

Motivation Centered Learning

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Abstract—This Research Work in Progress Paper evaluates students' motivation sources and shows the high impact that work of professors has on students' motivation.

Common goal of most professors is to help students acquiring knowledge and competencies that are relevant for their further life. From the beginning of Universities' history, lectures are usually chosen to reach this goal but it is seen in recent years that they are in many cases not the optimal choice. In the last years, many efforts were made to increase students knowledge gain. From learning and motivation psychology research, many details are known how humans remember and transfer knowledge. These research results are used to create new lecture formats to activate students. Research based learning, project based lab courses, problem based learning, feedback systems, flipped classroom, blended learning and gamification in lectures are only some examples for new formats. Common goal of all these new types of learning formats is to increase students' motivation and to enhance learning success.

In this paper, evaluations using a questionnaire with open questions were done among first year students, bachelor students before graduation and alumni, about their sources of motivation and demotivation. Interesting curricula and lectures with application related topics and possibilities for own work are the main sources of motivation. Enthusiastic professors with high competences and good lecture didactics also contribute to students' motivation. On the other side, demotivated professors with boring lectures play a much higher role for demotivating students. Therefore, it is necessary to integrate aspects of student motivation into curriculum and lecture design and professors should become aware that they are important role-models for motivating or demotivating students.

I. INTRODUCTION

One important goal for professors all over the world is to educate students for a successful professional career. This goal is only achievable with motivated students who are engaged in their study courses and are eager to be successful. On the other hand, professors often talk to each other about achieved results and are sometimes frustrated about the low performance of many students. These talks negatively influences professors' view on students' learning success and can lead to a self-fulfilling prophecy [11].

Personalities of young people changed over the last years and this influences learning success in study programs [5]. It leads to a mismatch between professors' and students' expectations how good education should be [31]. For an optimal education it is an important question for professors how students' motivations are influenced by all factors inside and outside the curriculum. Due to the complex topic, this article gives neither receipts nor final outcomes about student

motivation. The goal is to summarize known aspects and to supply data from a student evaluation for a discussion among professors about the importance of student motivation for successful study.

In the next Section, sources of motivation are depicted. Different methods for increasing student motivation are described in Section III. Afterwards, methodology and results of an evaluation about student motivation is shown in Section IV. Results are interpreted in Section V, conclusion and outlook are given in Section VI.

II. SOURCES OF MOTIVATION

Motivation and learning psychology are well established research fields. There are two main types of motivation theories. One focuses on the dualism of intrinsic and extrinsic motivation, the other interprets motivation to be a multifaceted topic which can't be reduced to two sources [36]. Various motivation theories for learning are known, which emphasize on expectancy-value, attribution, social-cognitive, goal orientation and self-determination [6]. Motivational design models are made to build up environments for fostering motivation [22].

Self-determination says that the important sources of self-motivation and mental health are "competence, autonomy and relatedness" [38]. Passion for the things you do is an essential source of motivation and engagement [9]. Meaningful work is very important for the motivation of students to see positive results of one's own efforts [18].

Higher-order learning is most important for students; they solve problems, think critically, analyze and synthesize complex topics, express orally and in written texts. Reasons to motivate or demotivate students for this type of learning are complex [10].

III. METHODS TO INCREASE STUDENT MOTIVATION

Professors all over the world wish to increase student motivation in various disciplines using different methods [15, 16, 40] and frameworks [27]. Motivation leads to students with higher activities that significantly increases learning outcome and examination success rate [13, 26, 30, 35]. Several new lecture formats are used to achieve this goal; they activate students [21] to increase self-determined learning [7, 12], students see own results [33, 41], collaborate with each other [17] and get direct feedback [39]. From the first day as a student, reasons for lecture contents are displayed with

connections to industrial work [20, 29, 37] and also new types of laboratory exercises are developed [3]. Project Based Learning is one appropriate means to enhance motivation [4, 19, 34] and learning success [14] using different technologies like LEGO® [28].

With increased information technology abilities, online learning is increasing during recent years with new challenges for student motivation when implementing courses without personal contact [2]. Gamification is one chance to increase motivation by using computer support for learning stimulation, higher self-determination, direct feedback of success and encouragement [1, 23].

It is known that role models and guidance by personal examples are very important for motivation, which can be seen in numerous examples [8]. Therefore it is known that professors should act as role models for students.

It is seen that student motivation is the key factor for study success. All these measures have in common to improve student motivation with self-determined learning, seeing results of own work, experiencing success and having direct feedback.

IV. EVALUATION OF MOTIVATION AND DEMOTIVATION

A. Scope

Many papers are published, which evaluate motivational sources and student motivation levels. Most of these evaluations are done for single lectures or lab courses to get motivation levels. Therefore, detailed questionnaires with closed questions are normally used to obtain a quantitative level of motivation.

The questions of this evaluation are about the overall sources of student motivation and demotivation within the bachelor program “Electrical Engineering and Information Technology”. Therefore, a questionnaire with open questions was chosen for getting the overall motivation of students for their entire bachelor program.

B. Methodology

Different techniques for measuring learning motivation are used [25]. Most motivation measurement techniques use closed questions to calculate a numeric degree of motivation [24, 30, 32]. These methods induce that answer possibilities are fixed when designing the questionnaire; no new ideas, induced by student answers can be discovered.

Therefore it was decided to use open questions which can’t be answered by checking boxed due to the fact that motivation is a complex question with diverse aspects that are difficult to be predicted when setting up the questionnaire. Also unexpected topics can be stated by students that introduce completely new views.

Therefore two questions were chosen, which should be answered with free texts on one page:

- What motivates you during your studies?
- What DEMotivates you during your studies?

This chosen questionnaire was as short as possible and focused on both central topics to attain a high motivation of students to seriously and extensively answer these questions.

Table I
MOTIVATION AND DEMOTIVATION SOURCES FOR FIRST YEAR BACHELOR STUDENTS

Question Cluster	Percentage of Answers	
	Motivation	Demotivation
University	9.3%	5.2%
Study Program	48.7%	65.1%
Professors	12.6%	16.6%
Job	21.2%	0.0%
Private Surroundings	1.9%	3.5%
Personal Characteristics	6.3%	9.6%

Both questions for motivation and demotivation were asked explicitly because sources for motivation and demotivation are not automatically contrary but can have different reasons.

The questionnaire was distributed in the class room, students had about ten minutes time to fill in their thoughts and it was collected afterwards. The whole process was fully anonymous.

Alumni were contacted and asked the same questions using a social media platform. Their answers were anonymized for evaluation.

C. Evaluation

Free texts with differing lengths and levels of detail are categorized to get comparable and analyzable results. Answer categories are clustered according to the following criteria:

- University infrastructure,
- content and organization of the study program,
- knowledge, dedication and didactics of the professors,
- job opportunities and payment,
- private surroundings like city, parents and friends,
- personal characteristics.

The number of possible answers per student was unlimited. All questionnaires were answered seriously. The answer lengths ranged from buzzwords to texts that filled the whole page.

D. Results from First Year Bachelor Students

Students at the beginning of their second semester were chosen as the first group for evaluation. They already experienced one full semester with theoretical lectures, exercises and exams; but they had nearly no practical lab courses and no internships to see connections between theory and practice. It is expected that not all of these evaluated students will reach their bachelor degree. Some of them will change their study program or will completely quit studying.

84 students of the second semester answered the questionnaire. Aggregated results can be seen in Table I.

The main source of motivation is the study program itself with 48.7% answers; students want to gain knowledge, have interesting topics, connect theory with practice and have success in their studies. The second most answers mention interesting and good job opportunities with 21.2%. Professors play a medium significant role for students motivation (12.6%) with their own motivation and good lectures.

Table II
MOTIVATION AND DEMOTIVATION SOURCES FOR FINAL YEAR
BACHELOR STUDENTS

Question Cluster	Percentage of Answers	
	Motivation	Demotivation
University	10.4%	2.8%
Study Program	70.9%	55.6%
Professors	8.3%	30.5%
Job	10.4%	0.0%
Private Surroundings	0.0%	2.8%
Personal Characteristics	0.0%	8.3%

Students are demotivated by the study program itself (65.1%) due to too high workload and difficulties. The second-most reason for demotivation is caused by insufficient didactics of professors (16.6%). Students also complain about personal problems (9.6%) like not enough leisure time.

Some typical answers of students for sources of motivation are (translated by the author):

“Good opportunities for a job that is as interesting as expected. Change the future of tomorrow. My Mum.”

“Sense of achievement when program code works. Exam pressure.”

Typical answers for sources of demotivation are:

“Packed timetable. No free time. No chance to learn all necessary topics.”

“Too little time for non-university activities. No possibility to choose elective courses. Boring lectures given by some professors.”

E. Results from Final Year Bachelor Students

The second evaluated group of students started with their sixth semester; they already had all fundamental lectures, application oriented lectures, elective courses, several lab courses and an industrial internship. They are now in their last study phase with elective courses to deepen their chosen study field and will soon start with their final thesis.

All 12 Students of the lecture “Communication Systems” answered the questionnaire. Aggregated results are shown in Table II.

The last year students were mainly motivated by their study program (70.9%) with interesting topics, gaining knowledge and connecting theory and practice. All other sources of motivation like University environment, job opportunities and professors play minor roles.

Students can be demotivated by the study program (55.6%) with too high workload and a non-optimal timetable. The second most mentioned source of demotivation are professors (30.5%) with insufficient didactics in lectures.

Typical answers for sources of motivation are:

“Insights into interesting topics. Many job possibilities. Understanding of complex things. Interest in electrical engineering itself. Importance of topics in today’s world. Motivated professors.”

Table III
MOTIVATION AND DEMOTIVATION SOURCES IN ALUMNI SURVEY

Question Cluster	Percentage of Answers	
	Motivation	Demotivation
University	7.5%	2.3%
Study Program	71.3%	68.2%
Professors	12.5%	22.7%
Job	7.5%	0.0%
Private Surroundings	0.0%	4.5%
Personal Characteristics	1.2%	2.3%

“Chances for a good job. Get to know new people. Interesting topics and professors who also tell about their own professional life. Clear study structures and tasks in lectures and labs.”

Students wrote for sources of demotivation:

“Organizational problems e.g. with timetable. Library overcrowded. Few unmotivated professors. A little less time for basic theory. Not enough exercise tasks. Not enough time for self study.”

“Unclear study structures and confusion in lectures. Distraction by advantages of the city. Own laziness.”

F. Results from Alumni

Alumni with an industrial working experience between two and about ten years were asked to think about their motivation and demotivation as students in retrospect.

31 alumni answered the questionnaire, which was sent to them using a social media platform. The aggregated results can be seen in Table III.

Also for the alumni, the main source of motivation came from the study program itself (71.3%) with connections between theory and practice, interesting topics and the possibility to gain knowledge. The second most important source of motivation were professors (12.5%) with their commitment. Other topics play only a minor role for alumni.

They were demotivated during their study mainly due to their study program (68.2%). These were uninteresting lecture topics and too high study demands. The second most important source of demotivation were professors (22.7%) with insufficient lecture didactics. All other topics are of negligible importance.

Alumni stated about their motivation sources:

“Topics with personal interest. These were especially the lab courses where theoretical knowledge could be used and deepened.”

“Connections to applications. Lab courses with state of the art topics. Short distances and small groups. Good knowledge exchange between students. Small group and good atmosphere within the dual study group. View on different areas of applications. Using knowledge in Formula Student team.”

They answered about their sources of demotivation:

“Lectures that were uninteresting for me but important for the whole study program.”

“No clear learning objectives. No clear connection to practical applications. Too short exam periods. Theoretical lectures.”

V. INTERPRETATION OF EVALUATIONS

When comparing all three evaluations it can be seen a clear shift in students’ opinions.

For the first year students, good job opportunities have a high impact for study motivation. Also factors in personal life are important for study motivation and demotivation. Friends at the University are important to form learning groups and to get acquainted with the new surrounding. Also the high workload together with the high academic challenge in the first study year can be seen. Even a small success like mastering a programming exercise is important for first year students to gain motivation.

For the last year students, the personal topics and job perspectives (although they are very good) lost importance and nearly all answers concentrate on the study program itself. But insufficient didactics of lectures are also important reasons for student demotivation.

Alumni main motivation came from the study program itself and emphasized the close connection of theory and practice. They were demotivated by uninteresting topics and also by insufficient lecture didactics.

For all students, the study program with interesting topics and the possibility of acquiring knowledge is the main source of study motivation. The engagement of professors and good lecture didactics play medium to minor roles for students’ motivation; but professors who are demotivated or give lectures with insufficient didactics are the second most important source for demotivation after the study program itself.

VI. CONCLUSION AND OUTLOOK

This evaluation leads to the conclusion that sources of motivation and demotivation are changing over the time being a student. Freshmen have a higher dependence on topics outside the study program itself like family, friends and personal topics. More experienced students focus on the study program itself. The most important source for motivation and demotivation for all evaluated cohorts is the study program and are the lecture topics. Innovative curricula and learning methods are measures to increase student motivation, which are very important for a high learning success. Therefore it is very important to take student motivation into account when designing study programs and deciding about lecture topics.

This evaluation also leads to the conclusion that the way how lectures are given is the second most important source for motivation and demotivation. Therefore it is important for professors to think about their own motivation, appropriate lecture didactics and to develop it further.

In sum, professors play the key role in student motivation. They directly influence motivation with their role model and

good lecture didactics. Their indirect influence is even higher when designing curricula and lectures.

It is planned to do further research to gain more insights into student motivation and the impact on study success.

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