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Active Learning in Economics:

A Comparative Analysis of challenge-based learning and  
team-based learning impact on students' satisfaction

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# **Active Learning in Economics: A Comparative Analysis of challenge-based learning and team-based learning impact on students' satisfaction**

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## **ABSTRACT:**

In the contemporary academic system, a substantial body of literature emphasizes the central role of active learning in fostering inclusion.

This study compares two different teaching approaches focused on the active engagement of students: challenge-based learning (CBL) and team-based learning (TBL). These two teaching methodologies have several similarities including the fact that students work in small heterogeneous groups to solve problems and brainstorm together.

In a nutshell, in the CBL application analysed in this paper each team deals with a specific spinoff project in order to get an in-depth understanding of and empathise with real user/customer needs and prototype impactful service experiences, whereas with the TBL application, the analysed students attending a Macroeconomics undergraduate course address problems in small teams as the final step of a sequence of tests involving both individual and team work.

The study analyses the impact of these teaching methodologies on three bachelor-degree classes in different economics courses by focusing on students' satisfaction with the teaching activity and their perceptions about it.

Preliminary results confirm an overall general satisfaction with the experience which differs in its sub-components according to the students' characteristics and the teaching methodology. The inclusive dimension of the experimented active learning strategies can be found in the greater satisfaction shown by students in minority groups (in terms of gender, ethnicity or lower previously acquired hard skills) with a different statistical significance and size in the courses analysed.

**Key-words:** Active Learning, Higher Education, Challenge-Based Learning, Team-Based Learning, Students' satisfaction, Inclusion

## 1. INTRODUCTION

Across various courses, spanning different sizes, academic levels, and student demographics, research suggests that students tend to learn more effectively in classes that incorporate active learning strategies (Fridolin et al. 2022; Freeman et al., 2014). This approach, celebrated for its effectiveness in facilitating diverse modes of engagement, stands as a marker of inclusiveness and benefit especially for students who are marginalised or at risk of low learning outcomes. Active learning approaches have been found to have a positive impact on students' learning outcomes (Alqasa and Afaneh, 2022; Armbruster et al., 2009; Fayombo, 2012; Freeman et al. 2014; Jung et al. 2017; Kalaian et al., 2018; Zhao et al., 2018) and students' satisfaction (Alqasa and Afaneh, 2022; Fayombo, 2012; Jung et al. 2017).

The teaching methodologies that use active learning strategies analysed in this essay are challenge-based learning (CBL) and team-based learning (TBL). They both include teamwork in small groups and go beyond simply covering content and provide students with the opportunity to practise using course concepts to solve practical problems. In the CBL application analysed, each team deals with a specific spinoff project in order to get an in-depth understanding of and empathise with real user/customer needs and prototype impactful service experiences. TBL, initiated by Michaelsen in the late 1970s (Michaelsen *et al.* 1997), consists of different modules starting with a flipped classroom activity requiring students to provide out-of-class preparation on the TBL content, an individual multiple-choice test (iRAT) followed by its replication based on teamwork (tRAT), feedback from the teacher on the test and an application exercise (tAPP). The application exercise challenges students to apply the acquired contents to solve real-world problems in the scientific domain of its application and is particularly close to the CBL application in introducing students to practice and real economic/business problems. Small group work takes place in the classroom (within the tRAT and the tAPP modules) but it is also encouraged out of the classroom.

Studies – including those by Manfrin *et al.* (2019) and Saadaldin *et al.* (2022) – on the impact of TBL pedagogy on students' satisfaction, measured by quantitative and/or qualitative analyses, detect a positive impact of TBL activities.

This paper is structured as follows: section 2 describes the methods (experiment, variables and the empirical model); section 4 follows with the results and section 5 expresses the conclusions and offers policy suggestions.

## 2. RESEARCH METHODS

This section presents the methods that were followed to respond to our research question regarding the impact of the two active learning methods on the students' level of satisfaction, together with the composition of the groups of students participating in the evaluation.

## **Participants**

The participants are students enrolled in undergraduate courses in the Economics Department in a medium-sized public university located in the North of Italy in the academic year 2022/2023. The students come from three different bachelor's degree programmes namely marketing (CLEMI; n =75), finance (CLEF; n = 65) and business (CLEAM; n=91).

The students from the Business and Finance programmes belong to the same cohort and attend Macroeconomics classes in the second year of their bachelor's degree, whereas students from marketing are in the third year of their bachelor's degree and are attending the Marketing Research course.

**Identification strategy and selection problems:** The sample potentially involved all students who are required to take the exam in the courses analysed, i.e. 169 for the Marketing Research course, 183 for Macroeconomics in the Finance degree and 226 for Macroeconomics in the Business degree for an overall total of 578.

In order to be included in the sample, three conditions needed to be met simultaneously: firstly, the student had to be treated; secondly, he or she had to have filled out the preliminary questionnaire (which provided us with his or her demographic, ability and attitudinal information) and lastly, he or she must also have filled out the follow-up questionnaire. The intersection of all these conditions jointly gave us the final sample of 231 students (65 from Finance, 91 from Business and 75 from Marketing).

Restricting our sample only to those who had completed the questionnaire and attended the active lessons (TBL or CBL) could have created a sample bias. Sample shrinkage *per se* is not a problem. The bias would have come from the fact that the individuals in the sample were not randomised but rather self-selected. Since lesson attendance is not mandatory the most frequent dynamic is that students with work commitments, longer enrolment histories, lower motivation levels, or sporadic attendance are underrepresented in the sample. As our evaluation primarily focuses on assessing various teaching activities, we do not perceive a particular issue with self-selection because we are interested in observing the response of the average student who participates in these activities. However, this premise is taken into consideration and discussed in the conclusions because the results cannot be generalised with respect to all students but pertain to the "typical attending student".

### Course(s) design

As mentioned, three different bachelor's degree programmes in the same Economics department are involved in the study, namely Finance, Marketing and Business.

The degree programmes are basically similar as regards their fundamental macro-subjects (especially in the first year), but then each of them has exams focused on different content: the Finance major is the one with the highest quantitative and mathematical content while the Marketing major has the lowest.

Table 1 below clearly and concisely displays several aspects of the sample and teaching methodologies of the three courses.

**Table 1 – Characteristics of lectures and teaching methodology in the three courses.**

	<b>Marketing</b>	<b>Finance</b>	<b>Business</b>
Teaching methodology	CBL	TBL	TBL
Bachelor years in which the course is taken	3°	2°	2°
Course	Market research	Introduction to macroeconomics	Introduction to macroeconomics
Typology of the course	compulsory	compulsory	compulsory
Total number of lectures in the semester	24	36	36
Number of lectures spent on the active teaching methodology	12	6	6
Number of credits	6	9	9
Number of groups	25	19	27
Number of members per group	5/6	5/6	5/6
Group creation rule	Maximum inner heterogeneity	Maximum inner heterogeneity	Maximum inner heterogeneity
Reward system (extrinsic motivation)	Yes	Yes	Yes
Activities planned outside of teaching hours	Interviews with real users/customers	Previous study of the course topics covered in the TBL session	Previous study of the course topics covered in the TBL session

The courses in which the two teaching methodologies are applied are Introduction to Macroeconomics, which is part of the Finance and Business degree programmes and employs the TBL teaching methodology, and the Market Research course within the Marketing programme, where the CBL approach is used.

TBL-related teaching activities were carried out in the Introduction to Macroeconomics course taught in the second year for Finance and Economics degree students, while CBL was implemented in the Market Research course of the Marketing degree. All three courses are compulsory.

Courses in Macroeconomics also have an identical number of credits (9) and scheduled lessons: 36 lessons lasting one and a half hours and 6 of these lessons were used for the TBL activity. Meanwhile, the course in Market research lasted 24 lessons and weighed 6 credits, but the lessons dedicated to the CBL were 12.

Regarding the organisation of active learning activities, the number of groups was around 20-30 teams according to the course and each group had 5/6 components. Group creation followed the principle of maximum inner heterogeneity promoting diversity and complementarity of skills within each group. Additionally, in all courses, group creation followed the G(roup)Rumbler algorithm developed by Malcolm K. Sparrow in 2011 (Sparrow, 2011).

As regards the TBL, students from the Business and Finance bachelor courses, arrived at their lessons having already studied the topics of the TBL session. They replied to multiple-choice questions initially on an individual basis (iRAT<sup>1</sup>) and then in teams (tRAT<sup>2</sup>). Team application (tAPP) came in the next phase, where they solved real-world problems using the knowledge they had acquired, requiring deductive reasoning. The lecturer provided immediate feedback and encouraged group discussions on tAPP solutions. Finally, there was peer evaluation, where each student assessed their own and their teammates' performance in terms of knowledge and teamwork. This usually took place at the end of class or, if time was limited, on the same day with a strict deadline.

During the CBL, Marketing Research teams were asked to analyse and assess the market potential of an academic spin-off company. The solution to the challenge was developed along four main interrelated stages:

- 'problem space' interviews with real users/customers, that enabled the buyer personas to be identified;
- from customer pains and gains to the development of a questionnaire;
- data collection and analysis in order to assess the main market target/segment;
- market potential estimation through the use of secondary data.

The lecturer provided methodologies and tools to develop the four interrelated stages, stimulating an abductive reasoning approach based on assumptions formed by observations which were turned into a hypothesis. The assessment was based on the final work presented by teams during the final session.

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<sup>1</sup> Where "i" state for individual.

<sup>2</sup> Where "t" state for team.

Both teaching methodologies i) expected work outside the lesson time and ii) extrinsically motivated participation in the educational activities.

In the case of Team-Based Learning (TBL), extrinsic motivation took the form of bonus points added to the final exam score (up to 3 points depending on performance), while, for Case-Based Learning (CBL), group activities contributed directly to the final exam grade. This means that students were externally incentivised to engage in the educational process, as their participation was linked to potential rewards or an impact on their final assessment.

Regarding work outside of class: TBL students had to arrive at didactic sessions having already studied the coursework whereas CBL students had to conduct interviews with users and potential customers 'out of the building'.

## **2.1 Description of Database and Variables**

The variables collected concerned students' characteristics, their past performance in courses related to those study items and attendance during the course, their views and their satisfaction with the teaching activity.

### **DEPENDENT VARIABLES**

Dependent variables were built on the basis of 22 items – inspired by the Minnesota Satisfaction Questionnaire – as previously done by Parmelee (2009) to assess TBL activities. Items consisted of 22 statements regarding various aspects of the learning experience with Likert-type responses ranging from Strongly Disagree (1) to Strongly Agree (5). Statements were grouped using a general aggregation and 4 sub-categories.

#### **Satisfaction with The Learning Experience**

The general satisfaction (*General\_sat*) averaged all 22 items after reversing the negative one (Cronbach's  $\alpha = 0.92$ ).

Furthermore, in order to provide a more detailed representation of students' evaluation of the experience, an additional four sub-indicators were built through a targeted selection from the 22 items, aiming to focus on specific aspects.

- i) The satisfaction of working in a group (*Group\_impact*): 6 items regarding the students' belief that working in groups had a positive impact on their professional development (collaboration, leadership and their personal identity) and on their learning (Cronbach's  $\alpha = 0.84$ ).
- ii) *Respect*: 4 items evaluating the degree of perceived respect and positive interpersonal relationships within group work (Cronbach's  $\alpha = 0.90$ ).

- iii) Workload distribution in the group (*Workload\_Team*): aggregation of 3 items which measured whether the workload was equally divided within the group (Cronbach's  $\alpha = 0.85$ ).
- iv) The *Social\_inclusion* variable aggregated 2 items of social isolation within the group which, for ease of interpretation, were reversed. Hence, the variable was renamed social inclusion to be aligned with the others (Cronbach's  $\alpha = 0.80$ ).

## COVARIATES

### MAIN COVARIATE OF INTEREST

*Tarm*: stands for Treatment arm and it is a categorical variable which classifies the three different courses. *Tarm* also appears reprocessed into three separate dichotomous variables labelled as *marketing*( $Tarm = 1$ ), *finance*( $Tarm = 2$ ) and *business*( $Tarm = 3$ ).

*MinorityD* is a dichotomous indicator indicating at least one of these conditions: whether the student was born abroad and/or has failed/not taken the previous exam in a related subject and/or is working and/or is overdue with taking the current exam. In addition, Female status was included only for those enrolled in Finance or Business courses. The decision not to classify female students with  $Tarm = 1$  as minorities is due to two main factors: class composition and course content. For the former because women are not underrepresented in Marketing courses, which is why they were not listed as minorities in that context. For the latter: Macroeconomics is more quantitative than market research, and this could lead to a greater potential for marginalisation of female students.

For both groups of covariates (*MinorityD* and *Tarm*) the information, rather than being used directly, had the function of delimiting the comparison groups.

### OTHERS

**Students' demographics:** information such as gender (*Female*), *Domicile* and *Residence*; whether the student works (*Worker*) or was born abroad (*Foreign*). In addition, *Fuoricorso* indicates that the student is behind schedule with the current exam.

**Students' behaviour/ personality:** Whether students had working experience in the past (*Working\_exp*), are accustomed to working in a team (*Team*), regard themselves to be *Leaders* rather than followers and are *Extroverts* rather than introverts. Whether Maths (*MathPass*) or Economics (*EcoPass*) are the subjects they are most passionate about. Finally, it also included students' *attendance* as a continuous variable, which represents the percentage of attended lessons out of the total number of lessons in the course.



**Students' prior ability:** prior ability was measured through the grade in a previous subject (*similar\_exam*) with similar content (*Microeconomics* for the Macroeconomics sample and *Economics and Management of enterprises* for the Market Research one). These are subjects taken in the previous year related in terms of content and skills requirements.

For *similar\_exam* we created four classes: *PendingExam* for those who have not yet taken or passed it; thereafter progressively *18to22*; *23to26*; *27to30*). Other indicators of prior ability are the secondary school attended (classical lyceum = *L\_class*, scientific lyceum = *L\_scie*, linguistic lyceum = *L\_ling*, other lyceum = *L\_other*, *technical* or *professional* high school) and whether students state that economics (*EcoSkill* dummy variable) or mathematics (*MathSkill* dummy variable) are the subjects on which their past education is predominantly based.

## 2.2 Descriptive statistics

Table 2 presents the overall descriptive statistics for the variables within the dataset for our sample of 231 students. 40% of students belong to the Business bachelor's degree course, 28% to Finance and 32% to Marketing. As regards the dependent variables of interest we can observe very high scores for both the overall index and all their respective sub-indices. The overall satisfaction with the teaching activity has an average score of 4.2 out of 5 and its subcategories range from 3.97 (the feeling that working in a group has a positive impact on personal skills) to 4.54 (perceived respect).

Thirty-five percent of the sample have at least one characteristic which could identify them as an at-risk and/or minority student (born abroad; failed/not taken the previous exam in a related subject; worker and late student).

These are students with a high participation rate (they attended more than 80 per cent of classes), which confirms what was discussed in the section on identification strategies. Nearly 4/5 of the sample had experience working in teams while half were extroverts or leaders. In terms of prior education, 40 per cent of the boys came from scientific secondary schools and almost the same percentage from a technical education. The distribution of grades in a related and previous exam showed a positive asymmetry (with a high percentage of students achieving excellence (42%) and 13% still having the exam pending). For 43 per cent of them, Economics was the subject in which they had received the most training, and for 59 per cent it is the subject they are most passionate about. Finally, they mainly come from the Emilia Romagna region (81%) and are mainly residents within the provinces of Modena and Reggio Emilia (78%).

**Table 2 – Descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
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<b>Tarm</b>						
C Marketing	231	.32	.47	0	1	
C Finance	231	.28	.45	0	1	
C Business	231	.40	.49	0	1	
General sat	231	4.22	.6	1.19	5	
Group Impact	231	3.97	.73	1	5	
Respect	231	4.54	.69	1	5	
Workload Team	231	4.17	.89	1	5	
Social inclusion	231	4.45	1.06	1	5	
MinorityD	231	.5	.5	0	1	
Female	231	.39	.49	0	1	
Foreign	231	.03	.18	0	1	
Fuoricorso	231	.04	.19	0	1	
Worker	231	.23	.42	0	1	
Working exp	231	.84	.36	0	1	
Team	231	.77	.42	0	1	
Extrovert	231	.53	.5	0	1	
Leader	231	.50	.5	0	1	
Attendances	231	81.39	14.7	30	100	
<b>Highschool</b>						
L_Clas	231	.06	.23	0	1	
L_Scie	231	.40	.49	0	1	
L_Ling	231	.11	.32	0	1	
L_Other	231	.04	.2	0	1	
Technical	231	.37	.48	0	1	
Professional	231	.02	.15	0	1	
<b>Similar exam</b>						
PendingExam	231	.13	.34	0	1	
18to22	231	.21	.41	0	1	
23to26	231	.25	.43	0	1	
27to30	231	.42	.49	0	1	
<b>SkillMajor</b>						
Mathematics	231	.25	.43	0	1	
Italian	231	.08	.27	0	1	
Law	231	.07	.26	0	1	
Economics	231	.43	.50	0	1	
Science	231	.06	.23	0	1	
Other	231	.11	.32	0	1	
<b>PassMajor</b>						
Mathematics	231	.07	.25	0	1	
Italian	231	.04	.19	0	1	
Law	231	.20	.40	0	1	
Economics	231	.59	.49	0	1	
Science	231	.05	.21	0	1	
Other	231	.05	.21	0	1	
<b>Domicile</b>						
Modena	231	.27	.45	0	1	
Province of Modena	231	.26	.44	0	1	
Reggio E. & Province	231	.25	.43	0	1	
Other	231	.22	.42	0	1	
<b>Residence</b>						
Abruzzo	231	.01	.11	0	1	
Basilicata	231	.01	.11	0	1	
Calabria	231	.01	.11	0	1	
Campania	231	0	0	0	0	
Emilia Romagna	231	.81	.39	0	1	
Liguria	231	0	.07	0	1	
Lombardia	231	.05	.21	0	1	
Marche	231	.01	.11	0	1	
Molise	231	0	0	0	0	
Piemonte	231	0	.07	0	1	
Puglia	231	.02	.15	0	1	

Sardegna	231	0	0	0	0
Sicilia	231	.03	.18	0	1
Toscana	231	0	.07	0	1
Trentino Alto Adige	231	0	.07	0	1
Umbria	231	.01	.09	0	1
Val d'Aosta	231	0	0	0	0
Veneto	231	0	.07	0	1

<sup>[1]</sup> For ease of interpretation, the *social isolation* variable was reversed (and renamed *social inclusion*) for conforming the direction to other Parmelee's items, so that higher values indicates lower social isolation.

## 2.3 Empirical Model

In the first step, we focused on the dependent variable definition.

General satisfaction with teaching activities is calculated by averaging the 22 items designed to collect students' perceptions after reversing the negative items.

Whereas, for the sub-indices, an item selection was conducted by combining methods empirically based on theoretical consideration (which was also employed in setting the questionnaire). The data-driven approach involved using exploratory PCA with an oblique rotation to identify dimensional clusters in the four groups (Group impact; Respect; Workload Team; Social inclusion). Subsequently, these areas were supplemented with items from the theoretical base integrated with further correlation analysis checks. The theoretical and empirical approaches, in multiple cases, agreed on the clustering of items, and their integrated approach produced consistent items with strong internal consistency, as demonstrated by Cronbach's alpha. Hence, the clustered items were combined by taking their mean. Differences in outcomes across courses were previously explored through the ANOVA test.

Then the Mann-Whitney U test (Wilcoxon 1945; Mann and Whitney 1947) was applied following the guidelines in Stata (2021).

The Mann-Whitney U test was employed to determine whether there were differences in students' evaluation and perceptions according to their Minority status.

It is a nonparametric test applicable to both continuous and ordinal variables (as in our case) The need for this test was confirmed by the normality test shown in Appendix A1, which reveals a non-normal distribution based on both kurtosis ( $p < 0.000$ ) and skewness ( $p < 0.000$ ) for all indicators. In a nutshell, it operated by discarding the treatment labels, ranking the observations (without accounting for which group they belong to) and computing the sum of the rank in the first treatment.

In the test we considered two independent random variables (one dependent variable in turn) and we are testing the following  $H_p$ :

$$H_0: X|_{MinorityD=1} \sim X|_{MinorityD=0}$$

H0, the null hypothesis states that the dependent variable is equally distributed in the two populations.

To accept (or reject) the null hypothesis we can compute the critical values (TS) in equation 4 and compare them with the z values proxies by normal distribution (due to sample size).

Wilcoxon's test statistic (T) (1945) is the sum of the ranks for the observations in the first sample;  $n_1$  is respectively the sample size for the first group (MinorityD == 1), whereas  $n_2$  corresponds to the sample size of students in a non-minority status:

$$1) T = \sum_{i=1}^{n_1} R_{1i}$$

Mann and Whitney's U statistic (1947) is the number of pairs  $(X_{1i}; X_{2j})$  such that  $X_{1i} > X_{2j}$ . These statistics differ only by a constant:

$$2) E(T) = \frac{n_1(n_1+n_2+1)}{2}$$

$$3) Var(T) = n_1 n_2 (n_1 + n_2 + 1) / N$$

The final formula containing the critical value is displayed in equation 4; the critical value is computed by the sum of the ranking in the first group (T) minus its expected value (E(T)) divided by its standard error (square root of the variance in eq. 3).

$$4) TS = \frac{T - E(T)}{sd(T)}$$

The conditions to be satisfied to apply the Mann-Whitney U test are all present in our sample:

- i) having nominal or ordinal variables with two categories: in our case and the Minority dummy.
- ii) having a metric or ordinal variable: in our case an ordinal variable (Students' satisfaction with the teaching activity)
- iii) the variables do not comply with a distribution curve (are not normally distributed).

### 3. RESULTS:

Table 3, offers further insight into our data by comparing outcome variables and students' characteristics across the three courses.

Regarding the outcome variables (*General\_sat*; *Group\_impact*; *Respect*; *Workload\_Team*; *Social\_inclusion*), despite high scores across all courses, heterogeneity is observed. With the exception of the variable *Social\_inclusion*, for the others, there are statistically significant differences in the courses (as confirmed by the ANOVA tests) mainly due to the highest satisfaction of students in the Business degree programme. In terms of demographic characteristics, our analysis reveals that there are no significant differences among the courses in the percentage of foreign students, workers, or students classified as '*fuoricorso*' (behind schedule with their studies). However, a remarkable finding emerges in the distribution of female students across the courses, which is notably heterogeneous (they are highly underrepresented in the Finance degree (22%) and the majority in

Marketing (59%). This evidence aligns with previous research in the literature, by producing results similar to those found by Bertocchi et al. (2022) when examining Italian data, which demonstrated a low percentage of female representation in courses with high mathematical content, such as Finance. Conversely, the gender gap is mitigated in the Marketing degree programmes, which are characterised by lower mathematical intensity, as evidenced by the findings in a study by Megalokonomou et al. (2021). In addition, besides being aligned with previous research, this evidence further confirms the decision to include females as minorities for Finance and Business.

Across the three courses, students do not exhibit significant differences in their behaviour or personality traits. The only notable distinction is in their leadership attitudes, which are significantly higher among Marketing students. This finding is somewhat counterintuitive, given the higher proportion of females in this course. In addition, Marketing students are more likely to declare Economics as the subject they are most passionate about. However, this inclination is partially attributed to their relatively lower interest in mathematics, as these choices are mutually exclusive. Regarding prior skills, heterogeneity among courses reflects differences in content. For example, the percentage of students with a background in language studies is double in the Marketing programme, and this is associated with lower maths proficiency among these students.

**Table 3 – Course comparison of personal characteristics and outcome variables**

	(1)		(2)		(3)		(4) Anova Test by Tarm	
	MARKETING		FINANCE		BUSINESS		F(2,228)	p-value
	<i>mean</i>	<i>sd</i>	<i>mean</i>	<i>sd</i>	<i>mean</i>	<i>sd</i>		
General_sat	4.19	0.58	4.06	0.69	4.37	4.19	5.59***	0.00
Group_impact	4.14	0.54	3.72	0.90	4.01	4.14	6.02***	0.00
Respect	4.36	0.76	4.53	0.77	4.70	4.36	5.25***	0.00
Workload_Team	3.76	1.04	4.17	0.82	4.51	3.76	16.49***	0.00
Social_inclusion	4.25	1.22	4.48	1.06	4.60	0.88	2.25***	0.10
MinorityD	0.32	0.47	0.63	0.49	0.56	0.50	8.19***	0.00
Female	0.59	0.50	0.22	0.41	0.36	0.48	11.23***	0.00
Foreign	0.04	0.20	0.05	0.21	0.03	0.18	0.09	0.91
fuoricorsoESSE3	0.03	0.16	0.03	0.17	0.05	0.23	0.52	0.60
Sud	0.11	0.31	0.09	0.29	0.09	0.28	0.09	0.91
Fuorisede	0.17	0.38	0.15	0.36	0.10	0.30	1.04	0.36
Worker	0.25	0.44	0.29	0.46	0.18	0.38	1.56	0.21
Working_exp	0.85	0.36	0.83	0.38	0.85	0.36	0.07	0.93
Team	0.83	0.38	0.75	0.43	0.74	0.44	1.02	0.36
Extrovert	0.63	0.49	0.48	0.50	0.49	0.50	2.01	0.14
Leader	0.64	0.48	0.45	0.50	0.43	0.50	4.35**	0.01
EcoPass	0.69	0.46	0.63	0.49	0.48	0.50	4.11**	0.02
MathPass	0.04	0.20	0.09	0.29	0.08	0.27	0.80	0.45
Attendances	80.61	15.68	79.40	16.32	83.45	12.36	1.61	0.20
L_Class	0.07	0.25	0.05	0.21	0.05	0.23	0.14	0.87
L_Scie	0.32	0.47	0.35	0.48	0.49	0.50	3.02*	0.05

L_Ling	0.20	0.40	0.08	0.27	0.07	0.25	4.38**	0.01
L_Other	0.05	0.23	0.06	0.24	0.02	0.15	0.85	0.43
Technical	0.32	0.47	0.45	0.50	0.35	0.48	1.27	0.28
Professional	0.04	0.20	0.02	0.12	0.01	0.10	0.90	0.41
PendingExam	0.05	0.23	0.26	0.44	0.10	0.30	7.71***	0.00
tra18to22	0.33	0.47	0.18	0.39	0.12	0.33	6.01***	0.00
tra23to26	0.35	0.48	0.15	0.36	0.23	0.42	3.65***	0.00
tra27to30	0.27	0.45	0.40	0.49	0.55	0.50	7.15***	0.00
EcoSkill	0.56	0.50	0.51	0.50	0.26	0.44	9.08***	0.00
MathSkill	0.16	0.37	0.17	0.38	0.38	0.49	7.50***	0.00
<i>N</i>	75		65		91		231	

NOTES:

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 4 presents the results of the Wilcoxon rank-sum test (Mann-Whitney U-test) as presented in Equation 4. The first significant and remarkable finding is that for almost all variables of interest, the minority group experiences higher mean values (regardless of significance).

Panel A shows the comparison made on the overall sample, regardless of the course of affiliation. It is reported that the overall satisfaction for marginalised students is 0.13 points (3%) higher. The Wilcoxon test indicates that the distributions are statistically different at a 0.05 significance level. At the same time, they are also the most satisfied with the equal distribution of workload within the group (+0.23; +6% compared to the reference group) and the high score of the counterpart (4.06) leads us to exclude freeriding behaviour. With weak static differences ( $p < 0.1$ ), the marginalised group also had a greater sense of respect and the belief that working in groups had a positive impact on their professional development and learning. There are no statistically significant differences in the feeling of social inclusion, although the score is slightly higher for the minority group. It is worth noting that the absence of statistically significant differences in the sense of inclusion by traditionally marginalised groups is viewed positively, as previous research generally characterises these groups as being more marginalised.

If we split the sample into the three degree programmes, we can observe that as overall student satisfaction increases, the positive gap in favour of minorities grows as well. Recalling the results in Table 3, it is worth noting that in the undergraduate Business course (regardless of individual characteristics), the averages of the dependent variables were higher. It is within this course that minority satisfaction is generally and significantly higher. In both the Marketing (panel C) and Business (panel D) degree programmes, the indicator (*group\_impact*) is significantly higher for at-risk students (minorities). This suggests that these students have the strongest belief that working in groups positively impacts their professional development (collaboration, leadership, and personal identity) and their learning. This result is expected because when working in groups, growth is often

more pronounced for the weaker members who benefit the most from the peer effect. This is consistent with what has been found in other studies, including Burke *et al.* (2022) and Goth *et al.* (2017), Theobald *et al.* (2020).

More unexpectedly and extremely positively, minorities feel included and respected within their groups (panel D), even more so than other students. This is a sign of an excellent impact of the TBL on integration in the Business course and on avoiding those vicious circles of polarization in the subject, in which the most marginalised students tend to distance themselves and consequently become even more marginalised.

**Table 4 – Wilcoxon rank-sum (Mann–Whitney) test by Minority status**

	MINORITY STATUS = 0			MINORITY STATUS = 1			WILC. RANK-SUM TEST	
	Mean	SD	N	Mean	SD	N	z	p
<b>PANEL A - overall</b>								
General sat	4.16	.59	115	4.29	.61	116	2.10**	0.04
Group impact	3.9	.72	115	4.04	.74	116	1.75*	0.08
Respect	4.5	.67	115	4.58	.71	116	1.70*	0.09
Workload Team	4.06	.94	115	4.29	.82	116	2.00**	0.04
Social inclusion	4.43	1.02	115	4.48	1.1	116	1.04	0.30
<b>PANEL B - Marketing</b>								
General sat	4.14	.57	51	4.30	.58	24	1.34	0.18 <sup>[1]</sup>
Group Impact	4.05	.57	51	4.33	.42	24	2.07**	0.04 <sup>[1]</sup>
Respect	4.36	.69	51	4.34	.92	24	0.43	0.67 <sup>[1]</sup>
Workload Team	3.71	1.08	51	3.88	.98	24	0.55	0.59 <sup>[1]</sup>
Social inclusion	4.27	1.15	51	4.21	1.38	24	0.24	0.83 <sup>[1]</sup>
<b>PANEL C - Finance</b>								
General sat	4.30	.58	24	4.01	.69	41	0.90	0.37 <sup>[1]</sup>
Group impact	4.33	.42	24	3.70	.87	41	0.27	0.79 <sup>[1]</sup>
Respect	4.34	.92	24	4.48	.79	41	0.76	0.45 <sup>[1]</sup>
Workload Team	3.88	.98	24	4.11	.89	41	0.55	0.59 <sup>[1]</sup>
Social inclusion	4.21	1.38	24	4.29	1.25	41	1.52	0.12 <sup>[1]</sup>
<b>PANEL D - Business</b>								
General sat	4.21	.56	40	4.5	.45	51	2.81	0.00 <sup>[1]</sup>
Group impact	3.80	.69	40	4.18	.66	51	2.86***	0.00 <sup>[1]</sup>
Respect	4.59	.58	40	4.78	.43	51	1.76*	0.08 <sup>[1]</sup>
Workload Team	4.36	.75	40	4.63	.49	51	1.40	0.17 <sup>[1]</sup>
Social inclusion	4.4	1.03	40	4.75	.71	51	2.00**	0.04 <sup>[1]</sup>

NOTES:

1= Strongly disagree      2= Disagree      3= Mixed Opinion      4= Agree      5=Strongly Agree

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

<sup>[1]</sup> corrected value (Exact prob.): The exact p-value is based on the actual randomization distribution of the test statistic and it is suggested for sample sizes n = n1+n2 ≤ 200 because the normal approximation may not be precise in small samples

## 4. CONCLUSIONS

These results provide a clear overview of students' high level of satisfaction with the attended teaching activity (CBL or TBL) in all courses. In fact, regardless of individual characteristics or the specific degree programme attended, students reported high levels of satisfaction.

The descriptive statistics show that, on average, satisfaction scores were high: the general satisfaction of the experience was an average score of 4.22 out of 5 in the sample (*General\_sat* = 4.22). The degree of perceived respect and positive interpersonal relationships within group work scored 4.54 out of 5. The level of perception that workload was equally distributed in the team scored 4.17 and the feeling of inclusion 4.45. Meanwhile, the belief that group activity boosts soft and hard skills scored 3.97 out of 5.

Given the positive interaction and level of students' satisfaction in their learning experiences and academic performance as well as the positive outcomes relating to the social inclusion dimension of the learning experience also showing a positive impact on minority students, policies geared to training teachers on active learning strategies such as TBL and CBL and to increasing the awareness of their impact on the quality of the learning experience and students' learning outcomes should be pursued in higher education institutions and included in faculty development programmes.

Heterogeneity is observed among outcomes across degree programmes, even when they employ similar teaching methodologies. This variability suggests the presence of a teacher effect (lecturer's expertise, other active strategies used), available resources (tutors involved in the TBL experience) and the class environment which can significantly affect the impact of teaching even when the same active learning strategy has been used. This implies that the quality and resources in the teaching activities can have a mediation effect and call for further analysis to measure and model its effect.

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## 5. APPENDIX

### Appendix A1 – Skewness and kurtosis tests for normality on Dependent variable

Variable	Obs	Pr(skewness)	Pr(kurtosis)	Adj chi2(2)	Prob>chi2
General_sat	231	0.000	0.000	60.82	0.000
Group_impact	231	0.000	0.001	31.69	0.000
Respect	231	0.000	0.000	96.57	0.000
Workload_Team	231	0.000	0.000	45.12	0.000
Social_inclusion	231	0.000	0.000	76.29	0.000

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