Learning and Teaching Cultures in Higher Education: The Role of Technology in Turning the Vicious Cycle into a Virtuous One

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Abstract

As wider and more diverse audiences attend universities, nowadays, more advanced instructional approaches are required. The current study explores the role of technology in facing this challenge. We report on a continuation of a previous three-year long study, focusing on students' learning-culture, which examined a pedagogical-technological innovation infused into an introductory biology course at the Technion. An online-tutorial was used in the most advanced level of the intervention as the main resource for student self-learning of course content. In parallel, students participated in a more in-depth process in small technology-enhanced knowledge-building teams, each focusing on a specific course topic. Findings indicated that students' learning-culture was highly affected by the teaching culture encapsulated in the course design. In the current study, we interviewed six introductory course-instructors at the same institution. These interviews, comprised of 427 utterances, were analyzed phenomenographically. Findings reveal compromises in teaching, made by these instructors, based on their faulty views about the learning-culture of "the typical student". We conclude that reciprocal relations exist between learning-culture and teaching-culture, which may cause stagnation of traditional instruction in higher-education. Technology can serve as a key enabler in channeling this process into a productive cycle that fosters a learning-culture based on internal values.

Keywords: Learning Culture, Teaching Culture, Higher Education, Technology-Enhanced Learning.

Introduction

Higher education instruction was shaped in past years, when only a small elite group of students attended university. Instructional approaches based on lectures were sufficient then, since students needed little help in studying (Biggs, 2012). Nowadays, with a larger variety among students, more advanced instructional approaches are required.

Last year we presented in this conference a three-year long gradual intervention in an introductory biology course at the Technion. The intervention we presented was based on an online-tutorial (Figure 1) that was used differently throughout the study.
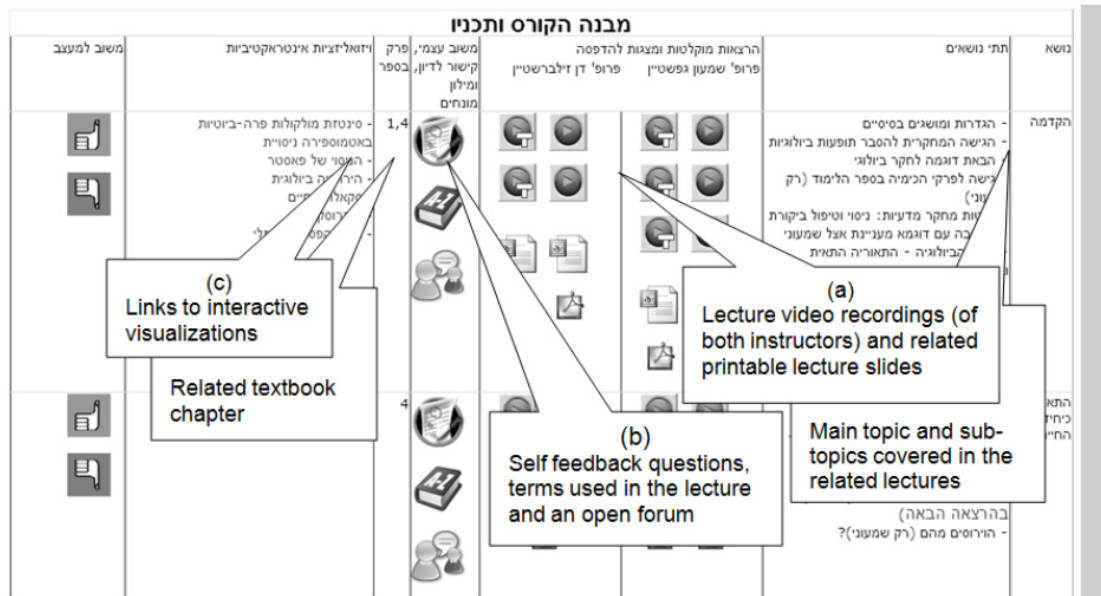
Figure 1. The online tutorial

In the first-level, the use of the online-tutorial was optional. In the second-level, students used it to learn contents omitted from lectures, to allow instructors to delve deeper into more complex topics. In the third-level, students learned most of the contents on their own using the online-tutorial, in addition to their participation in small knowledge-building teams focusing on various aspects of a topic they have chosen. Each team studied and prepared a presentation about their aspect for four weeks, using a private, editable teamwork area on the course' website, based on the sharing capabilities of Google Apps (Figure 2). At the end of these four weeks the teams presented their work in a "mini-conference" attended by teams focusing on other aspects of the topic, and led by the instructor (Author & colleagues, 2012).
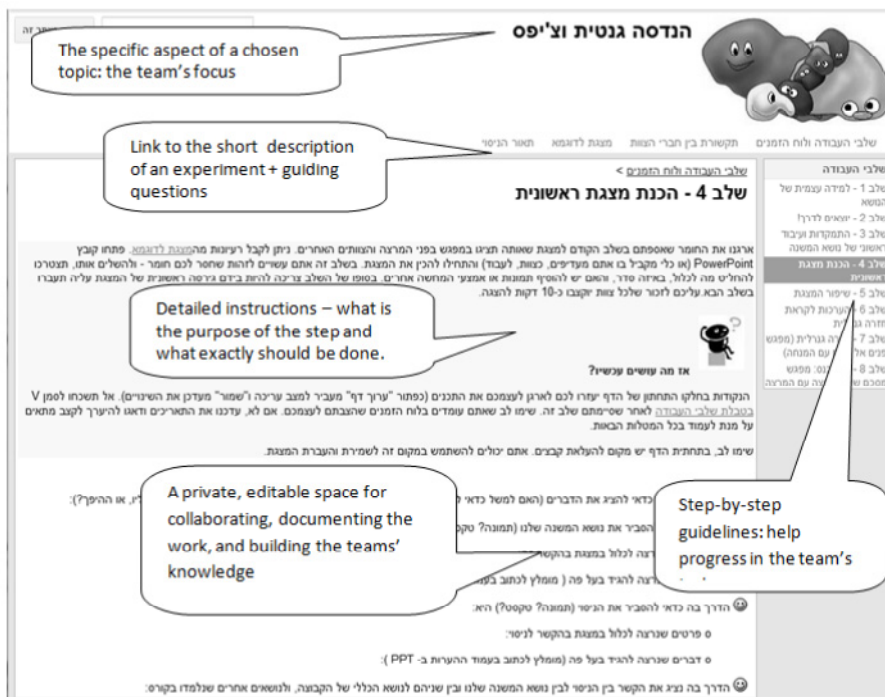

Figure 2. An online teamwork area

In addition, we presented the Cultures of Learning and Teaching (CLT) continuum (see figure 3), and showed that there is an effect of the teaching culture on students' learning culture in the course (see figure 4); as a more internal-value-based teaching culture was designed into the levels of the intervention, students tended to refer to course features with higher levels of internal values.
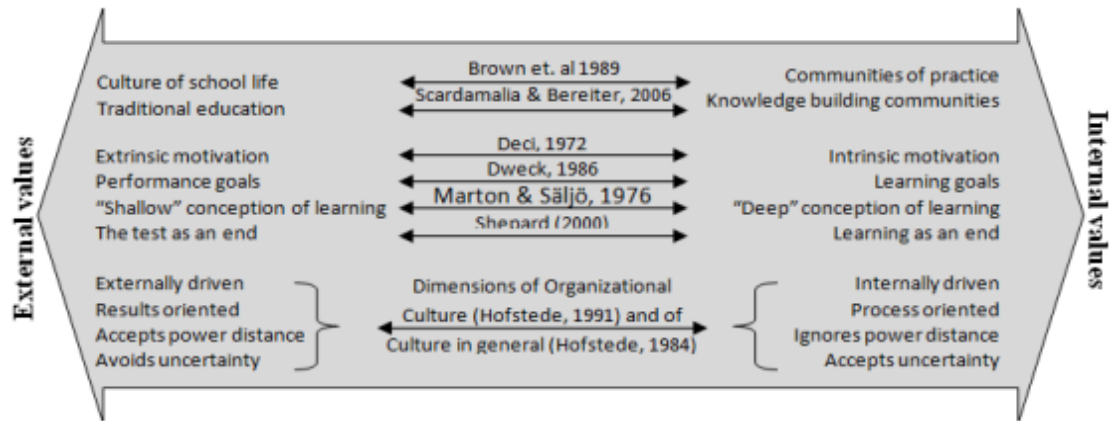

Figure 3. The Cultures of Learning and Teaching (CLT) continuum
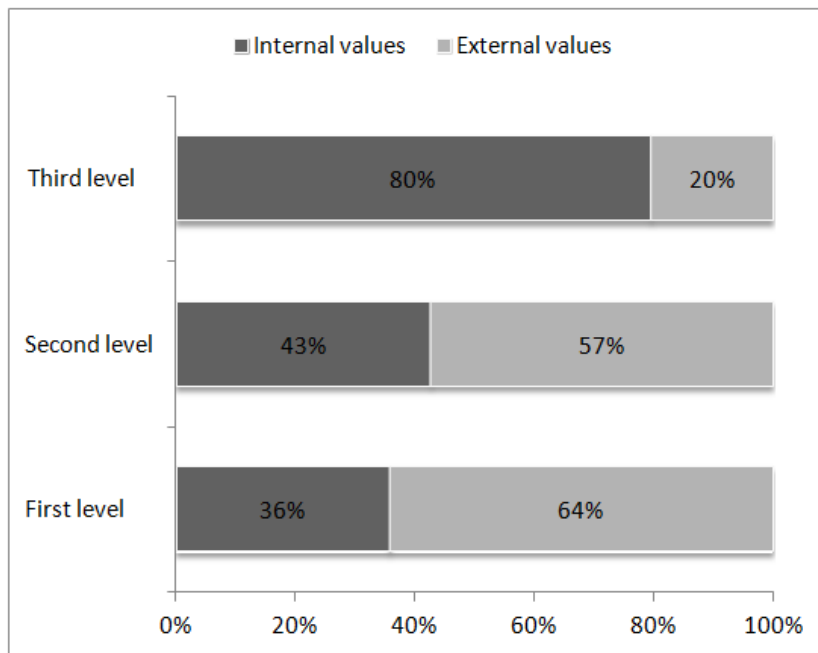(based on Author et al., 2012)

Figure 4. Students' references to specific features of the three levels of the intervention (Based on Author et al., 2012)

These findings raised a question regarding a possible reciprocity in the relationship between learning and teaching cultures. The study presented here is aimed at exploring this question.

Methodology
Semi-structured interviews with instructors

After the end of the whole intervention, six instructors of large, introductory undergraduate courses, from different disciplines (chemistry, physics, mathematics, and computer science) at the Technion were interviewed. The interviews, which lasted about 30 minutes each, were semi-structured and focused on instructors' views about students' learning, the way these views affect their instruction, and their notion of the term "learning culture". Thus, it was possible to deduct from these interviews, not just about learning culture, but also about teaching culture, and not only in relation to the interviewees themselves, but also in relation to several cultural circles – those of typical and ideal students, pre-college culture, and the culture of the institute. Each interview was audio-taped and transcribed verbatim.

These interviews were analyzed in two dimensions: (1) using the CLT rubric (see table 1), which was also used to analyze students' interviews (Author et al., 2012), and (2) using the cultural circle identification rubric (see table 2).

Table 1. The CLT rubric

Aspect	Learning culture based on internal values	Learning culture based on external values
Goal orientation[1]	• Seeking deep understanding, profundity, interest, expanding intellectual horizons, or personal growth. • Viewing the formative role of evaluation. • Showing internal motivation and expressing satisfaction or a feeling of achievement when referring to studying	• Seeking sufficient grade, fulfilling academic requirements • Viewing only the summative role of assessment • Showing external motivation by either comparing one's work to that of others or to an external standard (e.g. exam grade)
Willingness to invest an effort [2]	• Investing extra efforts in order to maximize the opportunities to learn	• Putting minimal efforts, looks for shortcuts
Attitude toward authority [3]	• Seeking help wherever possible, not only from "authoritative" sources. • Accepting new knowledge critically even when it comes from an "authoritative" source.	• Seeking authority, attempting to please the instructor, the institution's regulation, etc • Accepting knowledge coming from an "authoritative" source without contestation
Attitude toward uncertainty [3]	• Tendency to accept uncertainty and viewing it as an opportunity for self-growth.	• Intimidation by uncertainty, attempting to avoid it and viewing it as an obstacle to the learning process.
Ownership of the learning process [4]	• Accepting and even seeking ownership of one's learning process	• Attempting to avoid ownership, and insisting on the instructor's ownership
Conception of learning [5]	• Deep learning: reference to the deep meanings of the subject matters, making connections, and building on previous knowledge.	• Shallow learning: reference to the "face value" of the content, memorization.

[1] Based on the following theoretical frames: Goal orientation (Dweck, 1986), motivation (Deci, 1972), the role of assessment (Shepard, 2000) and Hofstede's (1991) "internally vs. externally driven" organizational cultural dimension.

[2] Based on Hofstede's (1991) "Process vs. Results orientation" organizational cultural dimension.

[3] Based on Hofstede's (1984) "Power distance" and "Uncertainty avoidance" cultural dimensions.

[4] Based on conceptions of learning (Prosser, Trigwell and Taylor, 1994)

[5] Based on Säljö's (1979) five levels of conceptions of learning: 1) a quantitative increase in knowledge, 2) memorizing, 3) Acquiring facts, skills and methods, 4) Making sense or abstracting meaning, 5) Understanding reality in a different way, that were divided to shallow conceptions of learning (levels 1-3) and deep conceptions of learning (levels 4-5).

Table 2. Cultural circle identification rubric

Cultural Circle	Description	Example
Pre-college general culture	References related to K-12 school life or the general culture of youngsters	"I don't expect the knowledge level of high-school graduates to be the same as in my days, I know the level dropped"
Institute general culture	References related to the academic institute in which the interviewees teach	"It is most common [at the Technion] to add a test in order to catch students' attention"
Typical student learning culture	References related to the interviewee's concept of the common student	"I have a good opinion about the Technion's students" "I think that they want to pass the course without putting too much pain"
Instructor's teaching culture	References related to the way the instructor acts as a teacher	"I try to connect with the students" "I try to teach to think logically"
Ideal student learning culture	References related to the interviewee's expectation from an ideal student	"An ideal student doesn't attend lectures" "They sit and try to confront a problem, they try to challenge themselves"
Instructor's learning culture	References related to the way the instructor acts as a student	"I use it [technology in education]… it requires conceptual change… it requires learning of the subject – theoretical and practical"

Each answer in the interviews was segmented into utterances based on ideas, and was coded based on the category that best characterized the idea. On the whole, 341 responses were broken into 427 utterances out of which 189 were relevant for the analysis (could be characterized by at least one of the two rubrics: the CLT rubric or Cultural circle identification rubric).

A value between 0 and 1, which we call the "CLT index", was calculated for each of the instructors, for each of the categories (cultural circle), to represent their learning culture. 0 represents 100% "external values", and 1 represents 100% "internal values". The value was calculated based on the following formula:

$$\frac{(Refernces\ representing\ internal\ values)}{(Refernces\ representing\ internal\ values) + (Refernces\ representing\ external\ values)}$$

Since the CLT indices of the instructors were very similar to each other, we accumulated the utterances of all the interviewees and recalculate a common CLT index of Technion instructors based on the same formula.

Findings

Instructors views on each of the cultural circles are represented by the calculated CLT indices. Figure 5 illustrates where these circles fall within the continuum; it shows that the instructors view the typical student as representing a learning culture that leans towards the external values (CLT index=0.17). However, when asked about the "ideal" student, their answers indicate a much higher index (0.96). Both values greatly vary from the value calculated from the Author et al., (2011) data of students' average CLT index (0.53), which falls somewhere in the middle between what instructors viewed as "typical" and "ideal".

On the other hand, when instructors referred to themselves, either as "teachers" or as "learners", they tended to use expressions that represent internal values, with slightly higher values when they refer to themselves as "learners" (CLT index = 1.0), than as "teachers" (index = 0.79).

Three of the six instructors (11 utterances) also referred to a pre-college culture of learning, which they all referred to as being on the extreme end of the continuum (CLT index = 0), and negatively affecting the typical student's learning culture ("Students' brains are still OK, but there are many missing spots in their background knowledge and learning habits"). Three of the instructors mentioned that students' low culture of learning (as they perceive it) affects their own teaching (reducing the "Instructor as teacher" category to the value of 0.79). Out of 16 utterances regarding factors that affect the instructors' teaching, twelve indicated a negative effect that their (biased) beliefs regarding student learning culture have on their teaching culture. This was evident in sayings such as: "The level of instruction keeps dropping because of the need to compromise", or "In the end, you have to write an exam that would not cause too much student failure".
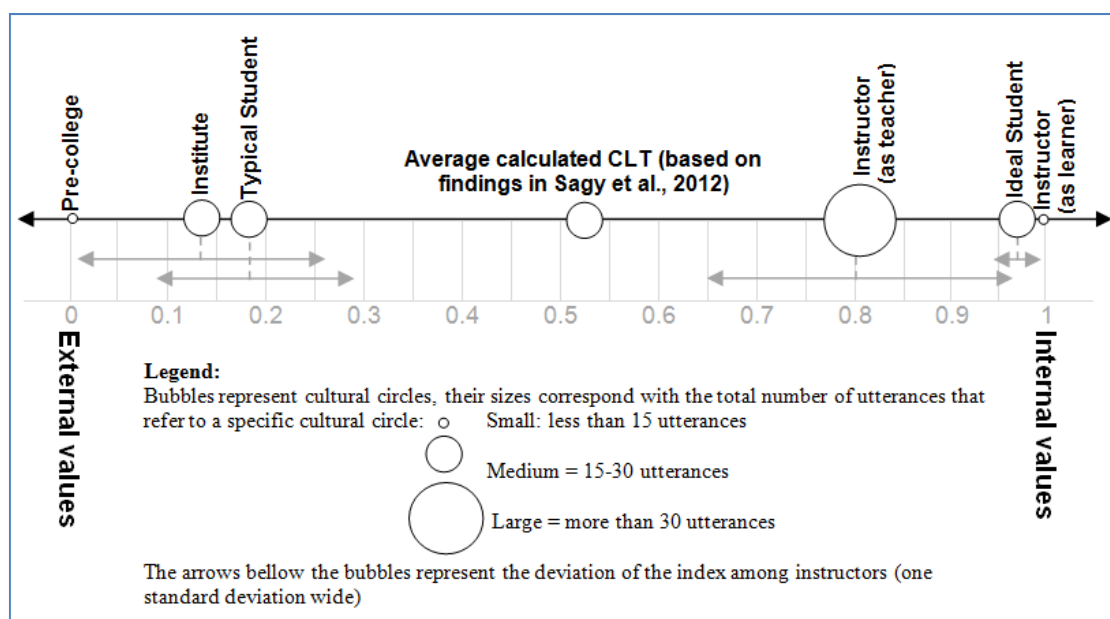

Figure 5. Instructors' CLT index of cultural circles

Discussion

We concluded that students tend to adopt a culture of learning that is appropriate to the culture of teaching in a specific context of the specific intervention. However, we also found, in the 2012 study, that students did not change their basic individual learning culture. Indeed, it would have been surprising if the change found in students' learning culture in the context of the biology course would have caused a significant change in their basic individual cultures, which had been developed over many years based on various learning experiences prior to their learning in the course. Based on Erez and Gati's multi-level model of culture (2004), it is clear that in order to reach a more holistic influence on students' basic individual learning culture, wider cultural circles need to be involved, such as the teaching culture in several courses in one faculty, and even in a whole institution. In other words, if students will encounter more courses that encourage them to adopt internal values of learning, it might be possible to reach a meaningful change in their basic individual learning cultures.

The findings of the current research indicate that instructors negatively adapt their instruction to suit a biased view of a typical student. These outcomes extend and provide new insights to the literature regarding the relationship between instructors' conceptions of learning and their approach to teaching in the context of higher education. Over the years, many studies have

shown that instructors tend to teach in an approach that coincides with the way they conceive of learning. For instance, Trigwell, Prosser and Waterhouse (1997), note that:

> "Teachers who conceive of learning as information accumulation to meet external demands also conceive their teaching as transmitting information to students, ... teachers who conceive of learning as developing and changing students' conceptions, conceive of teaching in terms of helping students to develop and change their conceptions and approach their teaching in a student-focused way." (p. 67).

However, the findings of the current research indicate that instructors might have advanced conceptions of learning, but still adopt traditional instructional strategies, if they believe that their students are not willing, or even capable of exploiting more advanced instructional approaches. Trigwell et al. (1997) already hinted at the variety of factors that affect instructors' teaching approaches, mentioning that "some tutors adapt their approach to teaching in response to the requests of students to, for example, go through problems in a transmission/teacher-focused manner" (p. 68). The gap that was found in the current research, between the basic individual learning culture of the instructors (CLT index = 1.0) and their teaching culture (CLT index = 0.79), together with the gap that was found between their conception of the typical student's learning culture (CLT index = 0.17), and the actual average basic individual culture (CLT index = 0.53), suggest that higher education instructional research and intervention should take into account more complex models of causality, than those presented in the current literature.

Furthermore, we suggest that there is what we call "vicious cycle", which may cause stagnation of traditional instruction in higher education. The instructors' (biased) conception of students' learning culture affects their teaching and "bends" it towards a teaching culture that is based on external values. Since teaching culture affects learning culture (Author et al., 2012), a vicious cycle can result, in which students adapt an external-value-based learning culture, only to fulfill their perceived role by the instructors, who then continue to get evidence regarding students' inappropriate values of learning. However, there is light at the end of the tunnel; the same mechanism, harnessing the power of technology, can be used in order to break this cycle. If more instructors will adopt instructional approaches such as those described in Author et al. (2012), students will encounter a more internal based teaching culture often. This experience might reach a critical mass and affect students' basic individual learning culture towards a more internal-values-based culture.

Finally, in this research technology was a key enabler for realization of the designed solution. In fact, it would not have been possible to enable such a large number of students with both the autonomy, and the support for teamwork without the online tutorial and the teamwork areas. The higher levels of internal-based learning culture that were found as the implementation advanced between the levels of intervention, indicates that the key for turning the vicious cycle, which may cause stagnation in higher education instruction, into a virtuous cycle, is in appropriate use of technology.

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