

# **Intervention to enhance the motivation to learn economics in a non-economics course**

Marie Lautrup

Department of Food and Resource Economics  
University of Copenhagen

## **Introduction**

As employed at a social science Department at a faculty of science, my colleagues and I are repeatedly asked to give short introductory guest lectures about different economic topics, for instance, cost-benefit analysis. Cost-benefit analysis (CBA) can be taught either as a tool or from a more theoretical perspective. Still, the lecture is seldom highly integrated into or assessed as part of the exam in the main subject. Studies find that learning styles and motivation for learning a subject differ not only between academic domains (e.g. math versus language) (Barron & Hulleman, 2015) but also between those majoring in a subject and those who do not (e.g. Shell & Soh, 2013). Shell & Soh (2013) find that non-majors engage more in surface learning rather than deep learning. Based on these results, non-economists might have lower motivation and have more shallow learning of an economic topic. As interest and motivation are known to increase student learning (Hidi, 1990), increasing motivation for non-economists to learn about economics might thus increase learning.

Course evaluations from previous years have shown a need for increasing the constructive alignment (Biggs, 1996) of the course topics such that the two lectures on cost-benefit analysis were more integrated with the rest of the course on life-cycle assessment (from last year's evaluation: "I would suggest the following improvements: link CBA better with the other elements"). Hence, I made changes in the lectures to make a clearer connection between the two economics lectures and the rest of the course and incorporated an exercise to create congruence between the student's backgrounds, knowledge, and aspirations and the

lecture materials (Hounsell & Hounsell, 2007). The aim of the intervention was ultimately to increase the motivation among non-economics students to learn an economics topic to increase student learning.

A meta-review of 74 experimental motivation intervention studies showed an effect size of on average half a standard deviation (Lazowski & Hulleman, 2016) indicating that it is in general possible to affect student motivation using interventions.

The questions addressed in this project are, 1) does motivation to learn an economics topic differ between economics and non-economics students? 2) Is it possible to increase student motivation of econ- and non-econ students using two small interventions integrated into the lectures in the form of directly communicating the value of learning the topic and a written essay exercise? The hypothesis is that non-economist students have a lower initial motivation. As the motivation in this particular class might be low among students who are already familiar with the topic, however, because they feel that they are wasting their time, the questions were framed as motivation to learn about CBA in general.

## **Theoretical framework**

Social-cognitive theories developed within the field of educational psychology have provided many insights into student motivation (Lazowski & Hulleman, 2016). In this project, I investigate student motivation using the expectancy-value-cost framework (Eccles et al., 1983; Wigfield & Eccles, 2000), which is one of the most commonly cited theories. According to this theory “Student motivation is determined most proximally by success expectancies and perceived task value” (Lazowski & Hulleman, 2016). Success expectancy, simply put, relates to the students' anticipation of being able to do well. Perceived task value is understood as operating through four value forms: attainment value, intrinsic value, utility value, and cost. Attainment value is how important success is for one's identity. Intrinsic value is closely related to interest and enjoyment of doing a task. Utility value refers to the perceived usefulness of the task now or later in one's career. Cost is the negative features of a task, grouped as opportunity costs, effort costs, e.g. the time

required to study, and emotional costs (Flake et al., 2015; Urhahne & Wijnia, 2023). Utility value has also been compared to extrinsic value and is thus believed to be the value most easily influenced by external interventions as it is likely more situational (Alberts et al., 2022).

Utility value interventions have been found to improve test scores as well as student interest (e.g. Hulleman et al., 2010). They have also been found to foster deeper engagement and learning (Johnson & Sinatra, 2013). Some studies, however, have found a negative impact of utility value interventions on interest/boredom among seventh and ninth graders (Alberts et al., 2022). Others find that students with a low success expectancy benefit from self-generated interventions whereas students with higher expectancy benefit from being told about the utility value directly. In this project, the theoretical framework outlined above frames the methods applied and is not used for data analysis. I implemented two interventions targeting the utility value. Due to the negative results, instead of addressing real-life utility value explicitly (Alberts et al., 2022), the aim of the intervention was to strengthen the congruence between CBA and LCA and use a writing intervention in combination with direct information. Further, I measure the students' motivation on three parameters: expectancy, value, and cost.

## **Methods**

In the following, I describe both the details of my intervention to enhance motivation about learning CBA in this context and the tool used to measure the impact, namely a survey.

### **Motivation interventions**

I implemented two motivation interventions during two lectures (lasting 3 and 3.5 hours) on cost-benefit analysis and valuation of non-marketed environmental goods. The lectures were part of the course Life Cycle Assessment within Biological Production Systems. In the course description, the intended learning outcomes related to the CBA lectures are formulated as follows: “The students are also introduced to the concept of cost-benefit analysis (CBA) and illustrative examples of CBA based on value transfer will be given” and competencies to “Link LCA-

outcomes with the CBA of economists and discuss the implications of this.” The intervention was two-fold: in the first lecture, compared to the previous year, I added a presentation element that directly highlighted similarities and differences between cost-benefit analysis and life-cycle assessment, based on a scientific paper. Afterwards, the students were asked to discuss the relevance and applicability of two methods with their peers and in plenum based on two prompts [CBA in relation to eLCA – discussion: Can they be used to assess sustainability? Can they be used as a decision making tool?]. Further, emphasis was made on avoiding economic jargon and explaining concepts in everyday language. At the end of the second lecture, I implemented a written exercise element based on Harackiewicz et al. (2016), where the students were asked to reflect on how learning about CBA might be relevant or useful to them (see Appendix 1).

Utility value interventions attempt to elicit the student’s sense of the relevance of the academic content. (Harackiewicz & Priniski, 2018; Alberts et al., 2022). I chose a utility value intervention as one study suggests that the utility value is the easiest to change using interventions (Alberts et al., 2022). Utility value interventions can be in different forms (Canning & Harackiewicz, 2015); either student-generated (e.g. Harackiewicz et al., 2016) or directly communicated by the teacher (e.g. Brown et al., 2015), and vary in timing (at the beginning or in the middle of a semester) and frequency (a single intervention or multiple during a semester). Previous studies of written reflection interventions have demonstrated changes in student motivations even for relatively brief activities. Kosovich et al. (2017) study how motivation changes in the very short term, during a single class, and how those changes influence interest in the long term. They find that the expectancy of success is a predictor of long-term interest and that expectancy in turn was strongly correlated with utility value.

## **Survey**

The students answered an Expectancy-value-cost survey at the beginning of the first lecture (ex-ante) and the end of the second lecture (ex-post). The ten-item survey with answers on a six-point Likert scale from

Strongly Disagree to Strongly Agree (see Appendix 2) was adopted from Barron et al. (2017) used e.g. in Ferland et al. (2022). The survey is validated in 15 different fields of study with a pool of 15,000 students from elementary school to college. Three items in the survey measure the student's expectancy, three items measure their value and four items measure the costs of learning the topic. The students were also asked to state which Master's program they were enrolled in. Finally, the students were asked to list things that increased and decreased their motivation to learn about cost-benefit analysis. The students filled out the survey anonymously and had time to answer during the lectures.

The survey used to measure the students' motivation and the effect of the intervention employed the pragmatic measurement principle (Kosovich et al., 2019). Researchers use the pragmatic measurement approach when the conditions for gathering data are less than optimal, due to time constraints or when traditional experimental settings are not possible. These conditions are seldom obtainable in a field setting within educational research, as was also the case in this project. Pragmatic measurement is defined as "balancing psychometric concerns and situational constraints to produce maximally informative and minimally intrusive measures" (Kosovich et al., 2019). An example is Kosovich et al. (2017) where students' motivation was measured three times over a semester using an eight-item survey to capture students' expectancy and value.

## **Results**

In total 20 students attended the first lecture and filled in the ex-ante survey. Students enrolled in a master's program with mandatory courses or lectures in cost-benefit analysis were identified as "econ students" (the programs Agricultural Economics, Environmental and Natural Resource Economics, and Forest and Nature Management) (n=6).

### **Ex-ante motivation level**

Based on the survey before the first lecture, the mean expectancy of being successful at cost-benefit analysis was 5.06. The econ-students scored 0.5 points higher with a mean expectancy of 5.44 compared to 4.90. The

difference is significant at a 1% level. The mean assessed value was 5.03 out of 6, and significantly higher at the 1% level for the econ-students compared to the non-econ students (a mean of 5.39 compared to 4.88). The average cost was 3 out of 6 for all students and slightly higher for the non-econ students (3.02 compared to 2.88), however, the difference was not significant. The students thus seem to have had a fairly high motivation for learning cost-benefit analysis, both in terms of expectancy and value. Further, the students did not find that the cost of engaging with the material in terms of time or other resources was too high to prevent them from succeeding (3 = slightly disagree). Still, the econ students seem more motivated than the non-econ students, indicating room for improving the non-econ student's motivation.

In the open comment section of the survey, the students listed things that they found decreasing their motivation to learn in the cost-benefit classes. The statements are divided into three groups. Things related to skills or costs, things related to the lecture style, and things related to the student's sense of utility value. In the cost category, students noted things like math, prior knowledge about economics required, and time. Some students noted that long technical lectures, lectures with too few breaks, or boring slides decreased their motivation. Some students preferred not having group work while others feared repetition from previous lectures. The econ students did not list any costs as decreasing their motivation. Instead, half of them stated lecture-style-related things. Interestingly, the econ-students provided value-related answers in line with the non-econ students, for instance when lectures were too hypothetical and did not correspond to how they viewed the real world. The non-econ students mentioned value-related things like if the topic is too money/business oriented or that the lectures might not be relevant for their studies.

Looking at the things mentioned by the students as increasing their motivation to learn in the CBA class, none of the students mentioned skills/cost as an increasing factor. Five students mentioned things related to the lecture style, such as student-teacher interaction, a motivated teacher, a high degree of discussion and cases, and relevant assignments. An overwhelming majority listed value items, either jobs or future careers, practical applications, a close relation to one's field of study, or a

perspective on other fields. Also, the students mentioned if the method could be used for a greater good, like protecting nature.

### **Ex-post motivation level**

Eight students submitted an answer to the writing exercise, spanning from 6 to 26 lines of text in a text document (average 17.4 lines). All students engaged with the assignment and demonstrated serious effort. The tone of the essays spanned from very positive, seeing CBA as a powerful tool that the student would like to apply in their career, to more skeptical mentioning the pitfalls of the method but stating that knowledge about the method was useful. Several students mentioned the link between LCA and CBA. One student also took the opportunity to provide feedback on the computation exercises during the lecture relative to more examples of the use of CBA. All students, who submitted an answer to the assignment, indicated that the CBA classes had been relevant.

Two potential biases are that the submissions were not anonymous (although negative statements would not influence their grade) and students who disliked the lectures might have self-selected out of receiving the final treatment (not handing in the assignment). It is a strong sign of failure to motivate the students that out of 20 students who participated in the first lecture, only eight showed up for the second lecture. Besides the content, lecture style, and quality, reasons for the low attendance might be the weather (it was pouring rain), the time of the week (Friday morning at 8:30), and the fact that the CBA lectures were not part of the final assessment. One of the students who did show up said: *“I don’t think you should take it personally”*. However, in the ex-post survey, one non-econ student mentioned as a factor that decreased the motivation to learn:

“When too much consideration is being put to the people with an economic background who already know about CBA :-)”

This indicated that I did not succeed in balancing the lectures between econ and non-econ students.

To test if the interventions (directly communicating the congruence between LCA and CBA and the writing exercise) had an

impact on student motivation, the students answered a follow-up survey identical to the ex-ante survey at the end of the second lecture. However, only five students answered the final survey, which limits the ability to make any comparisons between before and after the lectures. Further, a majority of the students who answered the ex-post survey had an economics background. Hence, the dataset is unbalanced. Based on the students, who did fill in the survey, the mean expectancy increased from 5.06 to 5.13 from the beginning of the first lecture to the end of the second. The mean value increased from 5.07 to 5.60 and the cost decreased from 2.98 to 2.35.

## **Discussion**

Several factors limit the conclusions that can be made based on the study. First, the number of students in the class is relatively small. Second, the students were not tested on their learning outcome, neither self-assess nor in the final exam. Hence, it was not possible to test the correlation between motivation and learning in this setup. Third, and most importantly, the number of students who showed up for the second lecture is too small to be able to make any conclusion about changes in their motivation over time. Data from the students who did not attend the second class might be acquired from the formal course evaluation, which is not available at the deadline of this project.

The student motivation before and after the interventions is measured using a survey. The survey itself, however, can be considered an intervention and might change the students' perception as it asks them to reflect on their motivation and their attitude towards the teaching. The direction of the motivation-altering effect of the survey might be increasing or decreasing.

## **Conclusion**

In this project, I studied student motivation for learning about cost-benefit analysis in a non-economics class within the expectancy-value-cost framework using a pragmatic measurement survey. The students answered the survey before two utility value interventions and subsequently, their motivation to learn about CBA was measured at the



end of the second lecture. Unsurprisingly, results from the first survey showed significant differences in the expectancy of success and value of learning cost-benefit analysis between students with and without an economics background. The mean expectancy and value were high across the two groups (five out of six on average). The costs of learning (time, effort, or emotional) were not different between the two groups. Due to a low participation rate in the second ex-post survey, I cannot draw any conclusions about the effects of the interventions. However, experience from both this year and last year indicates that some students struggle to find motivation to learn about CBA. Balancing the content and the theoretical level to accommodate students with different academic backgrounds, motivations, and learning styles is an ever-occurring challenge. As a guest lecturer, the background of the students is seldom known when you plan the lectures, and central elements, like the final assessment, are not directly within the hands of the guest teacher to change. Thus, flexibility might be the key. Open-text answers from the surveys show that value-related changes could be applied to increase motivation among most student groups, economists as well and non-economists. This could be done by directly relating the academic content to the different study programs, showing real-world examples of the use of CBA, explaining how the narrative of CBA impacts their world, and including reflection exercises as part of the lectures.

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## **Appendix 1 Exercise description, student administered utility value motivation intervention**

Spend 7-10 Minutes

Based on what you heard last time:

On your own, write a short essay reflecting on ways that CBA might be relevant or useful to you and your work with LCA cases

How might knowledge about cost-benefit analysis be useful to you:

- During the rest of this course
- During the rest of your studies
- In your future work life
- Please upload your writings (not perfect) on Absalon.

## **Appendix 2 Expectancy-value-cost survey**

This is not a test. Instead, it is a short survey about your attitudes toward your cost-benefit analysis class. Your responses will help your university learn how to improve these classes. So, please respond openly and honestly.

The answers from the survey will be used in aggregated and anonymized form as input to a project during a course in University Pedagogics at UCPH.

In relation to your participation in the survey, we need your consent in accordance with the General Data Protection Regulation to process the answers that you give in the survey. Your answers are treated and stored confidentially up to five years after the completion and are always used in an anonymized form.

We are permitted to process your data in accordance with the rules in the General Data Protection Regulation (GDPR). We are obliged to inform you of the rules that apply to our work with your data is Article 6 (1) (a) and article 9 (2) (a), which give the University of Copenhagen the right to process sensitive personal data about you on the basis of your consent.

As a participant in a research project, you have a number of rights under the GDPR. Your rights are specified in the University of Copenhagen's privacy policy. <https://informationssikkerhed.ku.dk/english/protection-of-information-privacy/privacy-policy/>

University of Copenhagen, CVR no. 29979812, is the data controller responsible for processing personal data in the research project. The research project is headed by Marie Lautrup, who can be contacted at [ml@ifro.ku.dk](mailto:ml@ifro.ku.dk)

I hereby give my consent that the University of Copenhagen may register and process my personal data in the abovementioned research project

- (1) Yes
- (2) No

What is your field of study? (name of MSc)

\_\_\_\_\_

Please answer each question below by ranging from 1 (Strongly Disagree) to 6 (Strongly Agree)

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I think learning about cost benefit analysis is important.

I know I can learn the material in cost-benefit analysis classes

I value learning about cost-benefit analysis

My cost-benefit analysis classwork requires too much time

I believe that I can be successful in the cost-benefit analysis classes

Because of other things that I do, I don't have time to put into the cost-benefit analysis classes

I think learning about cost-benefit analysis is useful

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I'm unable to put in the time needed to do well in the cost-benefit analysis classes

I am confident that I can understand the material in the cost-benefit analysis classes

I have to give up too much to do well in the cost-benefit analysis classes

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In the space below, please list specific things that INCREASE your motivation to learn in your cost-benefit analysis class

\_\_\_\_\_

In the space below, please list specific things that DECREASE your motivation to learn in your cost-benefit analysis class

\_\_\_\_\_

Thank you for your participation!