



İZMİR UNIVERSITY OF ECONOMICS

Data Literacy in Business Curriculum

A Case Study of Student Reception and Success Factors

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Why have a core data course in business curriculum?

- Data is a major driver of decision-making in business
- The ability to understand, interpret, and use data, known as **data literacy**, has become an essential skill
- Employers prefer candidates with data skills for jobs with their organizations
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- We had heads of 5 departments and 6 undergrad programs under the business faculty demanding a course(s) for data skills



Course design - content

- a panel of department heads out a set of student skills which their evolving curriculums required,
- expert group responded by reviewing and reducing the skill set to one which forms a coherent training track and which can realistically build upon the general background of business faculty students,
- Course coverage was compared and refined against designs in the literature
- Resulted in three modules:
 - (m1) “**data essentials**” module covers data handling and basic exploratory statistics concepts,
 - (m2) “**data management**” module focuses on real life data manipulation with the bulk being SQL, and
 - (m3) “**data storytelling**” module studies statistical analysis and visualization holistically to answer research questions.



Course design - teaching methods

- Students from multiple departments, diverse backgrounds
- Blended and flipped classroom design:
 - Students prepare by watching videos, studying slides and readings hosted on Learning Management system (LMS).
 - Face-to-face sessions in computer labs designed as led practice of the skills with selected scenarios, allows a leveling of student skills with one-on-one assistance from instructors.
 - Sessions are recorded and made available to students on lecture capture system (LCS).
 - Homeworks, project presentations, exams are used for assessment and reinforcement learning.



Course and research setting

- The course was added as a second year core course to curriculums of six undergraduate programs within IEU Business Faculty.
- Limited number of seats were offered to other departments as elective.
- Participating students did not have previous exposure to course subjects.
- Course was delivered by three instructors in six sections, using same outline, materials, and assessments, in a synchronized way.
- A total of 129 students were enrolled in its first run, which is reported here.
- Some dropping out, 113 of them finished the course with some grade.



The unknowns: Research questions

We have decided to turn the course implementation into a research study to answer the following:

- Is it suitable for all?: How will social science students respond-to/perform-in different data topics?
- Is it doable?: To what extent do student online course activity effects student course performance?
- How do students feel?: How students' confidence levels regarding their data literacy skills changed during the course?
- What works?:What are students' perceptions regarding the factors that affect their course performance?



Research design

- We employed a mainly quantitative research design
- Our four research questions, however, require slightly different variations under this general design.



Data

- Student performance data: grades on assignments, presentations, class participation, and overall grade.
- Granular student performance: grades broken into three sub-modules of the course.
- Student demographics: sex, entry year, department.
- Self-reflection survey conducted twice (one at the beginning and one at the end of the semester) to measure student confidence in 12 different course subjects such as data management, data formats, legal/privacy issues about data, etc.
- Mid-semester student survey to understand the assessment of students about the lecture: difficulties they encounter and useful or appreciated parts of the lecture in five questions: 3 Likert-scale, 2 open-ended questions.
- The data collected from the LMS and LCS:
 - Course accesses: The number of times the course site is accessed during the 14-week term.
 - Course interactions: The number of interactions, i.e. clicks on each item residing in the course site during the 14-week term.
 - Course minutes: The total number of minutes spent on the course site during the 14-week term



Descriptive statistics

Sex	Number of Students
Male	58
Female	55

Table 1: Gender distribution of the students

Entry Year	Number of Students
2017	1
2018	2
2019	73
2020	37

Table 2: Entry year distribution of students

Department	Number of Students
International Trade and Finance	35
Business Administration	27
International Relations and Political Science	22
Logistics Management	11
Accounting and Auditing	8
Economics	7
Faculty of Engineering	3

Table 3: Department distribution of the students



RQ1: Is it suitable for all?

How does student performance vary across the data literacy topics included in the course syllabus? → **Data analysis method:** Cluster analysis

Cluster	Student count	M1 mean grade	M2 mean grade	M3 mean grade
1	46	77.22826	87.02174	86.71196
2	31	65.66935	62.49677	37.66129
3	36	50.43056	44.41667	73.20833

C1: Students who are successful in all modules ,

C2: Students who are successful in M2(data management), but not M3(data story telling)

C3: Students who are successful in M3(data story telling), but not M2(data management)

C3 -> struggled the most in M1(data essentials)



RQ2: Is it doable?

To what extent do student online course activity effects student course performance? → **Data analysis methods:** Linear regression and ANOVA

- gender, department and entry year has no effect on performance
- Student's previous GPA was a significant predictor
- total percent (LCS), minutes (LMS), and GPA are found to have a significant effect on performance.
- total views (LCS) and interactions (LMS) have no effect.
- The model was able to explain 44 percent of the variability in final grades



RQ3: How do students feel?

How students' confidence levels regarding their data literacy skills changed during the course? → **Data analysis method:** Descriptive statistics and cluster analysis

Data: 120 respondent to pre-survey, 101 respondent to post-survey

Cluster No	Number of students	Average confidence	Confidence variance across topics
1	15	2.53	0.48
2	102	1.57	0.08
3	3	3.68	0.18

Table 5: Beginning-of-semester confidence of students in different clusters

C3: very small number of students who had high confidence

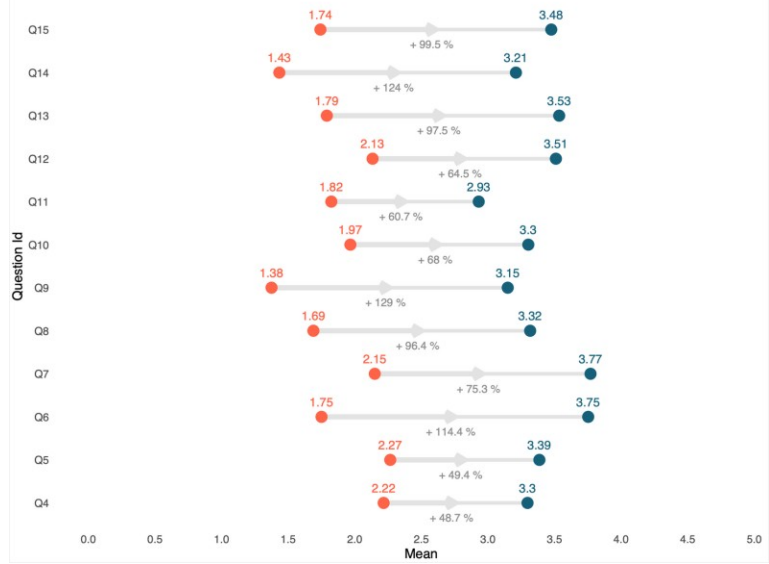
C1: relatively small cluster of students who had medium confidence

C2: largest cluster of students who had low confidence

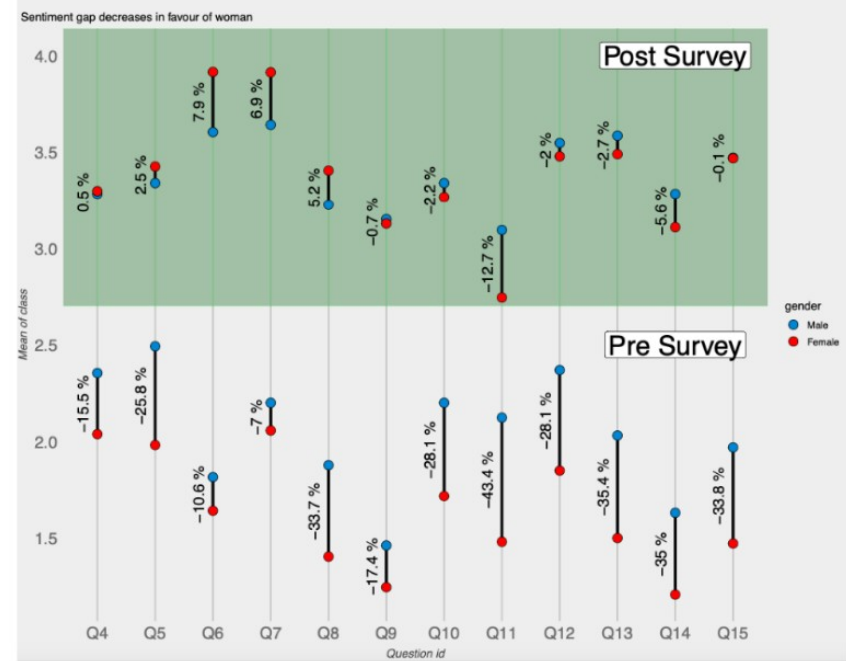


RQ3: ...continued...

Students sentiment improves after the course



Sentiment increases overall





RQ4: What works?

What are students' perceptions regarding the factors that affect their course performance?

Data: Mid-semester survey with some open ended questions.

Data analysis methods: Descriptive analysis and content analysis.

Main and Subcategory	Positive	Negative
Course Delivery	46%	51%
In-Class Practice	30%	4%
Assignments	16%	41%
Language barrier	-	6%
Course Content	30%	7%
Videos	20%	7%
Course Materials	10%	-
Student Self Assessment	11%	42%
Using relevant software (excel, google sheets, etc.)	11%	23%
Difficulty in programming languages	-	7%
Incompetence in general digital literacy	-	6%
Difficulty interpreting outputs and graphs	-	6%
Instructor	13%	-
Instructional quality	8%	-
Instructor's attitude	3%	-
Office Hours	2%	-



Discussion & implications

- Confidence improvement indicates that a “business oriented” data course fits well into student needs.
- Blended learning and flipped-classroom works well for this topic
- Modular course design accommodates differences in student background and interest
- A surprising result is male vs female confidence in data subjects and great boost in female student’s confidence as a result of taking the course.



Limitations & further study

- What other teaching techniques to accommodate background and interest differences (e.g. team exercises)?
- Causal pathways between student effort and success for this topic?
- What teaching skills matter in a course on this topic?
- What causes data anxiety of female students (what problem have we solved?)



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Questions?

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