

Validation of a Scale of Student Satisfaction with Final Year Degree Projects

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ABSTRACT

Introduction. A key aspect of teaching is analyzed in the framework of Higher Education that is student satisfaction with the completion of Final-Year Degree Projects (FYDP).

Method. A longitudinal study is conducted over three academic years on student satisfaction with FYDPs. The study involves a sample of 1331 students, 1014 undergraduate students, and 217 master's students following 30 degrees projects and 23 master's projects. The objectives of this study are as follows: 1) To find the indicators of reliability and validity of the Satisfaction Scale; 2) To test whether significant differences exist in relation to the two variables 'type of studies' and 'type of discipline'; and, 3) To study the proposals suggested by the students for improvements to their FYDPs.

Results. With regard to the first objective, the indicators tested with Confirmatory Factorial Analysis (CFA) were high ($\alpha = .88$; $\alpha = .90$) both for reliability ($\alpha = .88$; $\alpha = .90$) and for validity. With regard to the second objective, significant differences were found for student satisfaction in relation to both variables on all items of the Scale, except for general satisfaction. In relation to the third objective, the indicators of improvement consisted of optimization of planning and tutoring.

Discussion and conclusions. Future training actions consisted of a training plan for teachers that considered the actions detected for improvement, as well as their follow up in a proposal for continuous improvement.

Keywords. Final degree project, evaluation, satisfaction survey, quality improvement, validation scale.

RESUMEN

Introducción. Este artículo analiza un aspecto referencial en las enseñanzas en el marco de la Educación Superior como es el de la satisfacción de los estudiantes con la realización de los trabajos de fin de titulación (FYDP).

Método. Se realizó un estudio longitudinal durante tres cursos académicos sobre la satisfacción de los estudiantes con los FYDP. Se trabajó con una muestra de 1331 estudiantes, 1014 de grado y 317 de máster distribuidos en 30 grados y 23 másteres. Los objetivos de este estudio fueron 1) Hallar los indicadores de fiabilidad y de validez de la Escala de satisfacción, 2) Comprobar si existían diferencias significativas atendiendo a las variables el tipo de estudios y tipo de rama de conocimiento, 3) Estudiar las propuestas de mejora sugeridas por los estudiantes.

Resultados. Respecto del primer objetivo se encontraron indicadores de fiabilidad altos ($\alpha = .88$; $\alpha = .90$) y de validez que se comprobaron con un Análisis Factorial Confirmatorio (AFC). Respecto del segundo objetivo, se hallaron diferencias significativas en la satisfacción de los estudiantes en las dos variables en todos los ítems de la Escala, salvo en la satisfacción general. Relativo al tercer objetivo, las indicaciones de mejora se concretaron en optimizar la planificación y la tutorización.

Discusión y conclusiones. Futuras acciones formativas se concretan en un plan de formación del profesorado que contemple las acciones de mejora detectadas, así como su seguimiento en una propuesta de mejora continua.

Palabras Clave. Trabajos de Fin de Titulación, evaluación, encuesta de satisfacción, mejora de la calidad, validación escala.

Introduction

State of the Art in the development of Final Year Projects

The university is a complex organization that has both teaching and research as its fields of reference. At an institutional level, many universities have placed emphasis on increasing research studies over and above the development of different teaching actions with a view to improving academic results and the satisfaction of students with their teaching (Kivistö, 2008; Cardoso, Santiago, & Sarrico, 2012). In this sense, there are many studies and lines of research that specifically make reference to teaching actions in the classroom, whether face to face or virtual (Hattie, 2009; Marsh, 2008). Nevertheless, very few of these investigations have analyzed the development of the tutoring actions of the teacher on the Final Year Degree Project -FYDP- (on both degree and master's courses). A significant change has taken place in Spain, since its incorporation in the EHEA (European Higher Education Area), that has affected the structure of study plans for teachers and the system of awarding (ECTS) credits for students. At present, as expressed in Spanish legislation in Royal Decree 1393/2007, the completion of an FYDP is described in all the study plans. That work has to be done, as stated in the aforementioned Royal Decree, in the final months of the studies and can be awarded between 6 and 12 credits. This difference in credits, in the same way as for the diversity of studies that depend on a discipline or branch of knowledge, guides the governance organs of the universities in its monitoring of the progress of those projects (Gaspard et al., 2018). The final objective will be to detect the areas of improvement, so as to implement measures that will increase quality both in the preparation and in the production of those projects (REDU, 2016). It is an important achievement, because the completion of the FYDP is evidence of the acquisition of all the competences associated with the qualification (Pozo & del Puy, 2009). In the Spanish regulations, contained in Royal Decree 96/2014, those competences are of a different scope depending on whether a degree or a master's qualifications is involved; the first would be situated at Level 2 and the second at Level 3 of the Spanish Framework of Qualifications for Higher Education (MECES).

Along these lines, Vera and Briones (2015) in their research on the development of the FYDP found an average indicator of satisfaction among students of 2.89 over 5. Likewise, they found the following: that only 25.9% of those students declared that they had been properly informed of the evaluation criteria used by the tribunals; 47.3% indicated that they had been informed of the competences to be developed through the FYDP, and 41.2% indi-

cated that they had not been properly informed of the assignation of tutors and the procedure for selecting the FYDP. They also found variability, from 3 up to 10 months, with regard to the time of preparation of the FYDP. Likewise, 58.5% of students pointed to the need to increase the credits awarded for the preparation of the FYDP. Moreover, 86.2% indicated the importance of being able to select the tutor and the theme to be developed on the FYDP. With regard to the assessment of the tutoring that was received, the average score of satisfaction was 3.6 out of 5. In all, 63.8% of the students commented on useful aspects of the meetings that had been organized and 60.6% on the importance of the involvement of the tutor for a well-developed project. Likewise, global satisfaction with the project was awarded 3.49 over 5. A total of 51.8% of the students stated that they had learnt the competences assigned to the FYDP. In summary, the conclusions of this study were defined as: increasing the number of credits awarded for the FYDP, improving the tutoring processes, optimizing and uniformizing the evaluation criteria of the academic panels, improving the planning of the FYDP, and increasing the options for the selection of the content of the FYDP.

In this field, another interesting study is the one by Feather, Anchor, & Cowton (2014). Those authors analyzed the development of the FYDP in the United Kingdom. This investigation emphasized the diversity of the types of FYDP and of the credits assigned to those projects (the minimum number of credits for an FYDP is 20). The same authors also remarked on the importance of understanding the previous skills of the students to complete this type of project. For these authors, the key point is to know the initial competences of the students in order, in their case, to be able to provide the necessary assistance through specific processes of tutoring. In addition, they underlined the need to relate the FYDP with employment skills that the future graduates will have to put into practice in their professional life. Finally, the authors expressed the need to adapt student perceptions towards the development of the FYDP with the perceptions of the teachers engaged in the tutoring activities, as well as facilitating teacher training in instruction strategies that strengthen both the guidance and the tutoring (Sáiz, Bol, & Payo, 2014) of their students. The ultimate objective will be that students acquire conceptual and procedural strategies that make independent and efficient learning possible (Sáiz, Montero, Bol, & Carbonero, 2012).

Relevant factors in the Final Year Degree Projects

Looking at the earlier studies, three important factors can be isolated in the development of the FYDP: the evaluation of the process, which would fall to the institution; planning

the development of the FYDP, which would be the responsibility of the institution and those in charge of the educational center registered to impart the qualification and the coordinator of the qualification; and, finally, the work of the tutor, which would correspond to the institution itself in its selection and appointment of the teachers for this task. In addition, the institution makes a commitment to facilitate training to all those responsible at different levels (center, coordinators of the qualification and teachers), based on its ethical commitment to quality work.

Tutoring on the FYDP is therefore considered an effective method for the achievement of quality teaching (Knight, 2005). However, proper training is necessary, to perform good tutoring, especially with regard to tools and procedures that permit the teacher to offer the students feedback oriented towards learning processes (Sáiz & Payo, 2012). Along these lines, the work of the teacher requires a structural framework (Retna, Chong, & Cavan, 2009) directly linked with the organization of these processes that are managed by the centres with which the teacher is associated (Marsh & Hattie, 2002). The aforesaid structure is related with the use of strategies that will help the teacher to detect the learning needs of the students for proper development of the FYDP.

Lastly, the perceptions of the students towards the tutoring process of the FYDP must be evaluated, in order to evaluate the satisfaction of the students with the development of the FYDP (Biggs, 2005). To do so, measurement instruments must be prepared that have acceptable indicators of reliability and validity (Bol, Sáiz, & Pérez, 2013; Sáiz, Bol, & Payo, 2014). These instruments should, in turn, permit a reliable evaluation of the tutoring actions and strengthen the critical reflection of the teachers on their own practice (Gimeno-Sacristan, 2008; Hattie, 2017).

Objectives and hypothesis

With regard to everything that has been previously pointed out, the study has the following three objectives.

In the first place, to study the reliability and the validity of an instrument prepared *ad hoc* for the measurement of student satisfaction with tutoring on the FYDP, through the “Scale of student satisfaction with the development of the FYDP” (FYDP_Sc).

In second place, to study whether significant differences may be found in the degree of student satisfaction on the FYDP_Sc in view of the variables ‘type of qualification (degree vs.

master's)' and type of discipline, type of knowledge branch [Sciences, Health Sciences, Social Sciences, and Juridical (Law, Economics, Education, Labor Relations), Humanities and Engineering].

And finally, to study the proposals for improvement identified by the students in the responses to the open question of the FYDP_Sc.

Thus, two types of analysis were differentiated, one quantitative, that comprised the following three research hypotheses:

1. The FYDP_Sc will obtain high indices for reliability and validity.
2. There will be significant differences in relation to the variable type of qualification (degree vs. master) in the different dimensions of the FYDP_Sc.
3. There will be significant differences in the FYDP_Sc in relation to the variable type of branch of knowledge [Sciences, Health Sciences, Social Sciences, and Juridical (Law, Economics, Education, Labor Relations), Humanities and Engineering] in the different dimensions of the survey on satisfaction.

Finally, another qualitative analysis will be centered on the detection of the areas for improvement proposed by the students in the responses to the open question.

Method

Participants

Work was done with a sample of 1331 students, 1014 undergraduates and 317 master's students over three academic courses (2014-2015, 2015-2016 and 2016-2017) distributed across different branches of knowledge [Sciences (7.23%); Health Sciences (6.93%); Social and Juridical Sciences, distinguishing between: Law (6.63%), Economics (13.49%), Education (34.14%), Humanities (8.97%); and Engineering (22.61%)]. Having filtered out incomplete questionnaires the database contained $n = 1327$ individuals, which indicates a percentage loss of values lower than 1%.

Instruments

The "Scale of student satisfaction with the development of the FYDP" (FYDP_Sc) was used. The instrument analyzes the degree of student satisfaction with the development of

the FYDP and has thirteen closed response items on a Likert type scale of 1 (not satisfied) to 5 (Very satisfied) and, one with the possibility of an open response related to the specification of proposals for improvements to increase the quality of the development of the FYDP.

Procedure

The administration of the Scale took place over three academic years (2014-2015, 2015-2016 and 2016-2017) using Survey Methodology. The response rates were respectively 28.98%, 55.28% and 31.43%. The surveys were anonymous, identifying only the variables qualification and academic year, so as to ensure the transparency and confidentiality of the responses from the students. Before conducting the survey, the students had been informed of its purpose and had given their written consent for their participation in the study. Likewise, prior to its commencement, the study had been approved by the Bioethics Committee of the University of Burgos, because participation in these studies on satisfaction with teaching and tutoring actions is always voluntary. Likewise, the conditions for that participation are clearly explained in each of the satisfaction surveys that are applied at an institutional level. These surveys form part of the protocol of institutional surveys that has previously been approved by the Quality Committee of the University and that forms part of the controls over institutional quality built into the monitoring processes of the Quality Agencies in university environments both at a national level in Spain through two agencies -*Agencia Nacional de Evaluación de la Calidad y Acreditación (ANECA)* and *Agencia para la Calidad del Sistema Universitario de Castilla y León (ACSUCYL)*- and at an international level through the European Association for Quality Assurance in Higher Education (ENQA).

Data analysis

First of all, a quantitative study was performed. The first step in the study was the completion of a reliability analysis of the Scale. To do so, the Cronbach's Alpha test was used (α) for the whole Scale and for each one of its elements. A statistical descriptive study (average and standard deviation) was also performed, as well as an exploratory Principal Component Analysis (PCA), and a Structural Equations-based Confirmatory Factorial Analysis (CFA). In addition, the indicators of composite reliability and the average extracted variance were found. Likewise, a study of indicator asymmetry and kurtosis was completed, as well as a fixed-effects ANOVA (Factor 1: type of studies: degree vs. master's course; Factor 2: type of branch of knowledge [Sciences, Health Sciences, Social and Juridical Sciences (Law, Eco-

nomics, Education, Labor Relations), Humanities and Engineering], also analyzing the effect value (η^2). The analyses were done with the statistical package SPSS v.24 and AMOS v. 24.

In second place, a qualitative analysis was performed on the data that consisted of analysis of treatment and text processing. To do so, a frequency analysis was applied to the categorization of the texts in reply to the question with an open response, for which purpose the ATLAS ti v.8 software was used. The categorization of the responses was done after the application of the Scale, because only one open question was posed “Please suggest what you would change to improve quality in the development of the Undergraduate / Masters FYDP” and no categories could therefore be established *a priori*.

A pre-experimental case design was used with only one measurement (Campbell & Stanley, 1966).

Results

Preliminary analysis

Before testing the hypothesis, the normality of the scores was studied, for which purpose the indicators of asymmetry and kurtosis of the data were found. As may be observed in Table 1, the statistics were acceptable [values higher than |2.00| indicate extreme asymmetry and the lowest values indicate normality, and, for kurtosis, the values between |8.00| and |20.00| suggest extreme kurtosis (Bandalos & Finney, 2001)]. It may therefore be concluded that the distribution of the sample was normal, which justifies the use of parametric techniques of analysis (see Table 1).

Table 1. Matrix of inter-element correlations of the Evaluation Scale of Student Satisfaction with FYDP (FYDP_Sc)

Items	1	2	3	4	5	6	7	8	9	10	11	12
Q1. I was clearly aware of the objectives to be achieved, before the start of the Undergraduate / Masters FYDP												
Q2. The content of the Undergraduate / Masters FYDP was well defined from the outset	.63**											
Q3. The planning and timing of the project were both acceptable	.39**	.56**										
Q4. The resources in use were sufficient to cover all the set objectives	.41**	.56**	.61**									
Q5. Throughout the project, development of both the theoretical and the practical knowledge acquired on the course has been possible	.37**	.43**	.37**	.52**								
Q6. The availability of the academic tutor was sufficient	.25**	.35**	.35**	.42**	.34**							
Q7. The academic tutor has supported and directed the completion of the project and the dissertation in an effective manner	.30**	.40**	.42**	.49**	.39**	.85**						
Q8. Extent of your initial motivation on the Undergraduate / Masters FYDP.	.34**	.35**	.27**	.31**	.39**	.16**	.19**					
Q9. Adaptation of the Undergraduate / Masters FYDP with the studies completed.	.36**	.45**	.38**	.48**	.59**	.28**	.33**	.48**				
Q10. The completion of the Undergraduate / Masters FYDP has implied a significant contribution to improve my education	.37**	.43**	.35**	.45**	.58**	.29**	.33**	.54**	.57**			
Q11. In general, I am happy with the work of the academic tutor	.29**	.39**	.40**	.49**	.38**	.86**	.90**	.19**	.33**	.33**		
Q12. In general, I am satisfied with the Undergraduate / Masters FYDP that I have completed	.35**	.41**	.44**	.53**	.51**	.37**	.43**	.44**	.51**	.53**	.46**	
Q13. The quantity of work required for the completion of the Undergraduate / Masters FYDP, in relation to other subjects with the same number of credits, has been, (very little, 1; ... a lot, 5)	.01	-.02	-.06*	-.001	.10**	.05	.03	.04	.04	.08**	.04	.11**
<i>Mean</i>	2.77	2.80	2.85	3.24	3.38	3.76	3.57	3.38	3.52	3.32	3.60	3.75
<i>SD.</i>	1.27	1.5	1.29	1.18	1.17	1.37	1.40	1.28	1.17	1.30	1.39	1.12
<i>Asymmetry</i>	.15	.15	.04	-.33	-.41	-.81	-.58	-.44	-.51	-.38	-.62	-.84
<i>SAE</i>	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
<i>Kurtosis</i>	-1.04	-.98	-1.13	-.74	-.71	-.63	-1.01	-.88	-.55	-1.04	-.94	-.94
<i>SKE</i>	.14	.14	.14	.14	.14	.14	.14	.14	.14	.14	.14	.14

Note. * p<0.05; ** p<0.01; SD = Standard Deviation; SAE = Standard Asymmetry Error; SKE = Standard Kurtosis Error

Test of the first hypothesis

The internal consistency of the FYDP_Sc was analyzed, for which purpose Cronbach's Alpha was used (α). A reliability coefficient for the complete Scale was found of $\alpha = 0.90$. The reliability of the scale was also analyzed, by applying the test of two halves, which yielded $\alpha = 0.82$ for both the first and the second half and a Spearman-Brown coefficient = 0.86. The degree of homogeneity and internal consistency of the FYDP_Sc was also analyzed. In the first place, the existence or otherwise of relations between the variables was studied, with the objective of determining possible differences, for which purpose the Kaiser-Meyer-Olkin (KMO) test was applied and the Bartlett test of sphericity. The results on both indices were acceptable. The values closest to unity were accepted for KMO; in this case a KMO = 0.87 was obtained. With regard to the Bartlett test of sphericity an $\chi^2 = 7076.70$ was obtained, $p < .000$ and the hypothesis of the orthogonality of the matrix of correlations was rejected, which supports the pertinence of performing an CFA. Subsequently, the correlations between the items were found, which as can be observed in Table 1, are of some significance between all the elements, situating the coefficients of correlation in an interval of $r = .16$ to $r = .90$, except in item 13 (which refers to the workload that the completion of the FYDP implies for the student) where the lowest correlations were found. It can therefore be inferred that this item appears not to have any relation with the degree of satisfaction of the students with the other dimensions of the Scale. It is also relevant to point out that its average index was the highest ($M = 4.22$). Moreover, no correlations higher than $r = .90$ were found between the items, for which reason none of them were deleted.

Subsequently, within the analysis of items, the correlation of the total item with the scores, when each element of the scale is removed (indices of discrimination) from the scale was defined (see Table 2). The correlations between each element and the total were situated between $r = .53$ and $r = .69$ except the correlation between item 13 and the total that gave $r = .06$, so this item was removed from the Scale. Afterwards, the composite reliability was calculated, and average variance extracted taking into account the 12 items and the factorial saturations of the exploratory factorial analysis, obtaining an excellent reliability of 0.95 and a good average variance extracted of 0.61.

Table 2. *Internal validity of the items of the Scale of evaluation of student satisfaction with the FYDP*

Items	Correlation corrected element-total	Cronbach's Alpha if the element is removed
Q1. I was clearly aware of the objectives to be achieved, before the start of the Undergraduate / Masters FYDP	.53	.88
Q2. The content of the Undergraduate / Masters FYDP was well defined from the outset	.65	.88
Q3. The planning and timing of the project were both acceptable	.59	.88
Q4. The resources in use were sufficient to cover all the set objectives	.69	.88
Q5. Throughout the project, development of both the theoretical and the practical knowledge acquired on the course has been possible	.64	.88
Q6. The availability of the academic tutor was sufficient	.60	.88
Q7. The academic tutor has supported and directed the completion of the project and the dissertation in an effective manner	.68	.88
Q8. Extent of your initial motivation on the Undergraduate / Masters FYDP.	.50	.89
Q9. Adaptation of the Undergraduate / Masters FYDP with the studies completed.	.61	.88
Q10. The completion of the Undergraduate / Masters FYDP has implied a significant contribution to improve my education	.63	.88
Q11. In general, I am happy with the work of the academic tutor	.67	.88
Q12. In general, I am satisfied with the Undergraduate / Masters FYDP that I have completed	.66	.88

Additionally, with a view to analyzing the validity of the Scale, an Exploratory Factorial Analysis (EFA) with normalized Varimax-rotated Principal Component Analysis (PCA) was performed. As may be observed in both Table 3 and Table 4, three factors were detected that explained 70.20% of the variance. The first factor is related to the planning and guidance for completion of the FYDP, the second is related to the tutoring, and the third makes reference to the relation between FYDP and the adaptation of the FYDP to the Study Plan of the qualification.

Table 3. *Total variance explained in internal validity of the items of the Evaluation Scale of student satisfaction with the FYDP.*

Component	Total	% variance	% accumulated
Q1. I was clearly aware of the objectives to be achieved, before the start of the Undergraduate / Masters FYDP	5.33	48.50	48.50
Q2. The content of the Undergraduate / Masters FYDP was well defined from the outset	1.40	12.74	61.24
Q3. The planning and timing of the project were both acceptable	0.99	8.96	70.20
Q4. The resources in use were sufficient to cover all the set objectives	0.68	6.25	76.45
Q5. Throughout the project, development of both the theoretical and the practical knowledge acquired on the course has been possible	0.56	5.12	81.59
Q6. The availability of the academic tutor was sufficient	0.46	4.19	85.79
Q7. The academic tutor has supported and directed the completion of the project and the dissertation in an effective manner	0.41	3.69	89.47
Q8. Extent of your initial motivation on the Undergraduate / Masters FYDP.	0.36	3.31	92.78
Q9. Adaptation of the Undergraduate / Masters FYDP with the studies completed.	0.35	3.15	95.925
Q10. The completion of the Undergraduate / Masters FYDP has implied a significant contribution to improve my education	0.32	2.89	98.82
Q11. In general, I am happy with the work of the academic tutor	0.13	1.19	100.00
Q12. In general, I am satisfied with the Undergraduate / Masters FYDP that I have completed	5.34	48.50	48.50

Table 4. *Factors and associated items on the Evaluation Scale of student satisfaction with the FYDP*

Definition of the Item	Factor Weight Factor 1	Factor Weight Factor 3	Factor Weight Factor 1
Q1 You were clearly aware of the objectives to be achieved, before the start of the Undergraduate / Masters FYDP	0.76	0.06	0.25
Q2. The content of the Undergraduate / Masters FYDP was well defined from the outset	0.81	0.18	0.28
Q3. The planning and timing of the project were both acceptable	0.71	0.29	0.20
Q4. The resources in use were sufficient to cover all the set objectives	0.60	0.36	0.38
Q5. Throughout the project, development of both the theoretical and the practical knowledge acquired on the course has been possible	0.24	.25	0.70
Q6. The availability of the academic tutor was sufficient	0.16	0.91	0.13
Q7. The academic tutor has supported and directed the completion of the project and the dissertation in an effective manner	0.23	0.91	0.18
Q8. Extent of your initial motivation on the Undergraduate / Masters FYDP.	0.17	-0.03	0.75
Q9. Adaptation of the Undergraduate / Masters FYDP with the studies completed.	0.24	0.15	0.76
Q10. The completion of the Undergraduate / Masters FYDP has implied a significant contribution to improve my education	0.26	0.33	0.65
Q11. In general, I am happy with the work of the academic tutor	0.23	0.15	0.80
Q12. In general, I am satisfied with the Undergraduate / Masters FYDP that I have completed	0.20	0.92	.19

Note. Factor 1 = Planning and guidance to complete the FYDP; Factor 2: Tutoring by the tutor in charge; Factor 3 = Adaptation of the FYDP to the Study Plan of the qualification. Factor Weights >0.60 appear in black.

Subsequently, a CFA was performed, with the aim of establishing the structural validity of the factorial solution. Then, an EFA was performed with the objective of finding the structural validity of the factorial solution obtained with the EFA, using the multivariable technique of Structural Equations. As may be seen in Table 5, the fit of the model with the three factors found by the EFA may be compared with the Saturated model and the Independent model.

Likewise, the composite reliability was calculated, and the average variance extracted on the basis of the saturations and the measurement errors from the CFA: an excellent global the reliability indices were excellent at a global level, 0.95, and in the three factors Factor 1 = 0.99, Factor 1 = 0.99 and Factor 3 = 0.99, the average variance extracted exceeding in all cases a value of 0.50.

Table 5. *Goodness-of-Fit Indices*

		Default model	Saturated model	Independence model	Accepted value
Residual Base Indices	<i>df</i>	51	-	-	
	χ^2/df	516.735** <i>p</i> = .00	.00	10045.41	
	CMIN/ <i>df</i>	10.132		152.20	
	RMSEA	0.08	-	0.34	[0.05, 0.08]
	RMSEA confidence interval	[0.08, 0.09]		[0.33,0.34]	
	SRMR	0.05	-	-	0.05-.08
Comparative fit index	NFI	0.95	1.00	0.00	0.90-0.95
Variance proportion of the indices	CFI	0.95	1.00	0.00	0.95-0.97
Degree of parsimony of the indices	TLI	0.94	-	0.00	0.85-0.90
	AIC	594.74	180.00	10093.41	The lowest value
	ECVI	0.45	0.14	7.61	
	ECVI interval (90%)	0.40-0.51	0.14-0.14	7.37-7.61	

Note. ***p*<0.01; CMIN = minimum discrepancy divided by *df*; NFI = normed fit index; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = Root Mean Square Error of Approximation; AIC = Akaike Information Criterion; ECVI = parsimonious fit index.

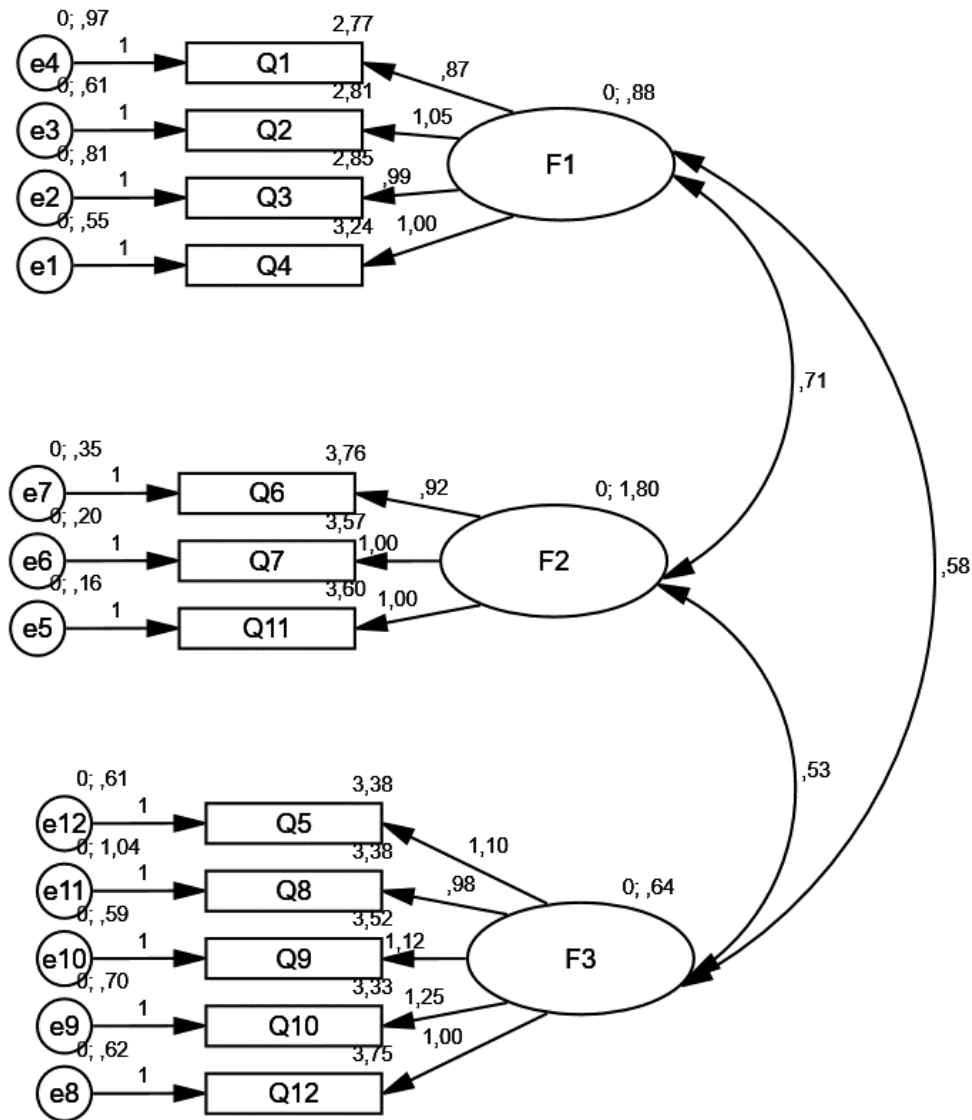


Figure 1. Multiple squared correlations and non-standardized regression weights.

Confirmation of the second hypothesis

Significant differences were found in the variable type of studies under the items Q1, Q6, Q7, Q11 and Q12. Q1 is one of the items that comprises Factor 1 and Q12 comes under F2 (see Table 6). However, significant differences for all items were found under Factor 2, which indicates that undergraduate students and the master’s students perceive the tutoring function in different ways. The differences were in favor of the master’s students rather than the graduate students in all items except under item Q12, which makes reference to the degree of general satisfaction, which was higher among the degree students than among the master’s students. Subsequent studies will analyze the reasons for this general perception

among master's students when their perceptions of the other elements of the scale are lower than the perceptions of the degree students.

Table 6. *Descriptive statistics and fixed-effects ANOVA (type of qualification Undergraduate vs. Master's) and the effect value (η^2) on student satisfaction with the development of the FYDP*

	Degree <i>n</i> = 1014	Master's <i>n</i> = 317	<i>F</i> (1, 1325)	<i>p</i>	η^2
	<i>M</i> (<i>DT</i>)	<i>M</i> (<i>DT</i>)			
Q1. I was clearly aware of the objectives to be achieved, before the start of the Undergraduate / Masters FYDP.	2.70(1.23)	3.00(1.32)	14.128	.00**	.011
Q2. The content of the Undergraduate / Masters FYDP was well defined from the outset	2.77(1.26)	2.90(1.33)	2.547	.11	.002
Q3. The planning and timing of the project were both acceptable	2.47(1.05)	2.64(1.25)	0.619	.43	.000
Q4. The resources in use were sufficient to cover all the set objectives	3.22(1.19)	3.30(1.15)	1.079	.30	.001
Q5. Throughout the project, development of both the theoretical and the practical knowledge acquired on the course has been possible.	3.38(1.15)	3.38(1.17)	0.001	.97	.000
Q6. The availability of the academic tutor was sufficient	3.70(1.40)	4.00(1.24)	10.362	.001*	.008
Q7. The academic tutor has supported and directed the completion of the project and the dissertation in an effective manner.	3.50(1.44)	3.78(1.25)	9.640	.002*	.007
Q8. Extent of your initial motivation on the Undergraduate / Masters FYD	3.40(1.26)	3.30 (1.34)	1.603	.21	.001
Q9. Adaptation of the Undergraduate / Masters FYDP with the studies completed	3.55(1.15)	3.43(1.22)	2.432	.12	.002
Q10. The completion of the Undergraduate / Masters FYDP has implied a significant contribution to improve my education	3.34 (1.27)	3.26(1.37)	0.987	.32	.001
Q11. In general, I am happy with the work of the academic tutor	3.54(1.42)	3.80(1.10)	8.287	.004**	.006
Q12. In general, I am satisfied with the Undergraduate / Masters FYDP that I have completed	3.80(1.10)	3.61(1.13)	6.552	.01**	.005

* $p < 0.05$, ** $p < 0.01$ M = Mean; SD = Standard Deviation

Test of the third hypothesis

Significant differences were found between all the qualifications for satisfaction with the completion of the FYDP (see Table 7). Nevertheless, the effect values were not high, which relativizes the value of the differences that were found. These differences are especially evident and favor the studies from the Science disciplines rather than other branches of knowledge.

Table 7. Descriptive statistics and fixed-effects ANOVA (type of knowledge branch) and effect value (η^2) on student satisfaction with the development of the FYDP

Items	1.Sciences	2. Health Sciences	3.Law	4.Economics	5.Education	6. HPS	7.Humanities	<i>F</i> (7, 1319)	η^2	<i>Bonferroni test</i>
	<i>n</i> = 96	<i>n</i> = 92	<i>n</i> = 79	<i>n</i> = 179	<i>n</i> = 453	<i>n</i> = 300	<i>n</i> = 119			
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)			
Q1	3.18(1.33)	2.88 (1.14)	2.90(1.41)	2.70(1.28)	2.60(1.24)	2.88(1.22)	2.81(1.26)	5.185**	.027	1-5
Q2	3.39(1.27)	2.90(1.33)	3.01(1.40)	2.61(1.25)	2.71(1.20)	2.71(1.20)	3(1.25)	3.219**	.017	1-4, 1-5, 1-6
Q3	3.23(1.30)	2.72(1.21)	3(1.33)	2.90(1.22)	2.87(1.26)	2.63(1.26)	2.90(1.31)	9.906**	.050	1-6
Q4	3.96(1.01)	3.12(1.09)	3.45(1.18)	3.20(1.13)	3.25(1.12)	2.91(1.24)	3.44(1.18)	3.912**	.020	1-2, 1-4, 1-5, 1-6, 1-7, 3-6, 5-6, 6-7
Q5	3.80(.99)	3.36(1.07)	3.27(1.28)	3.17(1.22)	3.17(1.22)	3.31(1.19)	3.41(1.13)	4.711**	.024	1-4, 1-5, 7-4
Q6	4.20(1.20)	3.46(1.46)	4.02(1.28)	3.48(1.41)	3.73(1.39)	3.74(1.28)	4(1.31)	7.425**	.038	1-2, 1-4, 7-2, 7-4
Q6	4.14(1.23)	3.25(1.51)	3.85(1.30)	3.21(1.44)	3.64(1.37)	3.38(1.38)	3.91(1.36)	7.347**	.038	1-2, 1-7, 3-4, 7-6
Q8	4.09(.87)	3.48(1.14)	3.31(1.38)	3.17(1.26)	3.19(1.33)	3.52(1.23)	3.46(1.28)	4.301**	.022	1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 6-5
Q9	3.92(1)	3.64(1)	3.37(1.34)	3.37(1.19)	3.54(1.89)	3.34(1.16)	3.77(1.11)	7.860**	.040	1-3, 1-4, 1-6, 7-6
Q10	3.92(1.02)	3(1.30)	3.13(1.43)	3(1.30)	3.20(1.34)	3.58(1.14)	3.42(1.32)	6.204**	.032	1-2, 1-3, 1-4, 1-5, 6-2, 6-4, 6-5
Q11	4.14(1.17)	3.35(1.50)	3.89(1.30)	3.20(1.47)	3.62(1.39)	3.52(1.33)	3.90(1.33)	2.077*	.011	1-2, 1-4, 1-5, 1-6, 3-4, 7-4
Q12	3.91(1.05)	3.83(1.10)	3.80(1.23)	3.57(1.24)	3.80(1.02)	3.63(1.17)	3.90(1.02)	5.185**	.027	1-4

* $p < 0.05$, ** $p < 0.01$; HPS = Higher Polytechnic School; M = Mean; SD = Standard Deviation

Note. In this analysis, a center was removed that already had a response rate lower than 20% ($n = 9$ responses). Q1. I was clearly aware of the objectives to be achieved, before the start of the Undergraduate / Masters FYDP; Q2. The content of the Undergraduate / Masters FYDP was well defined from the outset; Q3. The planning and timing of the project were both acceptable; Q4. The resources in use were sufficient to cover all the set objectives; Q5. Throughout the project, development of both the theoretical and the practical knowledge acquired on the course has been possible; Q6. The availability of the academic tutor was sufficient; Q7. The academic tutor has supported and directed the completion of the project and the dissertation in an effective manner; Q8. Extent of your initial motivation on the Undergraduate / Masters FYD; Q9. Adaptation of the Undergraduate / Masters FYDP with the studies completed; Q10. The completion of the Undergraduate / Masters FYDP has implied a significant contribution to improve my education; Q11. In general, I am happy with the work of the academic tutor; Q12. In general, I am satisfied with the Undergraduate / Masters FYDP that I have completed.

Finally, a qualitative analysis was completed to study the areas of improvement that the students proposed in reply to the question with an open answer (“Please suggest what you would change to improve quality in the development of the Undergraduate / Masters FYDP?”), yielding the results that are presented in Figure 2.

followed on the qualification, as it implies the practical application of the competences that have been gained. This result will, therefore, be an object of study in subsequent works. It indicates on the one hand, that the completion of the FYDP is associated with a high workload in relation to the number of awardable credits in the study plan and, on the other hand, that this aspect has no relevance to general satisfaction with the completion of those projects.

Nevertheless, there are indeed other aspects relating to the three factors found in the FYDP_Sc: Factor 1: Planning and guidance to complete the FYDP; Factor 2: Tutoring by the tutor in charge; Factor 3: Adaptation of the FYDP to the Study Plan of the qualification. These last results are in agreement with the findings of Vera and Briones (2015).

Differences in the satisfaction of the Undergraduate students vs. the master's students

The difference found between the satisfaction of the students, depending on whether they followed either undergraduate or master's courses for their qualifications might be related with the previous competences of those students when commencing the FYDP. These competences are linked to some aspects of the planning of the FYDP, and to the perceptions that some students have of the effectiveness of the tutoring with respect to the others. These results were previously pointed out in the work of Feather et al. (2014). Likewise, these differences can be explained by the fact that the master's students held a Level 3 MECES and were following specialized qualifications. Their situation might be associated with a higher degree of motivation towards the objectives to be learnt. It could likewise be related to more specialized choices in the options of the FYDP as against those for the undergraduates that might be more generalist.

Differences in student satisfaction depending on the qualification they are following

Along the lines of the conclusions on the preceding point, whether the variable 'type of qualification' influenced the results of student satisfaction was also studied. Significant differences were found on the degree of student satisfaction depending on the course that was followed, and, therefore, differences in satisfaction related to the branch of knowledge. The students with higher levels of satisfaction followed courses leading to qualifications in the disciplines of the Sciences. This fact might be related to the greater possibility that these students have for the practical application of the competences acquired throughout the course. The students from this knowledge branch completed the FYDP in laboratories under direct supervision and in the presence of the tutor of the FYDP, which implies greater interaction

and a more systematic follow up. The students from other branches of knowledge had greater difficulty developing the FYDP in practical environments under the continuous supervision of the FYDP tutor.

Final considerations and decision making

In summary, the aspects that the students have considered as points of analysis for increasing quality in the completion of the FYDP are related to better planning of the development of the FYDP, and with better training for tutors. In addition, they also increase the relation between the competences developed throughout the qualification and the preparation of the FYDP, which will corroborate what has been indicated in the studies of Retna et al. (2009) and Feather et al. (2014).

The actions that will be implemented to achieve this improvement objective consist of increasing the possibility of selecting the optional choices of the FYDP and the tutor, as well as evening the evaluation criteria and supervising their implementation in agreement with the points raised in Feather et al. (2014).

In view of the above, actions for institutional improvements are proposed as future lines of work that would be defined in a specific training plan. That plan would have three levels of action: level 1, directed at those in charge of the centers (directors and decans); level 2, oriented towards the coordinators of the qualification; and, level 3, directed at the tutors of the FYDP. This plan will be structured around three centers of interest: 1) relating the competences of the FYDP with the competences of the course [FYDP competences (general and specific); and, 2) relating the competences of the FYDP with the competences that the future undergraduates will have to develop in the professional working environments associated with the qualification that is followed]. At all three levels, aspects relating to the following points will be continued: implementation of the strategies to improve planning and guidance for the student to complete the FYDP; teaching strategies to improve tutoring by the tutor in charge; and, the adaptation of the FYDP to the Study Plan of the course leading to the qualification. However, the degree of implementation will be different in view of the institutional role that they are performing. Nevertheless, those strategies in the different roles will be interconnected in a decision-making structure that will be interactive and binding, in such a way that all staff responsible for planning the FYDP have to work in a coordinated way towards a common objective that is the improvement of planning. These actions will be reflected in the Improvement Plan included in the monitoring reports of the degree courses and will be sub-

ject to intensive yearly scrutiny within the University Quality Evaluation Area and externally by a regional quality control agency [*Área de Evaluación de la Calidad de la Universidad* and the *Agencia de Calidad Autónoma*].

Finally, the results found in this study have to be given prudent consideration, the limitations on any generalization of the results are related with the characteristics of the sample, all students are from one single university and they responded voluntarily to the FYDP_Sc. In addition, there are other variables [choice of tutor, topic, learning style of students, learning results] that they have not been able to study, as the responses were anonymous, and yet may be influencing the satisfaction of the students.

Thus, future lines of research will be directed towards the administration of the FYDP_Sc to students from other universities. Likewise, it is considered that the evaluation through techniques of meta-analysis by the institutions themselves is essential for the process of continuous improvement of quality teaching and for the commitment towards institutional transparency and reporting from in this case institutions of Higher Education (Gaspard et al., 2018).

Ethical norms

The design of the investigation was developed in accordance with the Declaration of Helsinki and Spanish legislation on Data Protection [*Ley española de Protección de Datos Personales* (15/1999)]. Permission from the Ethics Committee of the University of Burgos as well as the informed consent of all participants prior to their involvement in the study.

Conflict of interests

The authors declare that the investigation was completed in the absence of any commercial or financial relation that might be interpreted as a possible conflict of interests.

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