

INFORME TÉCNICO
GRIAL-TR-2024-002
FEBRERO 2024

Questionnaire with university students on STEM studies in Higher Education (QSTEMHE)

Sonia Verdugo-Castro¹,
Alicia García-Holgado¹,
M^a Cruz Sánchez-Gómez²,

¹Grupo de Investigación en InterAcción y eLearning (GRIAL)
Universidad de Salamanca

²Grupo de Investigación Interdisciplinar sobre Inteligencia Digital en Procesos
Educativos (INDIE)
Universidad de Salamanca
[soniavercas, aliciagh, mcsago]@usal.es

RECOMMENDED CITATION

In English:

Verdugo-Castro, S., García-Holgado, A., Sánchez-Gómez, M. C. (2024). Questionnaire with university students on STEM studies in Higher Education (QSTEMHE) (Technical Report GRIAL-TR-2024-002). Retrieved from <https://repositorio.grial.eu/handle/grial/3033> Salamanca, Spain: GRIAL Research Group. doi: 10.5281/zenodo.10668562.

TABLE OF CONTENTS

1. Introduction	1
2. Questionnaire	3
2.1. Socio-demographic and contextual data (I)	3
2.2. Open questions	5
2.3. Opinion items	5
2.4. Socio-demographic and contextual data (II)	7
Acknowledgements	11
References	13

1. Introduction

In some countries, there is gender segregation in some fields of study, one case being the science, technology, engineering, and mathematics (STEM) sector. For this reason, the Questionnaire with university students on STEM studies in Higher Education (QSTEMHE) has been designed. The instrument has been empirically validated (Verdugo-Castro et al., 2022b). It is part of the research carried out through Sonia Verdugo-Castro's doctoral thesis at the University of Salamanca (Verdugo-Castro, 2022). The objective pursued with the application of the QSTEMHE questionnaire is to find out the gender stereotypes that university students have about higher STEM studies once the factors that affect this gender gap have been identified (Verdugo-Castro, García-Holgado, et al., 2023).

The questionnaire is composed of four blocks, two of which contain socio-demographic and contextual questions, another contains open questions (Verdugo-Castro, Sánchez-Gómez, et al., 2023) and another block contains items in which statements are made to which one must respond with the degree of agreement or disagreement about the opinion that one has as a university student about higher studies related to science, technology, engineering and mathematics (Verdugo-Castro et al., 2020, 2022a). The dimensions to which the validated opinion items are associated are Gender Ideology (D3), Interests (D1), Attitudes (D4), Perception and Self-perception (D2) and Expectations about Science (D5) (Verdugo-Castro et al., 2022b).

Concerning some questions linked to gender, the research has been approached with respect and inclusion of the different gender identities, knowing that gender is not limited to the binary classification of male and female. However, some questions refer to men and women due to the historical tendency of segregation between the two genders in the field of study.

In the application of the questionnaire in the framework of the doctoral thesis of Sonia Verdugo-Castro (Verdugo-Castro, 2022), the data obtained have been processed in an aggregated and anonymous way once the favourable report of the Bioethics Committee (CBE) of the University of Salamanca has been obtained, with registration number 557.

Finally, some items have been deleted since the instrument has been subjected to validation procedures. For this reason, in this final version presented, next to the codes identifying each item, in some of them, there is a reference in italics and in grey, in brackets, which is associated with the identifying values of the questionnaire in its first version.

2. Questionnaire

2.1. Socio-demographic and contextual data (I)

P1. Please indicate your gender (only one option can be ticked):

P2. Indicate your age (in numbers):

P3. Please indicate in which country you were born (only one option can be ticked):

P4. Do you identify with any ethnicity or nationality? (Only one option can be ticked)

P5. Do you live in a rural area, an urban area, or somewhere in between? (Only one option can be ticked)

P6. Have you completed your university studies?

P7. What is the highest grade in which you have been enrolled in your university studies? (Only one option can be ticked)

P8. Indicate the name of the bachelor or master's degree you have taken or are currently taking:

P9. At which university are you studying, or have you studied for your bachelor or master's degree?

P10[1]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [Family tradition]

P10[2]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [The will of the family]

P10[3]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [Other friends have chosen these studies]

P10[4]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [Giving back and helping society]

P10[5]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [Improving the quality of life of society]

P10[6]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [It is an option to travel]

P10[7]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [The school was close to my home]

P10[8]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [Social recognition]

P10[9]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [Meet interesting people (in my area of interest)]

P10[10]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [\[Cultural enrichment\]](#)

P10[11]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [\[Attraction to studies\]](#)

P10[12]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [\[Find a job\]](#)

P10[13]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [\[High salaries\]](#)

P10[14]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [\[Possibility to work on projects\]](#)

P10[15]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [\[Possibility to work in a team\]](#)

P10[16]. What are the primary motivations for choosing your studies (please tick as many options as appropriate): [\[Create my own company\]](#)

P10[Other]. Cuáles son las principales motivaciones para elegir sus estudios (marque tantas opciones como proceda): [\[Other reason. Please specify:\]](#)

P11. In selecting your university studies (in the university entrance exams), what position did the degree you are studying or have studied occupy? (Only one option can be ticked)

P12. Would you choose again the university studies you have taken or are currently taking? (Only one option can be ticked)

P13. Before university studies, did you have a baccalaureate? (Only one option can be ticked)

P14. If you have studied baccalaureate, which baccalaureate pathway have you studied? (Only one option can be ticked)

P15. Before university studies, have you attended vocational training? (Only one option can be ticked)

P16. If you have completed vocational training, to which branch of knowledge are your studies linked? (Only one option can be ticked)

P17. Have you been interested in higher studies related to science, technology, engineering, or mathematics throughout your pre-university education? (Only one option can be ticked)

P18. Throughout your pre-university education have you participated in any activities or initiatives with links to science, technology, engineering or mathematics (e.g., olympiads, science championships, tech talks, technology camps, etc.)? (Only one option can be ticked)

P19[1]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [\[Mother\]](#)

P19[2]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [\[Father\]](#)

P19[3]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [Sister]

P19[4]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [Brother]

P19[5]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [Other male family member (uncle, cousin, grandparent, etc.)]

P19[6]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [Other female relative (aunt, cousin, grandmother, etc.)]

P19[7]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [A male friend]

P19[8]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [A female friend]

P19[9]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [None of these people have studied science, technology, engineering or mathematics.]

P19[other]. Have any of the following people in your environment studied science, technology, engineering or mathematics? (Please tick as many options as appropriate) [Other person. Please specify:]

2.2. Open questions

P20. What adjectives or terms do you think to differentiate men and women (physically, psychologically, professionally, socially, etc.)?

P21. In your opinion, what are the characteristics of a person who studies science, technology, engineering, and mathematics?

P22. On the other hand, in your opinion, what are the characteristics of a person who studies social sciences/humanities/reading, etc.?

P23. Do you think there are studies and professions "for men" and "for women"? If so, which ones and why do you think this difference exists?

P24. Do you think that women have the same rights and equal opportunities as men in studies, on the one hand, and in the workplace, on the other hand, related to science, technology, engineering, and mathematics? Why?

2.3. Opinion items

	Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly agree (4)	Don't know
25 (D4_26_1). If a woman decides to enter a traditionally masculine field, she will be more successful if she adopts					

<p>the prevailing male customs and behaviours.</p> <p>26(D4_28_1). Having men and women work side-by-side increases the likelihood of conflict.</p> <p>27(D3_33_1). University studies are more important for men than for women.</p> <p>28(D4_34_1). Women must sacrifice their careers to support their children/family.</p> <p>29(D3_37_1). In the IT field, a man's performance will be better than a woman's.</p> <p>30(D3_38_D). Women are capable of developing useful software.</p> <p>31(D1_39_1). At home, boys do more practical activities with their parents than girls (e.g. cars, tools, computers, etc.)</p> <p>32(D1_41_1). Boys prefer STEM-related hobbies.</p> <p>33(D1_42_1). There are more boys than girls in STEM studies as they are more freaks.</p> <p>34(D4_43_1). Women working in STEM areas have to be/act like men.</p> <p>35(D4_44_1). To have a successful career in STEM you need to think and act like a man.</p> <p>36(D3_45_1). Girls are not as good as boys in STEM issues.</p> <p>37(D1_46_1). Girls are not as interested as boys in STEM issues.</p> <p>38(D3_47_1). STEM themes are more masculine than others.</p> <p>39(D3_48_1). Girls have fewer natural abilities than men for STEM issues.</p> <p>40(D3_49_1). Most girls are better at other things (such as letters/languages) and choose studies in which they are better.</p> <p>41(D1_51_1). University studies in STEM are generally more attractive to boys.</p> <p>42(D2_52_1). I feel restricted by the gender labels that people attach to me.</p>					
---	--	--	--	--	--

<p>43(D2_53_I). I feel restricted by the expectations that people have of me because of my gender.</p> <p>44(D2_54_I). In my childhood home, I was taught that men should act like men and women should act like women.</p> <p>45(D2_56_I). In the past, I have been teased or bullied for acting like the opposite sex.</p> <p>46(D5_59_D). Science is helpful in my everyday life.</p> <p>47(D5_60_D). Learning science has made me more critical in general.</p> <p>48(D5_61_D). Science and technologies will provide greater opportunities for future generations.</p>					
---	--	--	--	--	--

2.4. Socio-demographic and contextual data (II)

P49[1](P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate):

[Mother]

P49[2](P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate):

[Father]

P49[3](P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate):

[Sister]

P49[4](P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate):

[Brother]

P49[5](P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate):

[Other male family member (uncle, cousin, grandparent, etc.)]

P49[6](P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate):

[Other female relative (aunt, cousin, grandmother, etc.)]

P49[7](P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate):

[A male teacher]

P49[8](P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate):

[A female teacher]

P49[9] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [A male friend]

P49[10] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [A female friend]

P49[11] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [Member of a youth association]

P49[12] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [A prestigious and well-known male figure in the field of my discipline]

P49[13] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [A prestigious and well-known female figure in the field of my discipline]

P49[14] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [A male character from a movie, series, comic book, music, video game, etc.]

P49[15] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [A female character from a movie, series, comic, music, video game, etc.]

P49[16] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [I have not had a role model/referent to follow to my decision]

P49[other] (P62). Have any of the following people in your environment been a role model/reference to your decision to study? (Please tick as many options as appropriate): [Other person. Please specify:]

P50[1] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Mother]

P50[2] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Father]

P50[3] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Sister]

P50[4] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Brother]

P50[5] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Other male family member (uncle, cousin, grandparent, etc.)]

P50[6] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Other female relative (aunt, cousin, grandmother, etc.)]

P50[7] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [A male teacher]

P50[8] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Male school counselor]

P50[9] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Male director of the centre]

P50[10] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [A female teacher]

P50[11] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Female school counselor]

P50[12] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Female director of the centre]

P50[13] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [A male friend]

P50[14] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [A female friend]

P50[15] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [No one questioned my decision]

P50[16] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [I don't remember]

P50[other] (P63). When you expressed the studies you wanted to pursue, did any of the following people around you question your decision or not support you? (Please tick as many options as appropriate): [Other person. Please specify:]

P51 (P64). What do you consider to be the socio-economic level of the area in which you have grown up and developed? (Only one option can be ticked)

P52 (P65). What level of education does your mother or legal guardian have? (Only one option can be ticked)

P53 (P66). What level of education does your parent or legal guardian have? (Only one option can be ticked)

Acknowledgements

This work has been carried out within the PhD Programme Training in the Knowledge Society of the University of Salamanca (<http://knowledgesociety.usal.es>). It has been supported by the Spanish Ministry of Science, Innovation and Universities with a pre-doctoral FPU contract (FPU017/01252).

References

- Verdugo-Castro, S. (2022). *La brecha de género en los estudios universitarios del sector STEM en el espacio español de educación*. Universidad de Salamanca. <https://knowledgesociety.usal.es/users/sonia-verdugo-castro>
- Verdugo-Castro, S., García-Holgado, A., Sánchez-Gómez, M. C., & Costa, A. P. (2023). Factores de la brecha de género en estudios superiores STEM: Libro de Códigos. In Á. Domínguez, F. J. García-Peñalvo, G. Zavala, A. García-Holgado, & H. Alarcón (Eds.), *Mujeres en la educación universitaria de ciencia, ingeniería, tecnología y matemáticas: Atracción, acceso y acompañamiento para reducir la brecha de género en Hispanoamérica* (pp. 301–318). Octaedro.
- Verdugo-Castro, S., Sánchez-Gómez, M. C., & García-Holgado, A. (2022a). Opiniones y percepciones sobre los estudios superiores STEM: Un estudio de caso exploratorio en España. *Education in the Knowledge Society*, 23, 15. <https://doi.org/10.14201/eks.27529>
- Verdugo-Castro, S., Sánchez-Gómez, M. C., & García-Holgado, A. (2022b). University students' views regarding gender in STEM studies: Design and validation of an instrument. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-022-11110-8>
- Verdugo-Castro, S., Sánchez-Gómez, M. C., & García-Holgado, A. (2023). The Opinion of the Spanish University Population on the Existence of Studies and Professions According to Gender. In F. J. García-Peñalvo & A. García-Holgado (Eds.), *Proceedings TEEM 2022: Tenth International Conference on Technological Ecosystems for Enhancing Multiculturality* (pp. 315–324). Springer Nature. https://doi.org/10.1007/978-981-99-0942-1_32
- Verdugo-Castro, S., Sánchez-Gómez, M. C., García-Holgado, A., & Bakieva, M. (2020). Pilot study on university students' opinion about STEM studies at higher education. In F. J. García-Peñalvo (Ed.), *Proceedings of the Eight International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM 2020) (Salamanca, Spain, October 21-23, 2020)* (pp. 158–165). ACM. <https://doi.org/10.1145/3434780.3436616>