

Course alignment: Application and revision of a method to align a course

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Introduction: the importance of the course alignment - Brief theoretical background

The course alignment is important to set up the desired outcomes of teaching in terms of contents and also level of understanding that we want students to achieve (Biggs, 2003). The course alignment should use the objectives or learning outcomes of the course as the driving force to plan teaching, learning and assessment activities. The course alignment should help to guide students with a clear direction and to improve learning experiences. Considering constructive alignment, a good structure of the course depends on consistency between the objectives, content, learning activities and assessment methods. It can constitute a good tool of communication with students to clarify expectations, reduce anxiety and give more sense of the course into the program (Biggs, 2014; Blumberg, 2009).

Context of application

The experiment took place in a MSc course of 7.5 credits of the European System (ECTS) from the Department of Plant and Environmental Sciences (PLEN) of the University of Copenhagen. The course name is Tropical Crop Production (5440-B1-1E18) held for three months; every year from September until November. This course focuses different aspects of tropical crop production such as the properties, management of major tropical crop species; production constraints (biotic/abiotic stress); and optimization of

small production systems. The course is given by different teachers (7 to 13 teachers between 2013 and 2018) that hold expertise in the region and with the topics of the course plan. Between 2013 and 2017, this course had from 12 to 40 students with different background.

The problem

For three years (2015 - 2017) the lack structure of this course has been an aspect coming out as an issue in the student evaluations of the course. Some comments about this matter are summarized in the following table to illustrate the problem:

Table 13.1. Comments from students about the main problem in the Tropical Crop Production course between 2015 - 2017

Comment to the evaluation question: Suggestions for improvement?	Student evaluation year/ Evaluation results	Element to target
<p><i>"The course is simply unstructured. There is no system in the order of topics, it is a complete mess in its current form. It is possible that these are the most important topics to cover, however the lectures has to follow each other in a much much more logical way."</i></p> <p><i>"Increased organization in the course objectives and lecture topics. There was a lot of jumping around from plant physiology topics to farming system topics, making it difficult to make connections."</i></p>	<p>2015/ 75% positive final evaluation of the course</p>	<p>Lack of structure and need of more logical order. More organization and connection of objectives and lecture topics.</p>
<p><i>"This is probably one of the most disorganized courses I have ever taken. We have had several different lecturers in random orders with random topics."</i></p> <p><i>"The different course components felt very disconnected to the overall aims of the course. It was often hard to follow the logic of what we were supposed to learn week-to-week. I think more connection between lecturers could give more sense to the whole content."</i></p>	<p>2016/ 36.8% positive final evaluation of the course</p>	<p>Randomized order of lectures. Disconnection among topics and aims of the course.</p>
<p><i>"The general organization of the individual lectures was in my opinion very illogical."</i></p> <p><i>"Develop a logical, linear plan for the course and follow it."</i></p> <p><i>"Organize the course better and make the course content more focused."</i></p>	<p>2017/ 45.5% positive final evaluation of the course</p>	<p>Develop a more logical organization of the course plan with more focused contents.</p>

Justification of the intervention

The results of the student evaluations held for three years had recurrent observations and suggestions to improve the structure and organization of the course. With this consideration in 2017, the course plan was changed and some topics were re-arranged according to calendar possibilities of teachers involved and personal criteria of few teachers in charge of this task. Nevertheless the good intentions, this organization didn't have yet good acceptance and response from students. Therefore a "Course Align-

ment" was proposed to improve the organization and structure of the Tropical Crop Production course plan.

Study question: Can the course alignment serve as a tool to align and have a better linkage between different topics of the course?

Intervention - Methods

The objective of this intervention was to determine the course alignment of a MSc course using the proposed method by Blumberg (2009) that takes into account the course objectives, cognitive processes, the different types of knowledge and assessment activities. This method was applied to two course plans (2017 and 2018) of the Tropical Crop Production course to test the course alignment of their structures. After testing, results were compared with the final student evaluations to evaluate the final learning outcomes.

The method proposed by Blumberg considers the course alignment and delivery of the course contents by the arrangement of activities that starts from the objectives and ends in the assessment. It uses the concepts of objectives taxonomy, cognitive processes and the different types of knowledge to maximize learning (Engelhart et al., 1984; Krathwohl et al., 2001). As this method considers how learning occurs (through different processes and knowledge) it was considered as suitable to be applied in the course where the problem was identified. Blumberg method indicates the following steps: The first part corresponds to filling out a table listing the course objectives, the teaching and learning activities and the assessment exercises according to their corresponding cognitive process. When an objective does not have any related teaching, learning or assessment activity, then the course is considered misaligned; this can be visualized through a line drawn connecting the cells in the columns, when the lines are straight and connect all elements, the course is aligned. If there are diagonals, then the course is misaligned due to missing elements (Blumberg, 2009).

The course alignment was built considering the Tropical Crop Production course Intended Learning Outcomes which in the course description were described considering the different dimensions of knowledge according to Anderson (Krathwohl et al., 2001): knowledge (factual and conceptual), skills (procedural) and competences (meta-cognitive).

Table 13.2. Main intended learning outcomes of course where Blumberg (2009) method was applied

Main Intended Learning Outcomes	To get a comprehensive understanding of properties of selected tropical crop species and management in tropical rainfed and irrigated agro-ecosystems. Focus on climate related production constraints (biotic/abiotic stress) and human endeavor to optimize crop production in small scale for poverty alleviation and sustainable production.	
Knowledge	Skills	Competences
Demonstrate knowledge on principles for Tropical Crop Production	Analyze and synthesize information about tropical crop production	Assess and formulate agronomical components of development support programs
Understand the characteristics of major tropical crops	Design cropping system calendars for major tropical crop species	Advise extension and research institutions in tropical countries
Demonstrate the characteristics of tropical crop production systems in relation to agro-ecological and socio-economic conditions	Develop tropical crop production plans in relation to their agro-ecological and socio-economic conditions	Assess field and greenhouse trials
	Design, implement and analyze research projects in a tropical environment	

Results and Discussion

The application of Blumberg method was done for all the objectives of the course. The application of the method in the course plans of 2017 and 2018 turned to be the same since both plans had the same objectives and activities and only differed in the activities arrangement. Ninety percent (90%) of the course plan was aligned (9 out of 10 objectives). For the objective that was not aligned ("Assess and formulate agronomical components of development support programs"), adjustments were formulated by reducing activities that were not in line with this objectives and giving more emphasis to the corresponding assessment exercise as suggested by Blumberg (2009). This adjustment was not applied yet in the course plan, in order to be able to compare the final course evaluation results. An example of the application is shown in Table 3 where the teaching, learning and assessment activities are aligned between them and with the course objective.

The course structures of 2017 and 2018 were considered aligned according to the method proposed by Blumberg (2009). There were different

types of cognitive activities to support and maximize the learning process. Nevertheless in the final student evaluation of 2017, only 45.5% of students showed a positive final valuation and kept complaining about the course structure. In contrast, in 2018 after the new arrangement of activities 100% of the students expressed a positive valuation of this course with comments such as "The lectures were logically planned out....".

The course plan of 2018 considered an arrangement of the activities in relation to the main objectives. As the factual and conceptual knowledge are considered the foundation to build the other two types (procedural and meta-cognitive); the objectives of the course describing the "knowledge objectives" were used to identify the key elements, together with the main objective of the course (Table 1). From here four modules were proposed: I: Principals of tropical crop production, II: Major tropical crops, III: Crop optimization in the tropics and IV: Evaluation. The arrangement of the course activities responded to a better logic that considered the main aspects of the course objectives and not to the teachers' time as it was mainly in previous years. From this case study to value or assess the course alignment it seems fundamental to consider the logic order of course activities. Therefore an initial step in the course alignment determination is proposed to determine the key elements that give a logic order to the course objectives, then enlist them following that order and apply the rest of Blumberg method. With this both the alignment and logic sequencing of the objectives in relation to the teaching, learning and assessment activities can be verified.

Conclusions

The objective of this intervention was to apply Blumberg (2009) method to assess a MSc course alignment. This exercise was applied to two course plans of the same MSc course implemented in 2017 and 2018. Considering that the course objectives, the teaching, learning and assessment activities were the same and only the order of these differed; the course alignment was the same and showed that 90% of the course objectives were aligned with the rest of the course activities. Nevertheless the final student evaluation of the course was positive for 45% of the students in 2017 compared to 100% in 2018. The course alignment method proposed by Blumberg (2009) and applied to this case was a useful, but not sufficient. The application showed that a good structure of a course that maximizes learning not only depends in the consistency between objectives, content, learning activities

and assessment methods, but also in a logic sequencing. With this consideration, an initial step to Blumberg's method is recommended to identify a logic sequencing based on key elements of the course objectives.

References

- Krathwohl, D. R., & Anderson, L. W. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Longman.
- Biggs, J. (2003). Aligning teaching and assessing to course objectives. *Teaching and learning in higher education: New trends and innovations*, 2(April), 13-17.
- Biggs, J. (2014). Constructive alignment in university teaching: HERDSA Review of Higher Education, 1, 5–22.
- Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1984). *Taxonomy of educational objectives book 1: Cognitive domain*. BS Bloom.
- Blumberg, P. (2009). Maximizing learning through course alignment and experience with different types of knowledge. *Innovative Higher Education*, 34(2), 93-103.

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Table 13.3. Example of the method using one of the objectives of the course

What level is each of the following?	Aspect not included in the course	1 Remember (recognize, recall)	2 Understand (interpret, exemplify, classify, summarize, infer, compare, explain)	3 Apply (execute, implement)	4 Analyze (differentiate, organize, attribute)	5 Evaluate (check, critique)	6 Create (generate, plan, produce)
Objective		Demonstrate knowledge on principles of Tropical Crop Production					
Teaching learning methods	The tropical environment, Highland Tropics, Seed biology, soil fertility, crop physiology and stress (lectures) Cooking activity with tropical products	Germination exercise, soil fertility, crop physiology and stress (practical exercises)	Germination and soil fertility, crop physiology implementation of experiments and exercises	Analyzing results in germination, soil fertility, crop physiology exercises	Course discussions	Cooking activity with tropical products Crop Production calendar	
Assessment requirements	Quizzes and exam questions	Course quiz I and II, exam questions, reports of practical exercises, final report	Report with the procedures of execution of practical exercises.	Reports with the analysis of practical exercises	Peer assess other students final reports	Final report	

Note: the vertical and horizontal blue lines show the alignment of the teaching, learning and assessment methods with the course objective (Blumberg 2009)

B

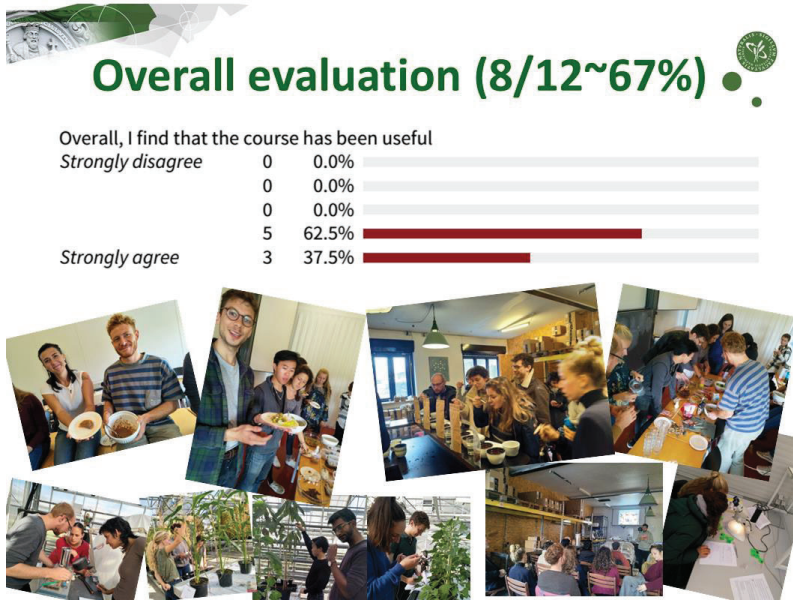


Fig. 13.1. Final evaluation results of the Tropical Crop Production course (from eight respondents out of twelve) with some pictures of the teaching and learning activities of this course held at the University of Copenhagen (2018).

