

TEACHING PROJECT



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Submitted: June 30, 2020

Declaration of independent work



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Abstract

Research on learning in higher education has revealed certain key aspects of teaching and learning that are most strongly associated with successful learning. One of those key characteristics is having **explicit learning goals** and communicating them to students. A small-scale survey of all courses offered at my department suggests that there is a mismatch between learning goals as intended by lecturers, and as perceived by students. Potential causes are that lecturers are ineffective at 1) designing or 2) communicating learning goals.

To address those problems, I have developed and published a series of short training videos for lecturers.¹

Keywords

Learning Goals, Achievement, Evaluation, Professionalization of Teaching, Lecturer Training

¹Find the videos and more information at <https://www.cl.uzh.ch/de/people/team/compling/mmueller/LearningGoals.html>.

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1 Introduction

1.1 A grounded way of evaluating and improving teaching

There is a lot of variety in higher education teaching: there are large differences between individual lecturers in terms of attitude towards teaching, preparation, delivery and so on. This puts empirical higher education research in the fortunate position that data about various ways of teaching is available, even without the need for controlled experiments. In theory, comparing different styles of teaching in a scientific manner should then tell us what works and what leads to the most successful learning outcomes. In my opinion, this is precisely the main appeal of meta studies that correlate various variables with measures of successful learning or student achievement.

Such large meta studies (e.g. [Feldman 2007](#); [Hattie 2015](#); [Schneider and Preckel 2017](#)) do reveal interesting findings, and to put it bluntly: not all styles of teaching are created equal. Some are decidedly better than others at enabling student learning. Also, it is not obvious what exactly is most conducive to learning: for instance, the “enthusiasm for subject or teaching” only weakly correlates with successful learning (Cohen’s $d=0.56$) compared to “clarity and understandableness” ($d=1.35$, [Schneider and Preckel 2017](#)). [Hattie \(2015\)](#) found that *humor* hardly correlates with successful learning at all. I would argue that findings such as these are surprising, as I would have attributed a lot to teachers being enthusiastic and cheerful.

Meta studies like these certainly have a plethora of limitations, but if they are taken at face value for the sake of argument, they suggest the following: decisions made by lecturers do not have to be arbitrary, they can be informed by empirical results. Departments looking to reform their teaching curricula can do so in a principled way, by 1) identifying from literature the key drivers of successful learning, 2) in all courses do a targeted evaluation of exactly those key characteristics and 3) act where the implementation is currently not satisfactory. Compared to conventional course evaluations that cast a very wide and unspecific net, this represents a focused and principled way of improving teaching.

1.2 One application: evaluate and improve learning goals

I see my teaching project as an *instantiation* of the line of thinking I have outlined so far. I have identified one key aspect of teaching that correlates well with successful learning: **learning goals**. I have then sought to evaluate the courses offered at my department, by means of small, specific surveys. I surveyed both lecturers and students to capture the perspective of both.

The main outcome of my survey is that there is a considerable mismatch between what lecturers intend as the learning goals, and what students understand about them. The most obvious illustration of this is perhaps that all lecturers reported that they did communicate the learning goals to their students explicitly, while about half of the students claimed to have never been informed about learning goals at all. After scrutinizing the actual learning goals set by lecturers and asking lecturers how exactly they communicate learning goals, I believe that the mismatch between lecturers and students is due to some lecturers being ineffective at 1) designing learning goals or 2) communicating them to students.

Those are interesting findings, but it is important to act on them once they become available: all too often, evaluation at universities does not lead to meaningful changes ([Schneider and Mustafić, 2015](#); [Beran and Violato, 2005](#); [Wachtel, 1998](#)). In order to improve our future teaching, I have designed short training videos for lecturers. The videos cover the importance of learning goals, design principles and effective communication to students.

I care deeply about teaching at my university, and I am thrilled at the prospect of bringing about real change.

2 Learning goals in higher education research

Learning goals are certainly a prominent topic in literature on teaching and learning. In this chapter I'd like to discuss evidence that learning goals are indeed a key driver of successful learning (§2.1), what makes good learning goals and how they should be communicated to students (§2.2).

In addition, I dediced to include two important categorization frameworks for learning goals: how learning goals for individual courses are embedded into the goals of an entire organization (§2.3) and how learning goals can be broken down into different levels of competence (§2.4).

2.1 Correlation with successful learning

Nature of meta studies

Research that tries to summarize all studies concerned with effective teaching and learning usually summarizes evidence as a ranked list of variables associated with achievement, or “successful learning” (Hattie, 2015). To illustrate such a ranking, I am reproducing the 5 top-ranking variables from Schneider and Preckel (2017, 568), which is a very recent meta-review about the subject matter:

Rank	Variable	Who	Effect size (Cohen's d)
1	Peer-assessment	Teacher	1.91
2	Performance self-efficacy	Student	1.81
3	Preparation/ organization of the course	Teacher	1.39
4	Clarity and understandableness	Teacher	1.35
5	Setting grade goals	Student	1.12

I added a third column (**Who**) to emphasize who is the primary addressee of each variable. This excerpt shows that among variables that are associated most strongly with successful learning, both teachers and students have a role to play: successful learning is neither the sole responsibility of the student, nor the teacher.

Evidence from important meta studies

According to Schneider and Mustafić (2015, 16), Feldman (2007) ranked clear learning goals as the third most important variable in his study². Speaking more generally about the importance of learning goals, Schneider and Mustafić emphasize (ibid.) that a crucial aspect of teaching is

die Verfolgung präziser Lehrziele. Dem Dozierenden sollte klar sein, was genau die Studierenden in der Lehrveranstaltung, in den einzelnen Veranstaltungssitzungen sowie in den einzelnen Abschnitten einer Sitzung überhaupt lernen sollen. Erst wenn ein Dozierender diese Ziele sprachlich knapp und präzise auf den Punkt bringen kann, vermag er die Mikrostruktur seines Unterrichts daran auszurichten, sein Unterrichtsmaterial zusammenzustellen, den Studierenden den Sinn der Lehreinheiten klar zu kommunizieren und den Lernfortschritt der Studierenden in Bezug auf die Ziele zu kontrollieren.

As a whole, the quote above suggests that learning goals do not simply serve the purpose of guiding student learning while a course is running, but are also critical for all other major phases of teaching such as planning and assessment.

In his landmark study, Hattie (2015, 82) includes “Goals” as one of the variables to be correlated with successful learning, albeit without much further explanation and relatively low correlation of $d=0.4$. 0.4 might appear to be a medium effect size at first sight, but in studies about successful learning, most variables and interventions are expected to correlate with achievement somehow. In other words, it is very rare for a variable to be entirely uncorrelated in this case. Instead of assuming that values around $d=0.0$ mean no correlation, it is more useful to determine a “hinge point” for meaningful correlation, such as $d=0.4$ (Hattie, 2015). However, Hattie and collaborators continuously update their rankings³, and the most recent version lists:

²In the original study by Feldman (2007) I cannot find the section or table that would support this claim.

³See <https://visible-learning.org/hattie-ranking-influences-effect-sizes-learning-achievement/> for the current list of variables and effect sizes.

Variable	Effect size (Cohen's d)
Learning goals vs. no goals	0.68
Appropriately challenging goals	0.59

While still using $d=0.4$ as the hinge point for meaningful positive correlation. Those numbers indicate that a) having learning goals (as opposed to not having them) is beneficial for student learning and b) that good learning goals are challenging but achievable (see also Section 2.2).

By far the most comprehensive discussion of the merit of learning goals is by [Schneider and Preckel \(2017\)](#). The “clarity of course objectives and requirements”⁴ ranks 13 in their meta analysis, with an effect size of $d=0.75$. They emphasize the “dual function” of learning goals by saying that students “need them for distinguishing between important and unimportant lesson contents, planning and organizing learning and problem solving, and preparing for exams” (ibid., 589; see also [Seidel et al. 2005](#)). As a possible underlying mechanism by which learning goals impact successful learning they discuss that setting clear learning goals improves students’ perceived self-efficacy ([Bandura, 1997](#)). Finally, they make it clear that improving the learning goals of a course is a small and easy to implement change for teachers, while also being self-contained and not requiring substantial reforms ([Schneider and Preckel, 2017](#), 593). Another way of saying this is that if teachers have some time to spare to improve their courses, learning goals are a good starting point.

2.2 Desirable properties of learning goals

The following is meant to be a concise list of what makes a good learning goal and how they are best communicated to students. Most of this information is derived from and discussed in more detail in [Schneider and Mustafić \(2015, 16-17\)](#).

Learning goals are about competences, not content

A very basic tenet is that the content of a course does not qualify as learning goals. In my own experience, if asked about learning goals of their course, many lecturers simply list the contents of the course. Actual learning goals often start with the formulaic *At the end of this course, students will ...*, and they always mention a *competence* to be acquired. As an example, consider

- x** Thermodynamics
- (✓)** At the end of the course, students will understand thermodynamics.

It shows the difference between a declaration of content that masquerades as a learning goal and an improved version that is competence-oriented. The checkmark in parentheses (**✓**) suggests that this variant is still not a proper learning goal and will need to be improved further.

Learning goals need to be specific

Learning goals that are too general defeat their purpose entirely, because neither teacher nor students can use them for guidance. To illustrate, I am improving the learning goal introduced earlier even more:

- x** At the end of the course, students will understand thermodynamics.
- (✓)** At the end of the course, students will understand the first law of thermodynamics.

Understanding thermodynamics in its entirety seems a goal that is not attainable because it is not specific enough. When encountering such a goal, the right action to take is to narrow its scope.

⁴Upon further inspection, I am not convinced that this variable is precisely about learning goals. The particular definition that ([Schneider and Preckel, 2017](#), 569) seem to be using is “The purpose and policies of the course were made clear to the student; the teacher clearly defined student responsibilities in the course.” This seems to be more broadly about what is expected of students. Still, the discussion in the paper strongly suggests this variable concerns learning goals.

Learning goals need to be verifiable

It is crucial for learning goals to be verifiable. This means that students need to be able to check their progress during the semester, and teachers must be able to verify whether students achieve goals. Making a learning goal verifiable is not entirely obvious:

- ✗ At the end of the course, students will understand the first law of thermodynamics.
- ✓ At the end of the course, students will be able to recite the first law of thermodynamics.

It is important to realize that using a word such as “understand” makes a goal unverifiable, because everyone will understand a subject to a certain extent. Even after a PhD in Physics people would perhaps say that they do not truly “understand” the first law of thermodynamics. In fact, lecturers experienced with writing learning goals avoid verbs such as *understand* altogether.

Learning goals for the entire course, but also individual lessons

Learning goals should be defined both for an entire semester, but also for all individual sessions. Goals for the entire course of course have a different scope, but both are equally important. For a light-hearted, but hopefully very mnemonic illustration, see Figure 1a.

Learning goals need to be communicated explicitly, ideally in each session

It is not enough for learning goals to exist in a lecturer’s mind, students need to be told explicitly about them. Also, there is not really a good argument to be made for why goals should not be disclosed to students. Ideally, goals are mentioned in each particular session – contrary to the common practice of explaining learning goals once, at the beginning of the semester. See Figure 1b.

Learning goals should be regarded as challenging, but achievable

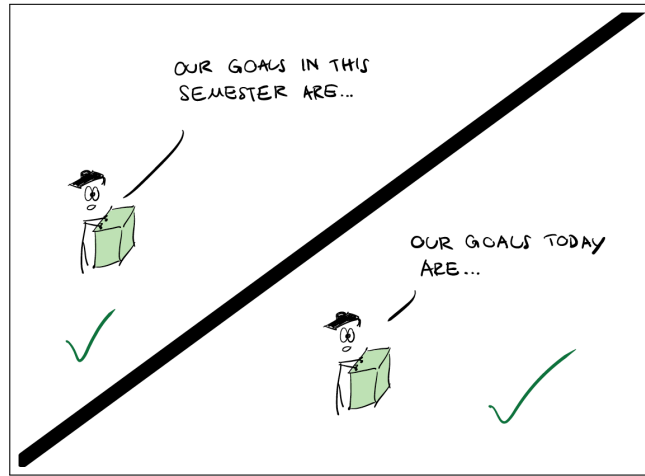
Perhaps the most subtle point I would like to make here is that teachers are responsible in part for how goals are perceived by students. To reach their full potential, goals must be seen as challenging, but achievable by both students and teachers. See Figure 1c.

2.3 Levels of organizational hierarchy

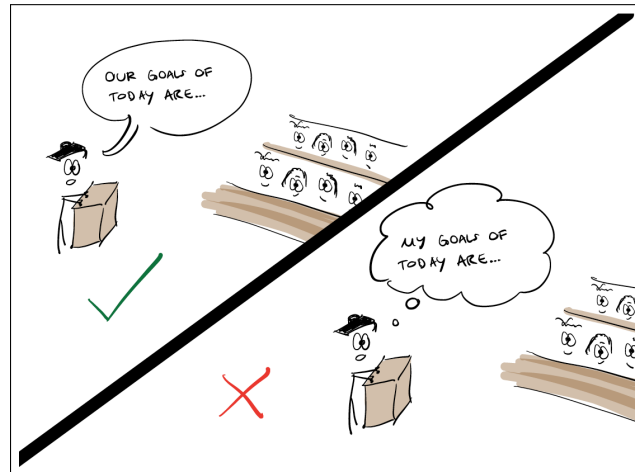
Most courses are not exactly independent enterprises, but are embedded into a curriculum for a certain degree, which is in turn embedded into the overall systems of degrees offered by the entire organization. In my opinion, most people teaching at a university are not aware of the overall teaching strategy laid out by the faculty or university. Most institutions have documents like these, sometimes also calling them “teaching vision” or “teaching statement”. [Schneider and Mustafić \(2015, 17\)](#) argue that it is useful to be aware of such higher-level goals such as ones defined for a degree program:

Da also unterschiedliche Veranstaltungsarten zur Erreichung unterschiedlicher Lehrziele sinnvoll sind, sollte der erste Schritt bei der Vorbereitung einer Vorlesung darin bestehen, sich über die Rolle der Vorlesung im Gesamtcurriculum des Studiengangs klar zu werden und zu präzisieren, welche Lehrziele des Studiengangs sinnvollerweise im Rahmen der Vorlesung verfolgt werden können.

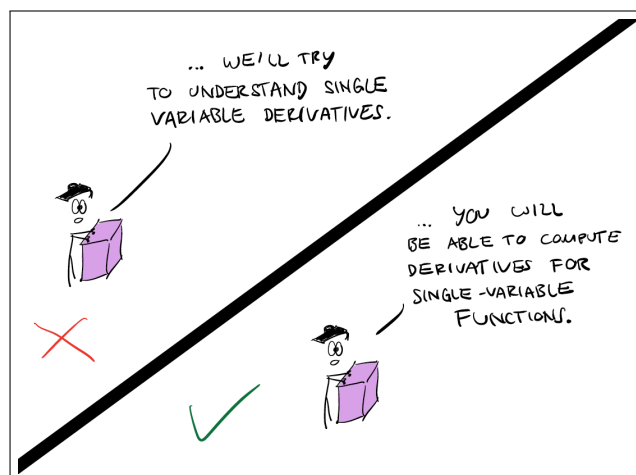
For an illustration of goals at different levels of organizational hierarchy, see Table 1.



(a)



(b)



(c)

Figure 1: (a) Importance of both semester and session goals. (b) Goals need to be communicated explicitly. (c) Goals need to be portrayed as challenging, but achievable.

Level	Example goal
University	An MSc course provides students with the necessary skills to independently identify and solve problems in their subject area.
Degree	Students acquire expertise in software development.
Course	Students can analyze and improve algorithms.
Lesson	Students can compute the worst-case runtime complexity of algorithms.

Table 1: Examples for learning goals at different levels of organizational hierarchy.

Category	Example goal
remember	Students are able to recite the runtime complexity of mergesort.
understand	
apply	
analyze	Students are able to classify sorting algorithms into complexity classes.
evaluate	
create	Students are able to improve the runtime complexity of a sorting algorithm from n^2 to $n \log n$.

Table 2: Examples for learning goals at different levels of Bloom’s taxonomy.

2.4 Levels of competence

An entirely different frame of reference for learning goals is *Bloom’s taxonomy* of learning goals (originally published as [Bloom et al. 1956](#); see [Nerdel 2017](#) for a more recent account). Its purpose is to provide categories for learning goals that differ in the complexity of the competence that is being acquired. The categories range from simply memorizing information to being able to create new intellectual matter. There are 6 such categories in Bloom’s taxonomy, but I believe that the boundaries between them are a little fuzzy.

See [Table 2](#) for examples. To make my illustration more clear, I am giving examples⁵ only for 3 out of 6 categories, to show goals that are indeed substantially different. From top to bottom, there is a noticeable increase in goal complexity, and keeping in mind Bloom’s taxonomy can be a helpful tool for designing learning goals.

⁵My sincere apologies to readers that are not familiar with the Computer Science concepts introduced here.

3 Department survey

I conducted a small-scale survey at my department about lecturers' current practices regarding learning goals. Besides, I also asked students of those lecturers how they perceive learning goals.

3.1 Design

I designed a qualitative survey consisting of a questionnaire with very few questions (4 for students, and 5 for lecturers, respectively). The exact questions for lecturers were:

Type	Question text
a	What are the learning goals for your course?
b	Are your learning goals specific to each session, or for the entire course?
b	Did you set explicit learning goals for this course in the planning phase?
b	Do you mention learning goals explicitly to students?
c	In your opinion, are explicit learning goals important for the learning experience of students?

The questions are designed to

- a** simply record the actual learning goals as intended by the lecturer,
- b** capture a lecturer's current practices when it comes to learning goals: for instance, whether they did use learning goals for planning the course, or whether they mention goals explicitly in class,
- c** capture a lecturer's attitude towards learning goals.

The questions for students are almost identical, but of course there is a shift in perspective:

Type	Question text
a	In your opinion, what are the learning goals for this course?
b	Are the learning goals specific to each session, or for the entire course?
b	Did the lecturer mention learning goals explicitly to you?
c	Are explicit learning goals important for your learning experience?

I prepared two Google Forms⁶ with those questions and sent separate emails to lecturers and students, inviting them to participate. At the top of the forms I asked people to select the course they are teaching or taking, out of all courses that our department is offering⁷. All questions have an opt-out answer, in the sense that it is always possible to click the "other" button and type a custom answer.

3.2 Outcomes

Survey recall and statistics

While promoting my survey, I met with some resistance from our head of department whose view is that most evaluation is inherently pointless and never leads to actual change. In the end, he gave his blessing for a survey that only takes a couple of minutes to fill in, is completely voluntary for lecturers and does not take away lecture time. At first I imagined I could ask my teaching colleagues to fill in the forms with all of their students during their lectures. Overall, it was an enormous effort to motivate people to respond, both lecturers and students. I pleaded with my colleagues several times in follow-up emails, and enlisted the help of the student association to reach students using more informal channels.

In the end, 15 lecturers completed the survey, which covers 14 of the 15 courses we offer (two answers are from lecturers teaching the same course together). I took the learning goals for

⁶The direct links to those forms are: <https://forms.gle/SRfCct2TJrn8pqAaA> and <https://forms.gle/wctXDpV5jXzavERv9>.

⁷See <https://www.cl.uzh.ch/de/studium/studies-tt/studies-1/FS2020.html> for the schedule in the spring semester 2020.

Survey answers by lecturers	15
Survey answers by students	21
Total courses offered by department	15
Courses covered by lecturer answers	14/15
Courses covered by student answers	11/15
Total student majoring in Computational Linguistics	80

Table 3: Department and survey statistics

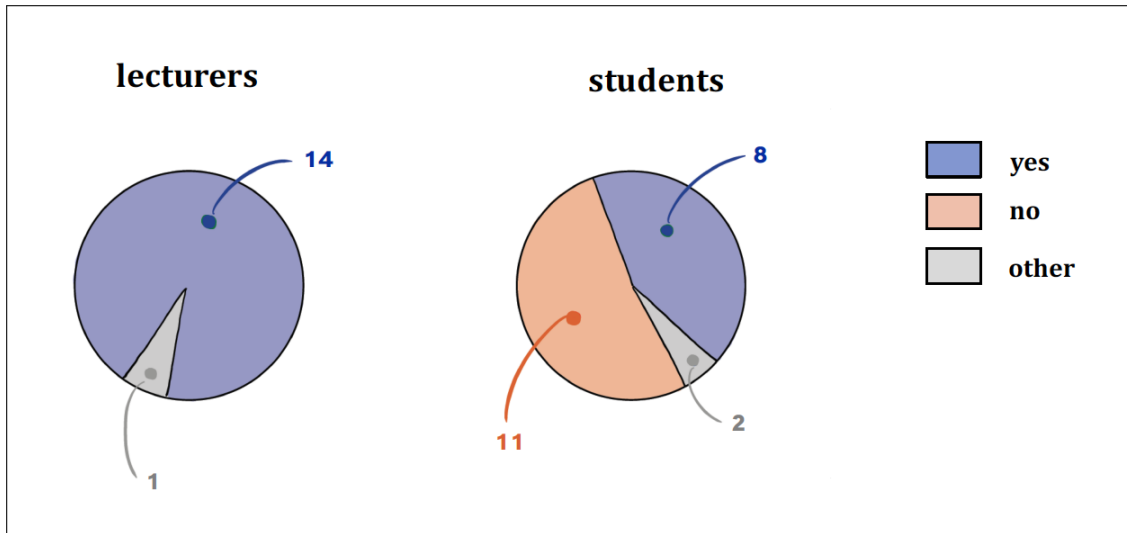


Figure 2: Answers to the question: *Are learning goals mentioned explicitly in your course?*

the missing course from the university course catalog, but could not record answers for all other questions. Out of 15 courses in total, I was able to collect at least one answer from a student for 11 on them, the number of students who participated is 21 in total. See Table 3 for further general statistics about our department and my survey.

Key results

14 out of 15 lecturers stated that they told students explicitly about the learning goals of their course. The remaining lecturer said they did not mention learning goals themselves, but their co-lecturer did. On the other hand, 11 out of 21 students stated that learning goals have never been mentioned to them. Two students used the option to give a custom answer⁸. See Figure 2 for an overview.

For 11 out of 15 courses, I compared the actual learning goals as stated by the lecturers and students. For each individual course, I checked if lecturers and students roughly agree on the learning goals. For 5 out of 11 courses (for which I had data from both parties) I came to the conclusion that there is a substantial mismatch between them. See top left of Figure 3 for an illustration. For examples that explain what a “substantial mismatch” between lecturer and student perspective is, see Table 4. In the first example, the mismatch is quite large since the lecturer has listed learning goals in a very detailed way, while the student answer is very general and could fit any course we offer. I am aware that such an analysis is purely subjective and I am not claiming general validity outside my own person.

As a further analysis, I determined whether learning goals submitted by lecturers adhere to two important design principles: specificity and verifiability (see Section 2.2). Out of 15 sets of learning goals by lecturers, I deemed 8 to be too general to be useful, in the sense that they cannot possibly guide the preparation of a course or student learning. 10 out of 15 sets of learning goals are hardly verifiable, which makes them improper goals. See bottom of Figure 3 for an illustration.

⁸The two custom answers are: “Partially, as the majority of the sessions are presentations by fellow students.” and “Actually yes, but as the exercises sometimes deviated from lectures contents, I automatically focused more on the topics of the exercises than from the lecture.”

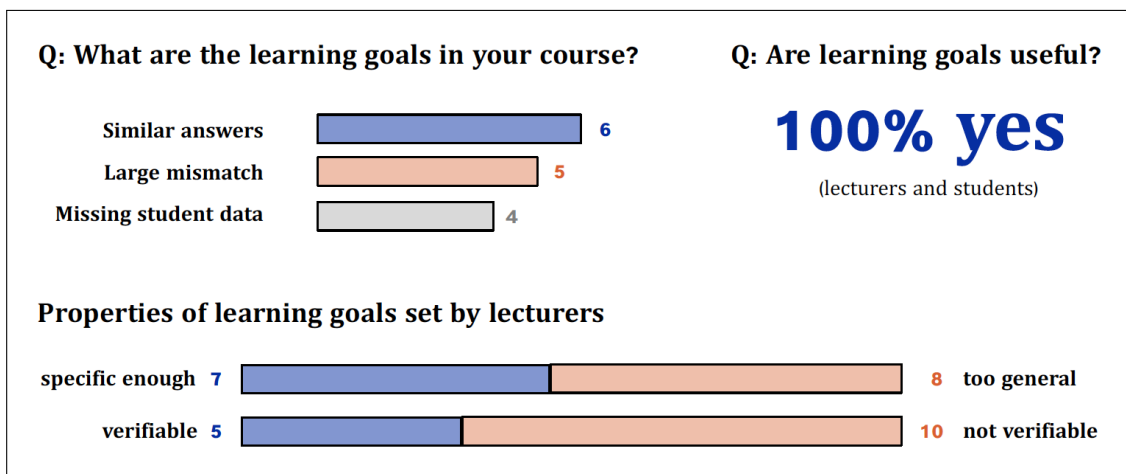


Figure 3: Illustration of results. Top left: whether lecturers and students agree on the learning goals of one particular course. Bottom: whether learning goals set by lecturers adhere to important design principles.

For examples of all kinds of goals, see Table 5. The first example is neither specific nor verifiable, but just a list of generic terms. The middle example shows how goals can be specific, but still be mainly a list of contents, which makes those goals not verifiable. The bottom example of Table 5 shows goals that are perfectly fine regarding specificity and verifiability⁹.

Finally, all participants unanimously agreed that learning goals are important for successful learning (see top right of Figure 3).

3.3 Discussion of outcomes

Lecturer versus student perspective

Lecturers and students appear to have very different views on whether learning goals have been communicated explicitly in a course. I do not doubt that all lecturers indeed intended to explain the learning goals to the students, but in some cases they did not succeed. One possible reason is that in some courses learning goals are only mentioned at the beginning of the semester: after several months, it is not surprising that some students do not even remember having heard them. As I have argued earlier, it is in fact crucial for learning goals to be mentioned at the beginning of each individual lesson (see Section 2.2). More generally, learning goals only work as intended if students are aware of them. In short, it seems that several lecturers fail to communicate goals effectively, and that is a shortcoming that could be addressed by some form of teacher training.

How lecturers design learning goals

As a litmus test for learning goals, I have looked at the specificity and verifiability of learning goals as stated by lecturers. The results suggest that some lecturers write passages of text that do not qualify as learning goals at all: their goals could not be used in a meaningful way as guidance for planning or studying. Also, many goals are not verifiable, meaning that lecturers cannot assess whether students achieved them, and students cannot know about their progress during the semester. It appears that for some, writing good, proper learning goals is difficult at the moment, but not because the process is inherently difficult. Rather, I would argue that there is a need for basic training to acquire the necessary skills.

Needless to say, both parties fully agree that learning goals are useful. This makes it worthwhile for me to invest in teacher training to improve the current situation.

⁹I could have admonished the person for using the term “understand”, but think that the learning goals are sufficiently clear in this case.

aligned?	who	learning goal text
✗	Lecturer	Gemäss Vorlesungsverzeichnis: Die Studierenden: - kennen die Anwendungs- und Problembereiche der Semantik innerhalb der Computerlinguistik: lexikalische Semantik, insbesondere Wortnetze, Framesemantik und Satzsemantik; - kennen Logik als Basis der Satzsemantik; - gewinnen Einblick in weitere Probleme beim automatischen Verarbeiten der natürlichen Sprache; - kennen computerlinguistische Verfahren zur Berechnung von semantischen Strukturen und Bedeutungsdesambiguierung; - erarbeiten praktische Fähigkeiten für die Modellierung von semantischen Beziehungen mit Wortnetzen, für die einfache semantische Annotation von Sätzen in FrameNet und für die Übersetzung von Sätzen in logische Formen; - erlangen Kenntnisse über die Modellierung von Wissen, die Grundlagen des Semantic Web und Basiskenntnisse in XML.
	Student	Become familiar with the field of CL, get an indepth overview of its methods and problems.
✓	Lecturer	The students: - know current state-of-the-art machine learning methods for different NLP tasks; - know how to conduct current machine-learning-based empirical research in NLP.
	Student	Understanding current techniques/approaches/research directions in machine learning (esp. deep learning), being able to read and understand current literature in the topic and being able conduct own experiements and document them.

Table 4: Examples of sets of learning goals. Top: large mismatch between lecturer and student perspective. Bottom: student and lecturer answers are mostly aligned.

specific	verifiable	learning goal text
✗	✗	Wissenserwerb aus dem Bereich Statistik und klassisches Machine Learning. Kennen und Verstehen der zugrundeliegenden mathematischen Zusammenhänge.
✓	✗	Basic probability and sampling, properties of language corpora, tools and algorithms for automatic and manual annotation, treebanks, translation corpus and multilingual alignment, corpus querying
✓	✓	Block objective: students will be able to understand the fundamentals of how humans process speech and text. Subgoals: - describe the main brain regions involved in language processing. - define neuroscience, neuroanatomy, neurolinguistics, psycholinguistics. - understand the elementary steps of language comprehension: from sound/text to meaning. - illustrate the basics of language acquisition. (...)

Table 5: Examples for sets of learning goals annotated for their *specificity* and *verifiability*.

Sample sizes, validity and limitations

The very small sample size of my survey clearly limits the range of permissible analyses and conclusions to draw from them. I received answers from 15 lecturers in total, and 21 students. Given those numbers, I believe any general claim about learning goals would be fundamentally flawed. For instance, it would not be permissible to draw the conclusion that lecturers and students at other departments or universities give similar answers. Moreover, since for some courses I relied on the opinion of one single student, it may well be that many other students from the same course think differently about learning goals. The data also precludes measures to quantify certain biases of sampling, such as an estimation of variance. In short, only qualitative methods should be used on this data set.

If I were to collect this kind of data again, there are a number of things I would do differently. It was challenging to find enough participants for my survey, and I noticed what can perhaps be described as *survey fatigue*. But then, I simply sent out emails to all of my colleagues, when I could have talked to them individually. What would be viable perhaps is the following: early on, ask lecturers if they are willing to participate in a multi-part experiment. Committing to the study would mean to commit to all parts, which would be a contract of some sort. This would give me more leverage to make them fill in the survey and ask them to have all of their students fill in the survey. Later on, they could feel more obliged to watch the videos that resulted from my study (see Section 4) because of their personal investment.

Likewise, I would need to improve some of the survey questions. The main problem in my opinion is that the survey does not clearly distinguish between learning goals for an entire semester and ones for individual lessons. Therefore, a question such as “*What are the learning goals of this course?*” is ambiguous. Many of the learning goals I analyzed are not verifiable or not specific enough, but there is a chance that lecturers simply understood that the semester goals are what I was asking for.

One final way in which I could improve a future study is by asking only questions I intend to study, even if there are very few questions overall. I asked lecturers: *Did you set explicit learning goals for this course in the planning phase?* without a clear intention to analyze or use those results. Therefore, it would have been better to not ask this question at all.

4 Training videos for lecturers

My qualitative survey (see Section 3) left me with the impression that some educators could need help with designing and communicating learning goals in an effective way. In my opinion, an efficient way to train lecturers are short videos that they can watch in their own time. I developed 4 videos that are available to the general public as a Youtube playlist¹⁰.

Section 4.1 gives a rationale for this and explains the design of my videos. Section 4.2 summarizes how I broke content down into four blocks and finally, Section 4.3 discusses the current and potential impact of my efforts.

4.1 Design considerations

The main purpose of the videos is to summarize key information in a condensed way, without taking away too much time from lecturers. As an upper limit, I decided that the maximum time people would put into learning goals without having a particular interest in them would be 1 hour. In the end, the content was broken down into four videos, and the total running time is 45 minutes.

While making the videos I took inspiration from two important role models for online teaching: the ETH course *Improving your teaching slides with simple means* by Karin Brown and Andreas Reinhardt, and the teaching approach of Sal Khan, founder of Khan Academy¹¹. More precisely, I imitate them in the following ways:

- **ETH course on teaching slides:** the course has some online elements. Many of the online assignments are of the form: watch a short video that introduces a concept, then do an exercise. In my opinion, this teaching method is extremely effective while also being very economical with the time participants put into the course. Also, important concepts are framed as **principles**, a technique I found very appealing and which I consequently mimicked in my own videos.
- **Khan Academy:** Khan academy is an online learning platform that is hugely successful on a global scale. In my view, the winning formula of Khan Academy boils down to: information is cut down into bite-sized pieces and presented in short videos that are rarely longer than 10 minutes. After several videos, viewers can optionally solve exercises to check their progress. Hundreds of videos are made by the founder Sal Khan himself, who teaches with an iPad or similar device – which I think adds to the immersion and which I also adopted in my own teaching. A further trick of the trade I have noticed in his videos is that he frequently presents a problem that he is going to work through in the video, but first encourages viewers to pause the video and solve it on their own. I also do this in my videos.

4.2 Content blocks

There are four videos in total, and they largely represent the theory I have introduced in Section 2. A nice side effect of this is that the theory section can serve as a video script of some sort. In a nutshell, here is what each video is about:

1 Research / theory

The video introduces meta studies about successful learning and explains the correlation of learning goals compared to other variables. I then talk about learning goals at different levels of organizational hierarchy, and also about Bloom's taxonomy of learning goals.

2 Designing learning goals

I summarize important design considerations for learning goals, framing them as “principles”. The particular principles I have coined are the *Competence*, *Specificity* and *Verifiability* principle. They are meant to explain that learning goals need to have at their core a competence that can be acquired, that they need to be specific enough and also verifiable by both students and lecturers.

¹⁰See <https://www.youtube.com/playlist?list=PLrIizxhlMn2b5sCBUSGvp0-Cv81JfI0nC>.

¹¹See <https://www.khanacademy.org/>.

3 Communicating learning goals

The third video emphasizes that learning goals need to be communicated explicitly to students, ideally at the beginning of every lesson, not just at the beginning of the semester. Also, lecturers should instil in their students the view that the learning goals are challenging, but attainable.

4 Practice exercises

The last video offers three activities related to learning goals, the main difference being how many people take part. A single person can work on improving several learning goals, and after that watch my particular solution to them. There are two activities for groups of people which both involve writing or reviewing learning goals, and discussing the results with the group. Those activities are designed in the style of *think, pair, share* – giving each participants time to think on their own first.

4.3 Impact

I did inform my colleagues about those videos and asked for informal feedback if anyone were to watch them. Until now, I have not received any feedback. At the time of writing, not many people watched the videos: for instance, the first video has 10 views. But also, the primary target group (teaching staff of our department) is fewer than 20 people and I did not circulate the videos widely yet. Simone Unseld, a colleague from the CAS was interested in using my videos to train doctors from the university hospital who have teaching responsibilities.

But of course, soliciting informal feedback is not an adequate means of measuring the impact of my videos on teaching at the department. What would be needed as a follow-up work to see if this brought about any changes is another survey. The impact I would hope for is that learning goals of students and lecturers are more aligned, that lecturers write high-quality learning goals and that overall, students feel that our teaching has improved.

5 Closing words

I am greatly indebted to my colleagues at the Department of Computational Linguistics for participating in my survey: thank you all for your help. Thanks to all the students who participated in my survey – and to all students in general: you are the one thing that makes teaching exciting.

Thanks to my supervisor Martin Volk for buying me an iPad early on and tolerating “experimental” teaching methods at his department. Sometimes against his better judgement, which shows just how thoughtful a leader he is.

References

- Bandura, A. (1997). *Self-efficacy: The exercise of control*. Macmillan.
- Beran, T. and Violato, C. (2005). Ratings of university teacher instruction: How much do student and course characteristics really matter? *Assessment & Evaluation in Higher Education*, 30(6):593–601.
- Bloom, B. S. et al. (1956). Taxonomy of educational objectives. vol. 1: Cognitive domain. *New York: McKay*, pages 20–24.
- Feldman, K. A. (2007). Identifying exemplary teachers and teaching: Evidence from student ratings. In *The scholarship of teaching and learning in higher education: An evidence-based perspective*, pages 93–143. Springer.
- Hattie, J. (2015). The applicability of visible learning to higher education. *Scholarship of Teaching and Learning in Psychology*, 1(1):79.
- Nerdel, C. (2017). Ziele und Inhalte des naturwissenschaftlichen Unterrichts. In *Grundlagen der Naturwissenschaftsdidaktik*, pages 37–59. Springer.
- Schneider, M. and Mustafić, M. (2015). *Gute Hochschullehre: Eine evidenzbasierte Orientierungshilfe: Wie man Vorlesungen, Seminare und Projekte effektiv gestaltet*. Springer-Verlag.
- Schneider, M. and Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychological bulletin*, 143(6):565.
- Seidel, T., Rimmele, R., and Prenzel, M. (2005). Clarity and coherence of lesson goals as a scaffold for student learning. *Learning and instruction*, 15(6):539–556.
- Wachtel, H. K. (1998). Student evaluation of college teaching effectiveness: A brief review. *Assessment & Evaluation in Higher Education*, 23(2):191–212.



Learning Goals

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1 Importance of learning goals in higher education research

Well-designed, explicit learning goals are highly correlated with successful learning in higher education meta studies [1,2,3]. Important properties of well-designed learning goals are that they are **verifiable** and **specific**.

I argue that those findings warrant an investigation of learning goals in the courses at our department.

Variable	Cohen's <i>d</i>
Self-efficacy	0.92
(...)	
Well-designed, explicit learning goals	0.56
(...)	
Humor	0.04

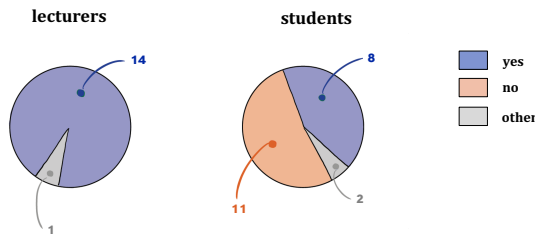
In a nutshell

A small survey about learning goals revealed that there is a mismatch between learning goals as intended by lecturers, and as perceived by students. Potential causes are that lecturers are ineffective at 1) designing or 2) communicating learning goals.

To address those problems, I developed a series of short videos about learning goals for lecturers.

2 Small-scale survey about learning goals

Q: Are learning goals mentioned explicitly in your course?

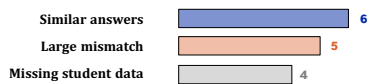


Survey and department stats

	#
Answers by lecturers	15
Answers by students	21
Total courses offered by dept	15
Total students majoring in subject	80
Projects terminated because of Corona	1 /

Motivating people to respond was an enormous effort.

Q: What are the learning goals in your course?



Q: Are learning goals useful?

100% yes
(lecturers and students)

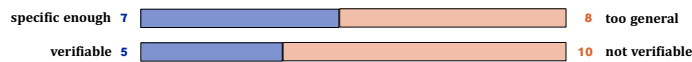
Learn more

Questions?
Please ask Mathias or email mmueller@cl.uzh.ch



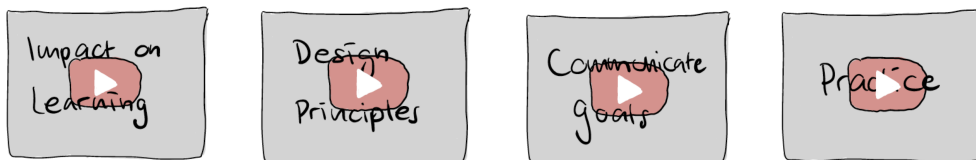
Look at survey or videos?
Please scan QR code:

Properties of learning goals set by lecturers



[1] Feldman, K. A. (2007). Identifying exemplary teachers and teaching: Evidence from student ratings. In *The scholarship of teaching and learning in higher education: An evidence-based perspective* (pp. 93-143). Springer, Dordrecht.
 [2] Hattie, J., & Yates, G. C. (2013). *Visible learning and the science of how we learn*. Routledge.
 [3] Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychological bulletin*, 143(6), 565.

3 Self-training for lecturers: a short video series on learning goals



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