Journal of Management and Business Education

JMBE

www.journaljmbe.com ISSN: 2605-1044 Published by Academia Europea de Dirección y Economía de la Empresa.

Financial literacy and motivation in University Mexican students. Gender gap and career choice

El conocimiento financiero en estudiantes universitarios mexicanos. Brecha de género y elección de carrera

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Arquero, J. L., Fernández-Polvillo, C., Michel-Vázquez, G. P. & Jiménez-Cardoso, S. M. (2025) Financial literacy and motivation in University Mexican students. Gender gap and career choice. *Journal of Management and Business Education*, 8(3), 522-542. https://doi.org/10.35564/jmbe.2025.0023
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Language: English
Received: 30 Apr 2025 / Accepted: 13 Jul 2025

Funding. The authors received no financial support for the research, authorship, and/or publication of this article.

Ethical Statement. The authors confirm that data collection for the research was conducted anonymously, and there was no possibility of identifying the participants. Participation was voluntary and had no impact of any kind on students' assessment. Participants were assured that the data only will be used for academic-research purposes and published in form of aggregated results.

Declaration of conflicting interests. The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

CRediT author statement. J.L. Arquero: Conceptualization, Methodology, Formal analysis, Writing C. Fernández-Polvillo: Methodology, Writing G.P. Michel: Resources, Data curation, Writing S.M. Jiménez-Cardoso: Methodology, Writing.

ABSTRACT

Educational choices, including active participation in innovations, are strongly connected with the perceptions of (I) self-competence, what the students think they can do successfully and (II) perceived goal fulfilment, or alignment between the activity objectives and students' motivations. The main objectives of this paper are to compare the motivations, and the levels of financial literacy and related variables of students enrolled in two careers that potentially attract students with different characteristics and vocational interests and to test whether there exist a gender gap and if this gender gap prevails even when self-selection should have diminished it. A sample of 99 Mexican students enrolled in Law and Business degrees was obtained. Our results indicate that extrinsic motives are the main motivators of those students, revealing also differences by degree in most variables associated with numeracy. For financial literacy the gender gap prevails over self-selection and is similar in both degrees. Educational implications of the results are discussed.

Keywords. Educational choices, motivation, self-determination theory, financial literacy, financial self-efficacy, math avoidance

RESUMEN

Las elecciones educativas, incluida la participación activa en innovaciones, están fuertemente conectadas con las percepciones de (I) autocompetencia, lo que los estudiantes creen que pueden hacer de forma exitosa y (II) percepción de cumplimiento de objetivos, o alineación entre los objetivos de la actividad y las motivaciones de los estudiantes. Los principales objetivos de este trabajo son comparar las motivaciones y los niveles de conocimientos financieros y variables relacionadas de estudiantes matriculados en dos carreras que potencialmente atraen a estudiantes con diferentes características e intereses vocacionales y comprobar si existe una brecha de género y si esta brecha de género prevalece incluso cuando la autoselección debería haberla disminuido. Se obtuvo una muestra de 99 estudiantes mexicanos inscritos en las carreras de Derecho y Administración de Empresas. Nuestros resultados indican que los motivos extrínsecos son los principales motivadores de estos estudiantes, revelando también diferencias por titulación en la mayoría de las variables asociadas a la competencia numérica. En el caso de los conocimientos financieros, la diferencia de género prevalece sobre la autoselección y es similar en ambas titulaciones. Se discuten las implicaciones educativas de los resultados.

Palabras clave. *Opciones educativas, motivación, teoría de la autodeterminación, conocimientos financieros, autoeficacia financiera, evitación de las matemáticas*

INTRODUCTION

Educational choices (career choice, course enrolment or participation in innovations) are strongly connected with perceptions of (I) self-competence, what students think they can do – including their perceptions of success, and (II) perceived goal fulfilment, what the students can obtain with that educational activity (Tellhed et al., 2018).

Regarding the first factor, self-competence, students should be more likely to be attracted to those educational activities, courses, or careers in which they perceive a closer fit between their self-perceived strengths and the demanded competences, avoiding those academic paths that require to develop competences they lack, do not feel confident, or are apprehensive about (see, e.g., Hassall et al., 2013). This is a self-selection process in which stereotypes associated with certain professions or studies have a relevant influence (Arquero & Fernandez-Polvillo 2019).

The second factor mentioned by Tellhed et al. (2018) is related to the motivations of the students. Educational innovations, courses, etc., to be successful must be presented in a way that students perceive them as useful for their own purposes/motivations (Arquero et al., 2015; Romero-Frías et al., 2023). The literature evidence that students enrolled in degrees with differing vocational components (Arquero et al., 2015) or knowledge areas (Guay et al., 2008) could present significant differences in their motivations to pursue their studies. For instance, the literature consistently highlights the strong influence of extrinsic motivations on the choices made by students who enrol in business-related degrees or courses (e.g., Arquero et al., 2009; Byrne & Flood, 2005 or Byrne et al., 2012). However, students pursuing a law career could have more mixed motivations, from a vocational ideal of the lawyer as public interest litigator, committed to improve society, and supporting labour and civil rights movements -which connects with intrinsic motives- (Zacharias, 2009), to the image of lawyers that are simply businesspersons who provide specific services, like any other professional (Zacharias, 2008), an image that is more linked to extrinsic motivations.

Why are these factors relevant in a higher education context? Inconsistencies between students' motives, how content or activities are presented, the pedagogy, and the assessment methods could result in poor learning and in severe difficulties in transferring or institutionalize innovations (Arquero et al., 2015). For instance, the results by Hytti et al. (2010) evidenced the connection between motivation and the results and satisfaction of a given programme: internally motivated students needed a more flexible context, whereas externally motivated students were more satisfied and showed more positive outcomes with a more rigid and controlled learning context.

The relevance of students' personal characteristics, beliefs and preconceptions derives from (I) their influence on the choices students make, both throughout their education and also in their initial professional steps (Wilkins & Gulati, 2000); and (II) because those characteristics and preconceptions could become a relevant constraint for the achievement of educational objectives. Therefore, the misinterpretation of the required level for certain competencies or skills could lead to a possible self-selection bias, in which students who do not present an adequate profile enrol in degrees or aim to enter the profession because they (erroneously) perceive that there is no need for certain skills (Arquero et al., 2017) or think they should not invest more effort developing such skills, since they are misperceived as unimportant or developed enough. This low interest, derived from overconfidence, results in a lower participation in activities designed to improve those skills and underperformance that ultimately harms future employability of students (Arquero et al., 2022).

The main objective of this paper is to compare (I) the motivations and (II) relevant personal characteristics (numeracy-financial literacy and related variables) of students enrolled in two careers that usually attract students with different profiles and vocational interests. Those students, anyhow, later converge in the professional arena working for the same companies or in further education programmes and master degrees. The first career, Law degree, is perceived as more orientated to communication and less numerically focused; the second -Business Administration- is much more numerical-mathematical slanted (Joyce et al., 2006), having a substantial core of economics, accounting, finance, and statistical subjects. A second, but equally important objective is to address if the numeracy-financial literacy gender gap, which is systematically found in the literature, is independent of the educational choice.

Although there exists a solid body of research on the influence of financial literacy (FL) on individuals and households, research focused on more specific subpopulations is much scarcer (García-Pérez-de-Lema et al., 2021) especially for law students; and also adds to the limited literature that studies the crossed effect of self-selection (career choice) in the FL gender gap. Therefore, this article contributes to the very scarce literature by offering a better understanding of the characteristics that could affect educational attempts to develop financial competences in certain groups of students.

The evidence is going to be obtained by using adaptations of well-established instruments to measure motivations and financial literacy in a sample of university students enrolled in the two aforementioned degrees. Our results highlight the relevance of external motives for both sub-samples, especially identification, with no significant differences in the level of self-determination. Contrariwise to what could be expected, there are no differences in FL by career, but the gender gap exists for both subsamples.

The rest of the paper is structured as follows: the second section presents a brief literature review focused on motivations according to the self-determination theory and the concept of financial literacy and related variables. Section 3 describes the methodology: sample, context, measures, and procedure. Section 4 is devoted to the results and the paper concludes with a discussion of these results, implications for practice, limitations, and suggestions for further research.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Motivation and self-determination theory

The literature reveals a widespread agreement on the extreme relevance of motivation in educational settings (e.g. Kim et al., 2015; Núñez-Alonso et al. ,2005) since the motivations of the students determine their willingness to learn, and the level of interest, effort, and persistence in learning activities (Firat et al., 2018; Nawaz et al., 2015; Schmidt, 2014) being consequently a key factor for the potential success of innovations (Arquero et al., 2024b).

Although the literature offers several theoretical frameworks to explain academic motivation, one of the most useful perspectives, as highlighted by Arquero et al. (2015), is the Self-Determination Theory (SDT), developed by Deci and Ryan (1980), who suggest a multidimensional perspective of motivation that ranges from a lack of control (amotivation) to more self-determined behaviours: intrinsic motivation (Ryan & Deci, 2000; Vallerand et al., 1992).

Ryan and Deci (2020) highlight that SDT research began focussing on intrinsic motivation, which they consider the 'prototypical expression of the active integrative tendencies in human nature assumed by SDT' (p. 2) being 'the inherent tendency to seek novelty and challenges, to extend and exercise one's capacity, to explore, to learn' (Ryan & Deci, 2000, p. 70). Thus, in an educational context, intrinsic motivation (IM) implies that students learn for the pleasure and satisfaction derived from learning or exploring new skills, contents and knowledge. As Arquero et al. (2015) state, a clear example of IM is going to class or enrolling in a course because the individual finds personally interesting to learn more about a given subject or content.

IM is indicative of competence and self-determination (Núñez-Alonso et al., 2005) and according to Tu and McIsaac (2002) IM is positively related to task engagement, persistence, and ability to manage failure.

Motivation is extrinsic (EM) when the final objective of participation in an activity is 'to attain some separable outcome" (Ryan & Deci, 2000, p. 71). In a learning context, the motivation is extrinsic when learning or participating in a learning activity is not the end in itself but just a requisite to achieve a different objective. As Arquero et al. (2015) remark, a high proportion of adult behaviours are not intrinsically motivated but driven by responsibilities and social pressures. In any case, EM present different levels in terms of self-determination (Vallerand et al., 1992).

EM *external regulation* is the least self-determined EM behaviour, and the most easily identifiable with external motives (Vallerand et al., 1992); activities are performed to respond to an external demand, obtain a reward, or avoid punishment (Arquero et al., 2024b). In academic settings, examples of this EM could be "I took the course to obtain credits" or "I chose this career for the economic prospects". EM *identification* is the most regulated form of EM: the motive is accepted as personally important and has been internalized, however it is still external because it

is a means to obtain a separate goal, for instance: 'I enrolled in this master because it gives a good preparation to enter in the professional area I like'.

Finally, *amotivation* is situated at the lowest level of autonomy in the continuum of the different types of motivation, and it is representative of absence of any kind of motivation, whether external or internal. Assertions such as 'Honestly, I don't know; I really feel like I'm wasting my time at university" are examples of amotivation (Arquero et al., 2024b).

Understanding students' motivational profiles is highly relevant when designing and implementing educational innovations. This relevance can be evidenced using the following arguments:

- Alignment with Basic Psychological Needs. According to SDT (Deci & Ryan, 2000), educational innovations are more likely to succeed if they satisfy students' basic psychological needs such as autonomy, competence, relatedness. If an innovation ignores the motivational profiles of the students, it may fail to engage them, even if it is technologically or pedagogically sound (Ryan & Deci, 2017; Reeve, 2012).

- Tailored Pedagogical Design. Knowing the dominant motivation profiles in a class (e.g., intrinsically vs. extrinsically motivated students) allows educators to adapt instructional methods and innovations. For instance, students with high IM may respond well to open-ended problem-based learning, while extrinsically motivated students might need clearer performance expectations (Niemiec & Ryan, 2009) and highly structured scenarios (Hytti et al., 2010). Knowing the motivation profiles of students is extremely relevant for adapting innovations, anticipating resistance to change or anxiety, and lately helps to sustain success beyond the pilot phase, which should be the ultimate objective of any innovation (Arquero, 2022).

The literature evidence that students enrolled in degrees with differing vocational components (Arquero et al., 2015) or knowledge areas (Guay et al., 2008) could present significant differences in their motivations to pursue their studies. For example, consistently highlights the strong influence of extrinsic motivations on the choices made by students who enrol in business-related degrees or curses, regardless of the instrument used, the approach taken, or the nationality of the sample. For instance, using the Motives, Expectations, and Preparedness for University questionnaire, Arquero et al. (2009) for Spanish students, Byrne & Flood, (2005), for Irish students, or Byrne et al. (2012) for several nationalities, reached a similar conclusion: future career prospects (salary, social position, etc.) are the main motivators for students enrolled in business-related degrees. Arquero et al. (2015) using an adaptation of the Academic Motivation Scale (Vallerand et al., 1992) found similar results: a lower quality of motivation, with a predominance of extrinsic motivations over intrinsic motives.

Students pursuing a Law career could have, however, more mixed motivations, from a vocational ideal of the lawyer as public interest litigator, committed to improve society, and supporting labour and civil rights movements -which connects with intrinsic motives- (Zacharias, 2009), to the image of lawyers that are simply businesspersons who provide specific services, like any other professional (Zacharias, 2008), an image that is more linked to extrinsic motivations.

Regarding gender differences, the literature does not provide consistent results. Vallerand et al. (1992) or Vantieghem and Van Houtte (2018), among others, reported that female students displayed higher levels of autonomous motivation. However, other studies, such as Litalien et al. (2019) found no gender-related differences in the motivational profiles of students in their research.

The hypotheses that can be put forward as a result is as follows:

H1a: Law and Business students present different motivation profiles.

H1b: There are differences in the motivational profiles of the students due to gender.

Financial literacy

Relevance and links between numeracy, maths anxiety and financial literacy

Numeracy is a broad competency that could be defined as the ability and dispositions that students need to use mathematics in a wide range of situations. More specifically, the OECD (2018) for the purposes of PISA 2022, defines mathematical literacy as the individual's capacity to reason mathematically and to formulate, employ, and interpret mathematics to solve problems in a variety of real-world contexts (OECD, 2018, p. 7). Although some research (e.g. Lusardi, 2012) used financial literacy (FL) items to measure *numeracy*, FL should be considered a special sub-type of numeracy; a subset of the real-world contexts in which maths skills, along with financial and economic knowledge should be used for problem solving and decision making. However, the connections between general numeracy and FL are strong: as Lusardi (2012) states, "Financial decisions, be they related to asset building or debt management, require the capacity to do calculations, including some complex ones" (p.2). Furthermore, the results of Skagerlund et al. (2018) found that the most determining factor in the development of FL is the ability to perform adequately with numbers.

FL is considered today a key competency for any citizen (Pérez-Espés, 2024), and it is becoming more and more relevant as the complexity of financial products and services available to any consumer is growing, requiring individuals to be able to understand how those products function and which are the uncertainties and risks are of their choices (Grigion Potrich et al., 2016). In addition to the variety, complexity and ubiquitous presence of financial products and services, a second trend pushes the relevance of FL to new boundaries (Erner et al., 2016; Lusardi, 2019): In many developed countries, the responsibility to ensure citizens' well-being (health coverage, higher education funding, or adequate retirement income) is being transferred from the state to individuals, who are required to make financial decisions on their own (Oehler & Kohlert, 2009) that will affect them in the long term, choosing from a wide variety of difficult-to-understand alternatives (Garg & Singh, 2018).

Consequently, following Gallardo-Vazquez et al. (2023), there is a clear need for any average citizen to be able to understand financial concepts and their long-term effects, so that they could make efficient and grounded decisions (the core of the OECD definition of financial literacy). If for any average citizen the development of an adequate level of FL is extremely relevant, for any professional dealing with firms, it is just mandatory. However, many authors (e.g., Atkinson & Messy, 2012; Erner et al., 2016; Lusardi, 2019) and institutions (OECD, 2016) are alerting of the inadequate average FL levels even in advanced economies with developed markets.

Given the connection between FL and numeracy, it is not surprising that numeracy and emotional attitudes towards numbers (i.e. mathematics anxiety: MA) was crucial to explain FL development (Skagerlund et al., 2018). Many authors researching with MA measures (e.g. Joyce et al., 2006; Harari et al., 2013; Martin-Puga et al., 2022; Wilson et al., 2006) refer to Richardson and Suinn's (1972) definition of MA: feelings of tension and anxiety that interfere with manipulating numbers and solving mathematical problems in a wide variety of ordinary and academic life situations (p. 551). As Harari et al. (2013) point out, one of the main problems intrinsically related to MA, and of particular concern, is that individuals with higher levels of MA avoid enrolling in math-related courses in high school and, later, avoid those university degrees perceived as intensive in mathematics, or numerically oriented. The results of Joyce et al. (2006) confirm this avoidance behaviour typically associated with anxiety, reporting significant higher levels of MA in students with arts-humanities educational background in comparison with their colleagues with numerical-scientific previous education. Levy et al. (2021) concluded that MA impacts educational choices, but differently for female (direct impact) and male students (mediated by numerical performance).

Financial literacy, career choice and gender gap.

While for Business administration (and related degrees) maths, economics, and finance contents are a relevant part of the syllabus that should be developed throughout the career, the same cannot be said about Law degree. Stereotypes or preconceptions play an essential role in

the creation of a 'public attitude' and in defining the interest of a profession for those who want to be part of it (Albu et al., 2011; Espinosa-Pike et al., 2021). For instance, the stereotypes associated with accounting, as a profession and as an academic degree, depict these professionals as "number crushers" that work in some kind of isolation. Consequently, students with a numerical educational background, who are happy dealing with numbers, but avoid communication, are attracted to this career (Joyce et al., 2006), leading to a self-selection bias guided by those stereotypes (Fernández-Polvillo & Michel, 2018). However, for Law degree students, communication skills are considered extremely relevant (Korn, 2004), while the 'numerical' subjects related to the business world (accounting, finance, etc.) are, in the words of Coates et al. (2015) a potentially valuable but 'pedagogically challenging component of legal education' that are not seen essential by students. Consequently, the previous educational background of law students is usually not numerical-scientific, but rather literature, arts, and humanities (e.g., 84%-16% for the law subsample used in Wilson et al. 2006, versus a more balanced 45% - 55% for students at BA and related degrees, reaching 21%-79% for Financial services degree) suggesting, at least, a lower interest in numerical subjects and careers (e.g., everything related with economics and finance). The combination of lower interest and less opportunities to develop these numerical skills results in concerns about the gaps in these numerical related skills of incoming first-year students, as well as alarm about the lack of skills of law graduates entering the profession, who are not adequately equipped for the practice (Biggs & Hurter, 2014).

Wannenburg and Curlewis (2023) note that, while in the past, communication skills and persuasiveness, logical reasoning and judgment, etc., were considered enough for legal practitioners nowadays are still needed, but not sufficient anymore to become a competent law practitioner; pointing to numeracy, and specifically, financial literacy as one of the competencies now required. As Robinson (2018) states, you need to understand the deal, the numbers behind the problem, not just the law.

The empirical results of several studies confirm the above assertions. Rowell and Bregant (2014) found a significant relationship between the substance of legal analysis and advice and their level of numeracy. The law practitioners surveyed by Coates et al. (2015) rated Accounting and Financial Reporting and Corporate Finance among the most relevant competencies, with overall scores of 4.38/5, even higher, 4.6/5, for practitioners in corporate/transactional practice, concluding that:

'*The most salient result from the survey for students is that they should learn accounting and financial statement analysis, as well as corporate finance. These subject areas are viewed as particularly valuable both for lawyers in litigation and as well those working in corporate and transactional practice areas'* (p. 451).

This relevance has an economic effect, as noted by Craft and Baker (2003), who found that lawyers with undergraduate training in economics tend to earn more than their colleagues.

Subsequently, the literature warns about the relevance of such numerical and financial related competences for a successful professional career in law, arguing that at least in certain fields economic-based analysis is a fundamental element of legal arguments made. However, the literature also alerts that the numeracy level of entry-level professionals is lower that required an that students do not consider them relevant.

As Arquero et al. (2024a) note, the relationship gender-FL is extensively documented in the literature, the meta-analysis by De Oliveira et al. (2019) reports a systematic association of gender with lower levels of FL, while Vijay Kumar and Senthil Kumar (2023) confirm the robustness of the observed FL gap by gender. The gender gap is not limited to actual FL, but significant connections between gender and (I) financial interest and (II) financial self-efficacy are also reported. Financial interest (FI) is defined by Hermannson and Jonson (2021) as a "motivational state where the individual is interested in economic issues and financial markets", and their results show that males present higher levels of financial interest FI; as well as positive correlations between FI and FL

scores. Regarding financial self-efficacy, the review of the literature by Furrebøe and Nyhus (2022) concluded that research supports lower FSE levels for females in the vast majority of reviewed studies.

From the results evidenced in literature above, the following hypotheses can be put forward:

Consequently, the following hypotheses can be proposed:

H2: the level of financial literacy, and related variables, is different between Law and BA students.

H3: there are gender-related differences in the level of financial literacy and related variables.

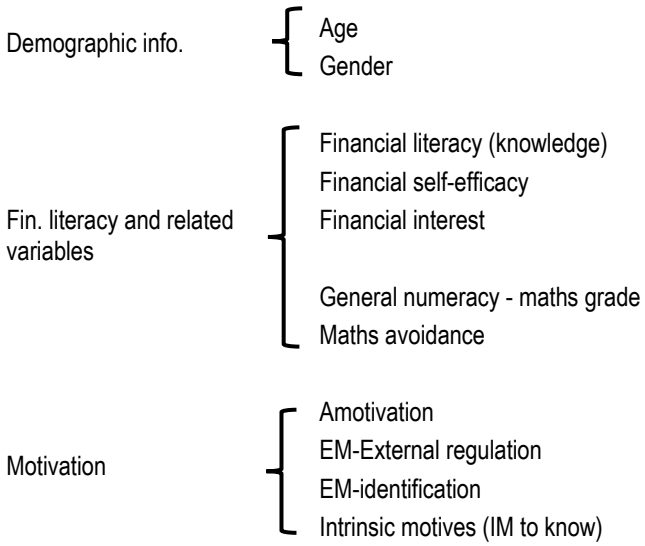
Given that there could be a cross-effect between self-selection (students tend to select careers in which the perceive a fit between self-perceived vs. required competences), the gender gap should be tested controlling by educational choice.

METHODOLOGY

Measures and administration procedure

The structure and measures of the questionnaire are presented in Figure 1. The first part gathered basic information about the respondent: age, gender, as well as a measure of perceived financial self-efficacy (FSE) and a question about previous performance in maths subjects (proxy for general numeracy). A section was devoted to financial literacy, financial interest, and maths avoidance, and the last section was focused on the motives of the respondents to choose their current studies.

Figure 1: Questionnaire structure



The financial literacy items are adapted from the questions used in both the OECD INFE pilot study (Atkinson & Messy, 2012) and the *Encuesta de Competencias Financieras-ECF* (Bover et al., 2018); this part includes six questions widely used in institutional FL surveys (all items and scales are presented in the Appendix). As previously done by several researchers (e.g., Lusardi & Mitchell, 2014; Trombetta, 2017), we focus on the knowledge component of FL, and as it is usually done in these studies, items are slightly reworded to better fit the economic context (e.g., adapting currency, values, interest, or inflation rates). The FL score is obtained by adding the number of correct answers and calculating the percentage of correct answers over the total possible score. Therefore, the FL score ranges from 0% to 100% of correct answers. In these calculations, following

the OECD (2016) criterion, erroneous answers, the 'don't know' option when applicable, as well as not responding (blanks) were all considered incorrect answers.

To measure FSE, we use a single item derived from the ECF (Bover et al., 2018) that was previously used for the same purposes by Arquero et al. (2024a). Students are asked to rate their general knowledge of financial topics in a five-point Likert-type scale. The item about previous maths performance asked students for the grades they obtained in maths subjects in secondary education, allowing three possible answers: pass grade (60-79), high grade (80-89) and outstanding grade (90-100) over a maximum of 100.

Financial interest was measured using the five items scale developed by Arquero et al. (2024a). These items asked students to rate their level of agreement with several assertions that indicate a proactive interest in economic issues and financial markets beyond the course requirements. Finally, a maths avoidance measure was also included. This is a three-item scale adapted from Harari et al. (2013).

The section devoted to motivation, following Romero-Frías et al. (2023) included a short adaptation of the Spanish version (Núñez Alonso et al., 2005) of the Academic Motivation Scale (Vallerand et al., 1992) consisting of two items for each measure (amotivation, EM external regulation, EM identification and intrinsic motivation). Motivation items were answered using a 7-point Likert scale. Guay et al. (2008) defined high quality motivation as high in intrinsic or identified regulation, but low in external regulation or amotivation. Following this definition of high-quality motivation, and analogously to Arquero et al. (2015) or Kusurkar et al. (2013), a *quality of motivation score* was calculated by adding IM and EM identification scores, minus the sum of EM external regulation and amotivation scores.

The instrument was distributed in class as a paper & pencil questionnaire in person by a member of the research team, at the beginning of the second term (August-December) of the 2024 academic year. This member provided explanations aimed at reducing the impact of the common-method variance -CMV- and response apprehension (Chang et al., 2010; Podsakoff et al., 2003). Students were asked to answer as honestly as possible, that perception items had no correct-incorrect answers; it was highlighted that participation was voluntary, that the data obtained were to be used only for research purposes in aggregate form and that treated confidently, and students were assured that their participation had no impact on their grades. Also, to reduce CMV, the items were designed to present different response types.

Sample

The sample is composed of 99 students enrolled in the Law degree (n: 49) and Business Administration degree (n: 50) at the Universidad de Guadalajara, one of the largest public universities in Mexico. All students were enrolled in the 4th course (out of 5). Table 1 presents the average age by degree, as well as the gender composition of each sub-sample. Students are around 23 years old, with no significant differences by degree (t-test: n.s.), however the proportion of female students enrolled in the Business Administration degree is substantially higher. While the distribution of law students could be considered balanced (44%-56%), the distribution of BA students is significantly different (Chi square test sig: .01) with an overrepresentation of female students (20.4% vs 79.6%).

Table 1. Composition of the sample (age and gender)

		Age		*Gender*	
Degree	*N*	*Mean*	*SD*	*Male*	*Female*
Law	50	23,42	2,98	44,0%	56,0%
Business	49	22,86	5,69	20,4%	79,6%

RESULTS

The first hypothesis proposed the existence of differences in motivation by educational choice (degree). Four measures of motivation were obtained: intrinsic motivation, EM identification, external regulation, and amotivation. As the distributions by gender of the degree subsamples are significantly different, and the literature provides evidence of differences by gender, the analyses of differences are performed considering at the same time degree and gender. Table 2 shows the scores obtained in all motivation measures by gender and degree.

Table 2. Differences in motivation scores by gender and degree

Panel A	Mean scores	Amotivation	EM ext. reg.	Identification	IM to know
Law	Male	3.24	5.81	5.67	5.29
	Female	2.80	6.12	5.69	5.90
	Overall	3.02	5.97	5.68	5.60
Business	Male	2.98	5.65	6.15	5.70
	Female	2.33	5.92	6.15	5.56
	Overall	2.66	5.79	6.15	5.63
Panel B	MANOVA				
Degree	F value	1.44	1.19	1.97	0.18
	sig. of F	n.s.	n.s.	n.s.	n.s.
Gender	F value	2.12	1.11	0.33	1.23
	sig. of F	n.s.	n.s.	n.s.	n.s.
Model	F value	2.43	0.91	1.48	0.62
	sig. of F	.09	n.s.	n.s.	n.s.

Note: the overall mean for both genders is a simple mean of the average scores by gender-group to avoid the impact of the unequally distribution by gender

The results (Table 2) indicate that, regardless of gender or degree, the students show a moderate-high level of intrinsic motivation (IM: 5.6 for the entire sample over a maximum of 7) with no significant differences.

EM identification, the most regulated form of EM, is the most important motivation for Business students, who present slightly higher levels in EM identification in comparison with law students (6.15 vs. 5.68). However, the statistical tests do not show significant differences.

External regulation, the most identifiable extrinsic motivation, links educational choices to obtaining external rewards (e.g. credits, salary prospects, etc.) and it is the main motivation for law students, who present higher levels of EM-external regulations in comparison with business students (5.97 vs 5.79). By gender, female law students present the highest average score in external regulation (6.21). However, those differences are not statistically significant for any of the grouping variables (gender or degree).

Finally, the levels of amotivation, indicative of lack of control over the behaviour, are low, as it could be expected from adult learners in a non-compulsory educational level. Male law students are those who present the highest average score (3.24) while female business students present the lowest score (2.33). However, those differences are not enough to be statistically significant.

The composite measure of motivation (quality of motivation score) is obtained by comparing the most regulated sources of motivation (IM and identified regulation) versus the least regulated sources (external regulation and amotivation). The higher the score in this variable, the more regulated is the source of motivation. Low or even negative, values are indicative of a low quality of motivation. As can be drawn from Table 3, Business students present a better quality of motivation than law students, and this difference is marginally significant ($p = .093$, two-tailed test).

Regarding gender, the results indicate that female students have a higher quality of motivation, but it is not enough to be statistically significant.

Table 3. Differences in quality of motivation score by gender and degree

Panel A		*n*	*Mean*	*SD*
Law	Male	22	1.85	3.41
	Female	26	2.78	2.64
Business	Male	10	3.23	1.82
	Female	39	3.54	2.29
Panel B (MANOVA)		*Degree*	*Gender*	*Model*
	F	2.88	1.28	2.80
	sig. of F	.093	n.s.	.066

Consequently, H1 is rejected: although the quality of motivation (the composite measure) is higher for Business students, and there are some differences in the main motivations for each group, that differences in the motivation profiles of students due to the career chosen are not enough to be statistically significant. Gender-related differences also do not appear to exist.

The second hypothesis (H2) proposed the existence of differences in FL level and associated variables by educational choice, while H3 put forward differences in the same variables associated to a gender gap. Given than the gender composition of the samples is unequal, both hypotheses are tested at the same time.

As Table 4 shows, the highest FL score corresponds to business male students, while the lowest is obtained by law female students. As expected, business students outperform their law colleagues by 5 percentage points, but those differences are not enough to be significant. The significant differences in FL are connected with gender (H3). Regardless of the self-selection associated with educational choices, a gender gap of 10 percentage points still exists even for business students.

Therefore, in terms of financial literacy scores, law students have lower levels of FL: Nevertheless, although consistent even controlling by gender, the differences by career (H2) are not enough to be statistically significant. However, the gender gap for FL is consistent, similar for both degrees, and statistically significant (H3).

The hypotheses also extended the expected differences by career and gender to other relevant variables: financial interest, financial self-efficacy, maths performance, and maths avoidance.

Table 5 presents the variables mean scores for the studied by degree and gender, as well as the results of the MANOVA analyses. Financial self-efficacy (FSE) gives a measure of the student's self-assessment in general financial issues (ranging from 1 to 5, being a 3 average). All law students present FSE levels slightly below the average point, while female business students indicate levels slightly above the average point. Although male business students present the highest level of FSE, it is still moderate (3.4/5). The differences by degree are significant, but there are no significant differences by gender. The lowest score for financial interest corresponds to female law students (2.69/5) while the highest, as expected, is shown by male business students (3.5/5). In this case, both variables (gender and degree) are associated with significant differences. It is to be noted that male law students present a higher interest than business female students, who are pursuing a career in which finance knowledge is central. The highest level of maths avoidance is found for female law students (4.84/7) and the lowest for male business students (3.37/7), although differences due to gender and career seem to be statistically significant, the explanatory power of the self-selection bias (career) is stronger. It should be noted that when it comes to actual performance in maths subjects, the group with highest average grade is female business students 2.64/3), although the lowest grade corresponds also to female law students (2.04/3). In this case, there is no gender gap, but the differences by career are significant.

Table 5. Differences in FSE, FI, MA, and MG score by gender and degree

Panel A	Mean scores	FL	FSE	FI	MA	MG
Law	Male	65.91%	2.91	3.14	3.95	2.14
	Female	55.36%	2.96	2.69	4.84	2.04
Business	Male	70.00%	3.40	**3.50**	3.37	2.3
	Female	59.40%	3.08	3.04	3.61	2.64
Panel B	MANOVA	FL	FSE	FI	MA	MG
Degree	F value	0.94	3.67	4.39	10.10	15.85
	sig. of F	n.s.	.029	.020	.001	.000
Gender	F value	5.58	0.55	6.64	3.36	0.33
	sig. of F	.010	n.s.	.006	.035	n.s.
Model	F value	2.87	1.87	4.32	5.53	9.25
	sig. of F	.031	n.s.	.008	.003	.000

Note: the significance level shown is one tailed

According to the results presented above, except for FL, there are significant differences in all variables studied associated with the educational choice (H2): Controlling by gender, Business students present significant higher levels of financial self -efficacy, numeracy (previous maths performance) and financial interest and lower levels of maths avoidance. H3 proposed the existence of a gender gap in FL and all related variables. This hypothesis cannot be fully accepted. Differences by gender are clearly found for financial literacy, where the gap is consistent, financial interest, and maths avoidance. However, there are no significant differences for FSE or numeracy.

DISCUSSION

Motivation is a key factor for the potential success of innovations (Arquero et al., 2024b). To obtain better engagement of students with a certain course, activity, or educational innovation, the proposal should be perceived by the students as useful to attain their goals, or motivations. Our results indicated that, although there are no significant differences in motivation scores by degree chosen of gender, the prevalent motivation for law students is EM external regulation while it is EM identification for business students. For students who are externally regulated, the activities should be presented as useful in terms of obtaining their desired rewards, be those rewards gaining recognition (e.g., grade improvement, credits, points in gamified activities, etc.) or having long term effects on their professional career (e.g., being valuable in hiring decisions or connected to better job positions or economic prospects). Guay et al. (2008) indicate that when the motivation is of high quality (high in intrinsic or identified regulation, but low in external regulation), the learning environmental conditions should facilitate autonomous regulation by supporting autonomy and communicating expectations. As students tend to present a mix of motivations (Romero-Frías et al., 2023) results, the design of innovations and their assessment should take into account this mix, so different students could see those interventions as useful for their own purposes.

Tellhed et al. (2018) also noted that educational choices are strongly connected with what students think they can do, avoiding those paths (courses, careers, or activities) that require competencies they lack, do not feel confident, or are apprehensive about (Hassall et al., 2013). In this choice process, preconceptions or stereotypes about the skills required to succeed could have more relevance than real professional demands, leading to a self-selection bias guided by those stereotypes (Fernández-Polvillo & Michel, 2018). Following this argumentation, although numeracy - financial literacy is an extremely relevant competency for any professional, especially those working with firms, we expected differences in FL (and related variables) between students

choosing university degrees that respond to different stereotypes and educational backgrounds; in our case Business (a degree clearly orientated to numbers) and Law (a degree more linked to communication). Given that the gender composition of the subsamples is significantly different, and the literature consistently reports a gender gap associated with financial literacy levels (e.g. De Oliveira et al., 2019; Vijay Kumar & Senthil Kumar, 2023), financial self-efficacy (Furrebøe & Nyhus, 2022), or financial interest (Hermannson & Jonson, 2021), the differences associated with both variables (degree and gender) should be tested at the same time. Our result indicates that the FL levels do not differ due to the degree chosen. It is true that business students score higher, obtaining around 5 percentual points over the law students; however, the variable that significantly explains differences is the gender gap, that remains similar (around 10 percentual point of advantage for male students) regardless of the career chosen. In this case, we could expect this gap to be lower for Business students, given that all these students are choosing a degree with a clear orientation to financial and economic contents; however, the difference remains the same. If we also consider that the OECD (2016, p. 19) sets 5 out of 7 (71% of correct answers) as minimum target score for a basic FL measure, only male business students obtain that minimum score (70% of correct answers), while female law students merely achieve 55%; values that are not appropriate for future professionals.

If the career effect is not significant for FL, it is for the rest of associated variables. Business students, as a group, have higher levels of financial self-efficacy and financial interest, report better grades in previous maths subjects and lower levels of maths avoidance. Differences related to gender appear to be significant for financial interest, with male students showing higher levels of FI than their female colleagues in both careers, and maths anxiety, which is more intense for female students. Analysing gender differences in FSE only for the Business students subsample, the difference in FSE score is also significant ($p = .034$, one tailed t-test). It is to be noted that when it comes to actual maths performance, the highest reported grades correspond to female business students, while they are still more avoidant than their male colleagues.

CONCLUSION

Educational choices (career choice, course enrolment or active participation in innovations) are strongly connected (Tellhed et al., 2018) with (I) the perceptions of self-competence, choosing the choice where the perceive a closer fit between their characteristics, self-perceived strengths and the demanded competences and (II) perceived goal fulfilment, to what extent is the participation the educational activity useful for their own purposes/motivations (Arquero et al., 2015; Romero-Frías et al., 2023). The main objectives of this paper are to compare the motivations and certain key characteristics (financial literacy and related variables) of students enrolled in two careers that potentially attract students with different individualities and vocational interests but later converge in the professional world.

Regarding motivation, our results conclude that, on average, students display a mix of motivations that are not mutually exclusive, confirming previous evidence (e.g., Romero-Frías, et al., 2023). Thus, although students have a moderate-to-high level in intrinsic motivation, they show even higher levels in extrinsic motivations (external regulation and identification).

Regarding financial literacy and related variables, we conclude that the gender gap is stronger and more consistent than the differences found by educational choice. In the case of business students, this gender gap still exists, and it is not counterbalanced by the self-selection.

There are educational implications derived from these results. For instance, in the case of educational innovations or other activities that require active participation from students, appealing to the intrinsic interest of the content or to a challenging component of the activity (e.g., gamification) is not enough to grant full involvement from students that have extrinsic motivations. These interventions should additionally connect the objectives of the innovation / subject with the

main motivations of those students. Externally regulated students, a motivation that appears to be more frequent in average than intrinsic motivation, require more structured educational designs to reduce uncertainty and obstacles to reach the final goal (Arquero et al., 2022), and also value the existence of external rewards associated with the participation or completion of the activity (e.g., credits, recognition of grades). For law students, given that the connection of financial knowledge with career success (identification) is not so evident for them (Coates et al., 2015), more emphasis should be placed in the importance given by literature to such content for an adequate performance of their future tasks as professional lawyers (e.g., Robinson, 2018; Wanneburg & Curlewis, 2023) and also highlighting the better economic prospects of those professionals who possess additional training in finance or economics (Craft & Baker, 2003).

The existence of a gender gap in financial literacy, financial interest, and maths avoidance for all students, and additionally in financial self-efficacy for business students, could result in lower enrolment and participation in those subjects or activities in which these female students consider themselves as less prepared to succeed or are viewed by female students as less interesting. In these cases, any innovation that requires voluntary participation from students should consider this constraint that could hinder the effectiveness for female students. As the literature connects self-efficacy (Arellano et al., 2014) and maths avoidance (Skagerlund et al., 2018) with financial literacy, previous interventions, such as those reviewed by Prieto-Rodriguez et al. (2020) to improve self-efficacy, or in Samuel and Warner (2019) to reduce math anxiety, could have a positive impact on students' perceptions and subsequent behaviours.

This research has limitations. First, the sample is relatively small and was obtained from one university. Second, although controlling for the main characteristic associated with differences (gender), omitted variables may exist. Future research could refine the measurement methods, including more variables with a larger and more diverse sample, and also test the variables evolution of the studied from entry level to the last courses.

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APPENDIX

Items included in the questionnaire

Financial self-efficacy

¿Cómo calificaría sus conocimientos generales sobre temas financieros?	O Muy bajos O Bastante bajos O Medios O Bastante altos O Muy altos

Notes: Adapted from the Encuesta de Competencias financieras de la CNMV (Bover et al., 2018)

Financial literacy items

Imagine que le comunican que es beneficiario de una herencia hoy, pero tiene que esperar un año para obtener su parte (10 millones de pesos), y que la inflación de ese año es del 7%. En el plazo de un año será capaz de comprar:	O Más de lo que podría comprar hoy con su parte del dinero O La misma cantidad O Menos de lo que podrían comprar hoy			
Supongamos que ingresa 10 mil pesos en una cuenta con un interés del 5% anual sobre el saldo, que se suma cada año a ese saldo. Si no hay ninguna otra entrada o salida de dinero. ¿Cuánto dinero habrá en la cuenta después de 5 años?	O Más de 10.250 pesos O Exactamente 10.250 pesos O Menos de 10.250 pesos O No se puede calcular con esos datos.			
Supongamos que el tipo de interés de su cuenta de ahorros es del 5% al año y que la tasa de inflación anual es del 7%. Al cabo de un año, ¿qué cantidad de bienes cree que podría comprar con el dinero de dicha cuenta?	O Más que hoy O Exactamente lo mismo que hoy O Menos que hoy O No se puede calcular con esos datos			
Es probable que una inversión con una rentabilidad elevada sea también de alto riesgo.		V	F	N.S
Una inflación elevada significa que el coste de la vida está aumentando rápidamente.		V	F	N.S
Por lo general, invertir en bolsa comprando una amplia variedad de acciones es menos arriesgado que invertir en una única empresa.		V	F	N.S

Notes: Adapted from the Encuesta de Competencias financieras de la CNMV (Bover et al., 2018)
V: verdadero-true, F: falso-false, N.S.: No sé-Do not know

Financial interest items

Me gusta leer noticias sobre empresas y temas de finanzas y mercados.	1-5
Si no tengo claro algún concepto o cuestión sobre temas financieros, busco información para entenderlo mejor.	1-5
Me gusta hablar con compañeros y amigos de temas de empresas y finanzas.	1-5
A veces busco información sobre empresas, cotizaciones, etc. en internet.	1-5
Me gustan las películas y documentales que tratan temas de empresa y financieros.	1-5

Notes: Adapted from Arquero et al. (2024a). To be answered in a 5-point scale from 1 (strongly disagree) to 5 (strongly agree), where 3 is a neutral point.

Maths avoidance items

Intento evitar materias que tengan muchas matemáticas	1-7
Me gustan más las asignaturas de letras que las de números	1-7
Las asignaturas de matemáticas me producen cierta ansiedad	1-7

Notes: Adapted from Harari et al. (2013). To be answered in a 7-point scale from 1 (strongly disagree) to 7 (strongly agree), where 4 is a neutral point.

Motivation items

EM external regulation.	Porque con este título tengo más opciones de encontrar un empleo que sólo con los estudios que ya tenía.	1-7

EM identification	Porque pienso que esta formación me ayudará a prepararme mejor para la carrera profesional que he elegido.	1-7
IM	Por el placer de saber más sobre las asignaturas que me atraen.	1-7
IM	Porque estos estudios me permiten continuar aprendiendo muchas cosas que me interesan.	1-7
EM identification	Porque creo que unos pocos años más de formación van a mejorar mi competencia como profesional.	1-7
EM external regulation.	Para obtener un título universitario que me permita un mejor acceso al mercado laboral o mejores condiciones.	1-7
Amotivation	En algún momento he pensado en abandonar la carrera.	1-7
Amotivation	Me he planteado dejar los estudios universitarios.	1-7

Notes: Adapted from Arquero et al. (2024b). To be answered in a 7-point scale from 1 (strongly disagree) to 7 (strongly agree), where 4 is a neutral point.