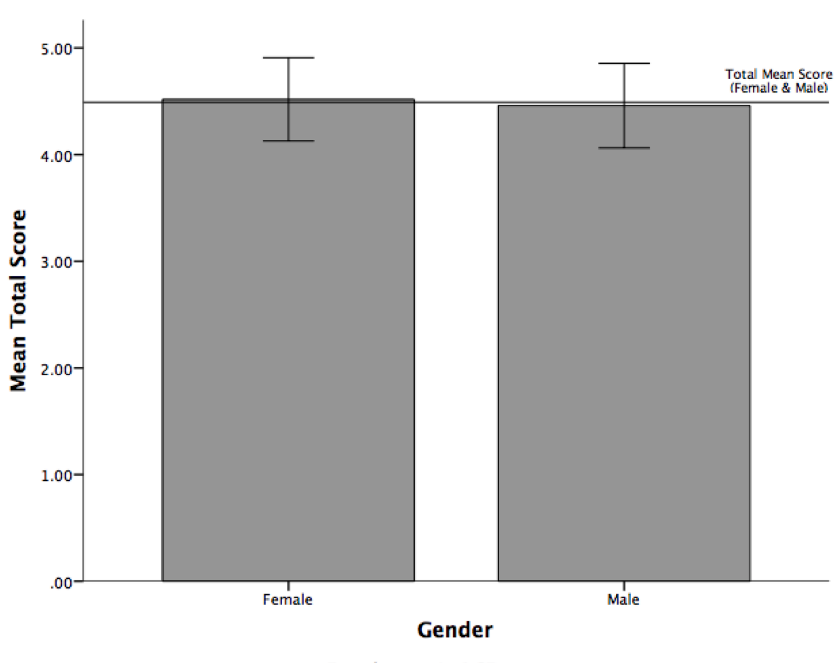

Fig. 1. Total Score (mean) obtained by male and female in the e-Complexity test. The solid line represents the sample's total mean score.

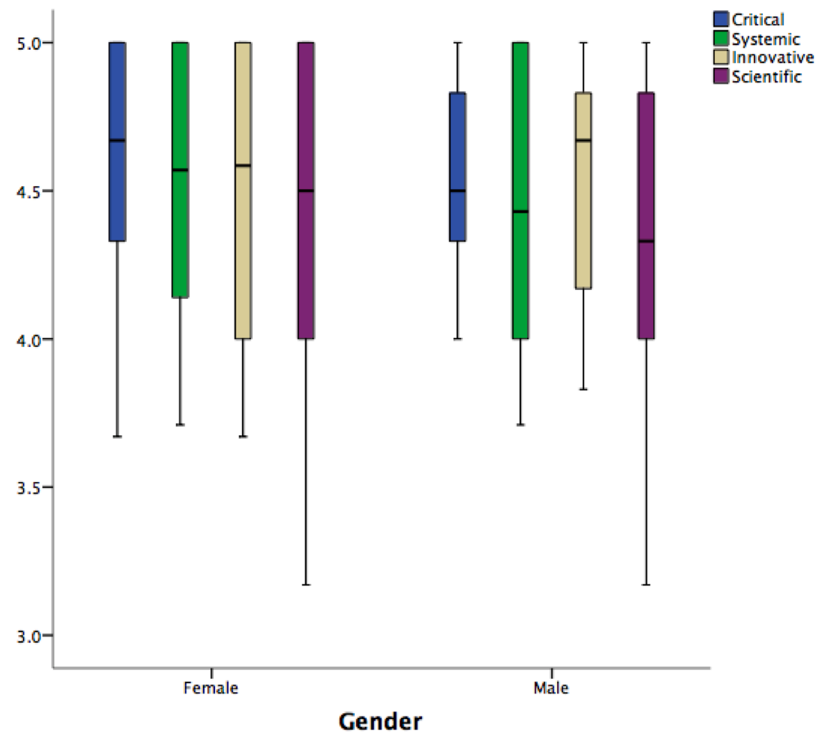

Fig. 2. Box plot of sub-competencies scores by gender.

Table 5
Results of Student's t-Test by gender.

	T	df	Sig
Total	.516	53	.608
Critical	.025	53	.980
Systemic	.655	53	.516
Innovative	−.047	53	.962
Scientific	.953	53	.345

significant, we highlight that students of Medicine and Health Sciences had notably higher perceived achievement of the complex thinking competency than students in the other disciplines. Fig. 3 marks the range of scores in the study sample with an oval; no other discipline attains it.

Discussion of results

These results indicate some trends or findings. First, the students in Medicine and Health Sciences attained notably high scores. Neither the overall competency average (complex thinking) nor the sub-competency means were lower than 4.40, showing very positive perceived achievement by candidates graduating in this discipline.

These results are in line with other studies previously conducted in populations of students from different disciplines, where participants from the health sciences are usually those with the best results (Vázquez-Parra, Amézquita-Zamora, & Ramírez-Montoya, 2021). The difference between this study and previous studies is that the population of this sample is exclusively graduate candidates, which provides a very particular and valuable characteristic.

On the other hand, it is possible to point out a differentiation based on gender, however, and as can be seen in the results, the difference is not significant, so it could be concluded that there are not enough elements to say that the perception differs between men and women. It should be noted that, unlike these studies, disciplinary competencies are not being evaluated here, which could be a point that should be taken into account. At the level of subcompetencies, although higher averages were found in critical thinking and lower in scientific thinking, these differences were also not significant, so it can be concluded that there is a balanced perception both in the competency and in its sub-competencies. All of the above is corroborated by the T-test performed, which did not show any statistically significant difference.

These results are contrary to previous studies in which more significant differences are stated for reasons of gender in terms of training in health areas (Research Work, 2020; Gomez, Gasso, Bisbe, &

Table 6
Participants' means and standard deviations in the e-Complexity test, differentiated by discipline.

		Total	Female	Male	Gender comparisons (Mann Whitney U test)	
		Mean *Std. Dev.*	Mean *Std. Dev.*	Mean *Std. Dev.*	Z	Sig.
1	**Humanities & Education** (n = 31) (Female = 21; Male = 10)	4.35 *0.44*	4.44 *0.4*	4.15 *0.46*	-1.69	0.09
2	**Social Sciences & Government** (n = 25) (Female = 19; Male = 6)	4.29 *0.39*	4.28 *0.4*	4.33 *0.39*	-0.096	0.92
3	**Medicine & Health Sciences** (n = 55) (Female = 38; Male = 17)	4.49 *0.38*	4.51 *0.39*	4.45 *0.39*	-0.42	0.67
4	**Architecture, Arts & Design** (n = 98) (Female = 64; Male = 34)	4.22 *0.51*	4.25 *0.51*	4.16 *0.52*	-0.773	0.43
5	**Engineering & Sciences** (n = 391) (Female = 110; Male = 281)	4.29 *0.44*	4.24 *0.41*	4.31 *0.45*	-1.41	0.15
6	**Business** (n = 232) (Female = 125; Male = 107)	4.30 *0.50*	4.38 *0.45*	4.21 *0.53*	-2.25	0.02 *

* $p < .05$

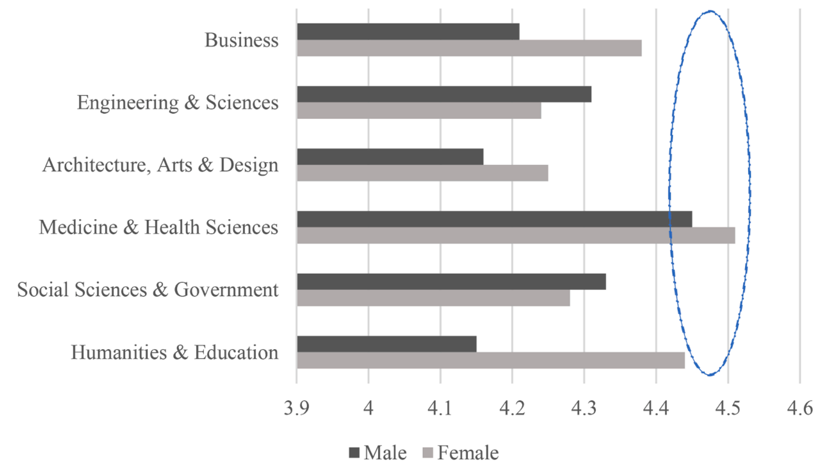

Fig. 3. e-Complexity total scores by gender in different disciplines, highlighting results from the Medicine & Health Sciences group.

Virumbrales, 2023). This is also contrary to results in other disciplines, such as the one by Cruz-Sandoval M. Vázquez-Parra, Carlos-Arroyo, & Del Angel-González (2023), in engineering students, where it is possible to identify a significant difference based on gender.

As a second part of the objective of this study, we performed a comparative analysis with other disciplines, where Medicine and Health Sciences yielded notably better results than other disciplines. Although Humanities and Education and Business also demonstrated relevant results, the difference from Health Sciences was considerable. Note also that some disciplines, such as Humanities and Education, are clearly differentiated by gender, which did not appear in Health Sciences. These results align with other studies previously conducted in other similar populations, where students in Medicine and Health Sciences had the highest perceived competency achievement compared to students in other disciplines (Cruz-Sandoval, Vázquez-Parra, & Alonso-Galicia, 2022; Cruz-Sandoval M., Vázquez-Parra, & Alonso-Galicia, 2022; Cruz-Sandoval M., Vázquez-Parra, & Alonso-Galicia, 2022; Cruz-Sandoval M., Vázquez-Parra, & Alonso-Galicia, 2022; Vázquez-Parra, Carlos-Arroyo, & Amézquita-Zamora, 2023).

Considering these results, it is possible to point out the following 3 findings:

1. It is not possible to identify statistically significant differences in the perception of achievement of the complex thinking competency and its subcompetencies in health sciences students by gender.
2. It is not possible to identify statistically significant differences in the perception of achievement of the complex thinking competency between health sciences students and students from other disciplines.
3. Although the differences do not turn out to be statistically significant, it is possible to identify differences in the averages of the different areas, with health sciences students yielding the highest averages, both male and female.

Theoretical and practical implications

These results are theoretically valuable because they contribute to the study of the development of professional competencies and skills as part of university training processes. It is also relevant to point out that this type of study pays attention to the importance of measuring the perception of achievement as a complementary element to the measurement of competencies in themselves. It is considered that, if an individual is competent, but does not perceive himself as such, this can be a limiting factor, since even if he has the competence, perceiving himself as competent is fundamental, especially for the adequate use of these skills.

At a practical level, this study allows us to identify a strength within the health sciences discipline in the process of developing complex thinking competence and its subcompetencies that can be used for other disciplines. These results raise an area of opportunity for universities with these disciplinary areas, as it invites the adoption of existing strengths to improve the perception of students in careers associated with other areas of knowledge. Conversely, it will be relevant to analyze what happens with students of architecture, art and design, in order to design interventions that will allow them to improve their level of perceived achievement.

Limitations and future studies

It is recognized that this study could be perceived as limited by the small and unbalanced sample in some of the disciplines; however, although it is known that the results are not exhaustive, they are valuable as a first exploratory approach to the subject, especially because they are based on a sample of students who are candidates for graduation. In this same sense, it is considered that one limitation is not having a homogeneous sample of men and women, although this is also due to the general characteristics of the selected sample.

The findings of this study suggest the need for future studies to address these identified limitations in order not only to corroborate the results, but also to have more reliable information that will allow the development of interventions and educational practices associated with the improvement of the perception of achievement of this competency. In this sense, it remains to scale this test to a population that considers more significant samples of disciplines such as humanities and education, social sciences and even health sciences, areas with few students in contrast to engineering and business. In addition, it will be relevant to delve deeper into the issue of gender in each discipline, seeking to develop a study that ensures a balance between male and female participants.

Finally, the study of subcompetencies by discipline remains to be expanded, since the present study focused only on the general competency. It will be relevant to develop specific studies by subcompetency, to identify whether there are differences between disciplines in terms of the level of perceived achievement of systemic, critical, scientific, or innovative thinking.

Conclusions

The objective of this article was to present the results of a study focused on the measurement of the perception of achievement of the complex thinking competency and its subcompetencies in a sample group of students in their last semester of studies associated with the discipline of Medicine and Health Sciences in a university in Western Mexico. Its intention was to identify possible differences by gender or in relation to students from other disciplines. The results, although they do not allow us to argue the presence of statistically significant differences either by gender or discipline, they do allow us to point out a tendency to high averages in health sciences students in contrast with students from other areas. Findings of the present study provide valuable data for the training of future health sciences students, as well as for students from other disciplines who can adopt good practices carried out in this area of study.

CRediT authorship contribution statement

Paloma Suárez-Brito: Formal analysis, Investigation, Writing – review & editing. **José Carlos Vázquez-Parra:** Conceptualization, Methodology, Project administration, Writing – original draft. **Edgar Omar López-Caudana:** Validation, Writing – review & editing. **Mariana Buenestado-Fernandez:** Data curation, Validation, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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