A suggested workflow to enhance students' motivation to learn based on theory and analysis of student survey data

Arthur Chakwizira, Lovisa Jessen, Ahmed Alshemi, Nicholas Borsato, Sajad Mohammed Ali

Teaching and learning in higher education

HT 2021

LUNDS UNIVERSITET

Abstract

Motivation has various definitions often related to goal-driven behaviour. Many studies have established a positive correlation between achievement and learning outcomes. This study studied student motivation through a combined lens of contemporary theories: expectancy-value, attribution, social-cognitive, goal-orientation, and self-determination. In addition, we conducted a survey using a questionnaire with content based on established theory to assess several aspects of university students' drive, the importance of adding value to learning and possible negative experiences relating to the subject. The findings of this report enabled the creation of a workflow that promotes student motivation to learn. We found that most students are motivated by intrinsic factors and that articulation of course value can improve student engagement. Our results confirm that competence, control, and relatedness are all strong predictors of motivation. Lack of relatedness is a critical reason for the lack of drive amongst university students. We propose a workflow including four main steps to promote student motivation.

Aim and goal

This study aimed to investigate what aspects affect students' motivation for learning. The study used a questionnaire designed with a few motivation theories in mind, including expectancy-value (Wigfield & Eccles, 2000) and self-determination (Ryan & Deci, 2000). Based on the survey outcome and the theory, our goal was to design a workflow on how to increase students' motivation for learning.

Background

Motivation is crucial in any human endeavour towards a given goal. The Cambridge Dictionary defines motivation as "enthusiasm for doing something". Other, more detailed definitions are that it is "a force that activates, directs and sustains goal-directed behaviour" (Liu, Wang & Ryan, 2016) and that it is "the personal investment that an individual has in reaching a desired state or outcome" (Maehr & Meyer, 1997). There is a plethora of theories proposed to explain human motivation (Cook & Artino, 2016), examples of which are expectancy-value (Wigfield & Eccles, 2000), attribution (Weiner, 1985), social-cognitive (Schunk, 2014), goal-orientation (Dweck, 1988) and self-determination (Ryan & Deci, 2000). We view motivation through a combined lens of all theories.

Self-determination theory offers an essential perspective on motivation (Turner, 2019). It divides motivation into three types: amotivation (a complete lack of motivation), extrinsic and intrinsic motivation (Ryan & Deci, 2000). Extrinsic motivation involves goals of "praise," "monetary reward," or some other concrete form of reward. In contrast, intrinsic motivation is related to objectives of the category "satisfaction of completing a challenge" or "learning" regardless of the outcome. Literature presents varying opinions on which type of motivation is more powerful. Maslow pointed out in 1970 that intrinsic motivation is more potent than extrinsic motivation. He believes that when a person's basic life, safety and social needs are guaranteed, people strive to gain self-esteem and a sense of accomplishment, regardless of the reward (Maslow, 1970). Some researchers, especially (Susan Harter, 1981), regard "inner" and "outer" as the two ends of a continuum. Harter stresses that the two types of motivation are more realistically regarded as influencing each other. The transition from extrinsic to intrinsic motivation involves the internalisation of values and goals, which requires satisfying three

psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000). Autonomy refers to the belief of control over, or ability to, affect one's situation. Competence relates to the acknowledgement of one's ability to perform a task (Harter, 1978; Ryan and Deci, 2000). Finally, relatedness refers to the need to form relations and a sense of belonging to others (Baumeister & Leary, 1995).

Most studies on motivation focus on value and expectancy theory (Atkinson, 1957,1964; Wigfield & Eccles 1992, 2000). These two factors stem from goal orientation theory (Dweck, 1988). Student motivation depends on the subjective value they place on their goals and their expectations for achieving those goals (Ambrose et al., 2010; Ryan, 1970; Mitchell, 1982). Goals can be divided into several categories (Ambrose et al., 2010). Performance goals (Dweck & Leggett, 1988) involve preserving and projecting an "intelligent" self-image. Students functioning on this goal tend to conform to normative standards and do what is needed to appear competent and gain praise. In contrast to performance goals, learning goals (Barron & Harackiewicz, 2001; McGregor & Elliot, 2002) involve an endeavour to gain a deep understanding and develop competence in a subject. Students driven by work-avoidant goals (Meece and Holt, 1993) aim to finish their work as quickly as possible with as little effort as possible. Affective and social goals (Ford, 1992) concern the quest for emotional stimulation and social engagement, respectively. The diversity of student goals entails that teaching approaches that target multiple goals motivate students more than those that target a single purpose (Valle, 2003). Several conflicting goals may also drive students, and in such cases, the concepts of value and expectancy are essential (Ambrose, 2010).

Goals with a higher value are more likely to be prioritised than those with a lower value. According to (Wigfield & Eccles, 1992, 2000), value comes from three primary sources. First, attainment value comes from the satisfaction of accomplishing a task. Intrinsic value comes from the pleasure of performing a task regardless of its outcome. This type of value is the source of intrinsic motivation. The third type of value is instrumental, which stems from extrinsic rewards such as praise, salary, and status. It is essential to highlight that several values usually operate in unison, again making the traditional divide between intrinsic and extrinsic motivation blurry (Hidi & Renninger, 2006).

Although value is essential, it is an insufficient explanation for motivation. Given multiple goals of similar value, students will be more motivated to pursue those they expect to achieve (Wigfield & Eccles, 2000). Here, one can distinguish between outcome expectancy (Carver & Scheier, 1998), which is the belief that performing a task will give a desired outcome and efficacy expectancy (Bandura, 1997), which is the belief in one's capability to complete the task and obtain desired results. Students' expectation to succeed is affected by several factors, one of which is their previous experience. Past success leads to a higher expectancy of success, and this is called self-efficacy (Bandura, 1997). More importantly, students' attributions of previous successes or failures are vital determinants of motivation (Weiner, 1985). Students who attribute their success to their efforts have a higher expectancy of future success than students who believe they succeeded due to chance. Furthermore, students who explain their failures with personal inadequacy tend to have lower expectancy than those that attribute failure to temporary circumstances such as insufficient preparation. (Dweck, 2006) distinguished these two cases as having a fixed mindset and a growth mindset, respectively.

Strategies that influence motivation

There exists a multitude of teaching theories and strategies within the literature. (Ambrose et al., 2010) suggest various approaches for improving motivation by helping students establish value for their learning goals and build positive expectancies. This can be achieved by:

- adapting course content to suit students' interests which creates a more engaging learning environment
- creating tasks with real-world relevance which helps students appreciate the usefulness of what they are learning
- expressing passion and enthusiasm for the subject, which can inspire and energise students
- giving students an opportunity to reflect
- aligning intended learning outcomes with teaching strategies and assessment techniques to give students a clear picture of what is expected of them
- setting an appropriate level of difficulty for the course to avoid overwhelming students
- clarifying your expectations for the students, which helps them make realistic expectations for themselves
- suggesting study strategies, which can build self-confidence since it guides the student through exactly what they need to do to succeed

Theory about surveys: "what information can we actually collect?"

One can define a survey as "collecting information from a sample of individuals through their responses to questions" (Check & Schutt, 2012). Questionnaires and interviews are the two most common data collection methods in surveys (Ponto, 2015). Questionnaires can implement qualitative and quantitative strategies by requesting numerical responses or detailed text as answers. It is also possible to combine approaches.

To design a questionnaire, the Harvard University Programme on Survey Research (Harrison, 2007) has formulated a step-by-step guide on how to develop questions and create a survey. The first step is to ensure that the study's intended questions are not repetitions of past questions already asked. This can be verified by checking on survey platforms. When creating a questionnaire, it is essential to keep it short (there is a lower probability of participation when the questionnaire is too long) and consider the order of the questions that relate to each other. Another crucial step is to consider the combination of open- and close-ended questions to be implemented. While open-ended questions allow a wider variety of answers, they are time-consuming to formulate, answer, and analyse. In addition, participants are more likely to skip open-ended questions. Finally, before distributing the questionnaire to the intended subjects, it is instructive to pre-test it on a small group (e.g. colleagues, a smaller cohort etc.)

How to define a workflow

A workflow for improving motivation should target the three pillars of motivation: increasing students' value for their goals, enhancing positive expectancies for success, and building a supportive learning environment (Ambrose et al., 2010). A thorough analysis of the

questionnaire data will aid the identification of patterns of the relative importance of the aspects promoting intrinsic motivation (competence, relatedness, and autonomy). This way, it becomes possible to define how these aspects should be focused on in teaching with relatable examples to promote a growth mindset in students. In addition, from the analysis of two separate but related questions (only different in phrasing) included in the questionnaire, it is expected to validate the importance of students' value to a particular concept/course as suggested by theory. Finally, by a qualitative analysis of an open-ended question, we hope to identify common threats to student motivation. The analysis and compiled results will serve as a backbone for the proposed workflow.

Design

Survey design

Motivation determines what students do to facilitate their learning (Ames, 1990; Ambrose et al., 2010). Thus, studying what enhances or degrades students' drive is of utter importance. To this end, we designed a questionnaire (Table 1) targeting the importance of value and expectancy to motivation in general, and the self-determination-theory addressing the role of competence, autonomy, and relatedness in promoting intrinsic motivation. The question formulation was guided by the Harvard PSR principles (Harrison, 2007). The questions were multiple-choice (close-ended) to increase the likelihood of responses and streamline analysis, except for Question 6, which expects a short answer (open-ended). Questions 1 and 7 are related by asking the same question without- (Question 1) and with (Question 7) a preceding explanation addressing the value of the concept presented to be able to assess the importance of "value" to students' motivation. Questions 2 and 3 address what type of motivation (extrinsic or intrinsic) students have in general and for a specific course, respectively. Questions 4a-d assess the students' current level of motivation and, more specifically, how the three aspects of the self-determination theory (competence, relatedness, and autonomy) are rated. Question 6 aims to identify patterns that might be destructive to students' motivation by asking for an example of a situation in which they felt a loss of motivation.

The questionnaire was of a digital format created at surveymonkey.com. The platform allows plotting the results directly or downloading the collected data to conduct separate analyses. The questionnaire was sent by email to all students listed at the Physics Institute of Lund University (thus including first-year and last-year undergraduate- and master students). The department coordinator sent the email (which gives a higher probability of participation since the sender is recognised and trusted by the recipients). It was clearly stated in the mail that the participation was completely anonymised. Students could access the questions from the 24th of November 2021, and the results were finalised on the 30th of November 2021. All the close-ended questions were contained in this questionnaire.

In contrast, the open-ended question (Question 6) was sent to the students as a follow-up question separately after collecting the responses from the first questionnaire. This proved beneficial as open-ended questions are usually less likely to be answered; by following up with only one question and emphasising the shortness of the follow-up, the responses were more than anticipated. In total, 120 responses were registered for the close-ended and 62 for the open-ended questions.

Table 1. The complete questionnaire to collect data on students' motivation.

QUESTION. 1. (Aim: *Offer an unrelatable and less engaging course to the student*)
Would you be interested in taking a course which teaches how to make scientific figures? (1=not interested, 5 = very interested)

- 1 • 2 • 3 • 4 • 5

QUESTION. 2. *(Aim: Gauge whether students generally are intrinsically or extrinsically motivated.)*
Why do you study at University?

- Employment • To learn • Not sure

QUESTION. 3. (*Aim: intrinsic or extrinsic motivation)*
For a given course, which would you say motivates you most strongly to study:

- Praise, grades, or monetary rewards
- Challenging yourself, or learning something new

QUESTION. 4A. *(Aim: Relate to the theory of self-determination for intrinsic motivation)*
Rate your motivation in general towards studying (1= not at all, 5 = quite a lot)

- 1 • 2 • 3 • 4 • 5

QUESTION. 4B. *(Aim: Relate to the theory of self-determination for intrinsic motivation)*
During your studies, would you say you have felt competent enough to succeed in what has been asked of you? (1= not at all, 5 = quite a lot)

- 1 • 2 • 3 • 4 • 5

QUESTION. 4C. *(Aim: Relate to the theory of self-determination for intrinsic motivation)*
Do you feel in control of your own successes and outcomes at Lund University? (1= not at all, 5 = quite a lot)

- 1 • 2 • 3 • 4 • 5

QUESTION. 4D. *(Aim: relate to the theory of self-determination for intrinsic motivation)*
Would you say that you feel connected to others studying the same thing as you? (1= not at all, 5 = quite a lot)

- 1 • 2 • 3 • 4 • 5

QUESTION. 5. *(Aim: determine student beliefs on the value of their studies)*
Do you believe that the courses you will take will help you develop the skills needed for a job? (1 = strongly disagree, 5 = strongly agree)

- 1 • 2 • 3 • 4 • 5

QUESTION. 6. *(Aim: Qualitatively, find examples which produce demotivation)*
In a sentence or two can you describe an experience that led you to losing motivation for a course or subject.
Insert text here.

QUESTION. 7. (Aim: *Offer a course that a student would value, find engaging and useful*)
Would you be interested in taking a course that teaches you to create scientific figures to a high-quality? (1=not interested, 5 = very interested)

- 1 • 2 • 3 • 4 • 5

A paired t-test and paired scatter plot differentiated the differences in Question 1 and 7's answers. Column graphs illustrate the results of the other close-ended questions. An Unsupervised-NLP AI (Natural Language Processing Artificial Intelligence) approach helped analyse the open-ended question. The AI algorithm processes all answers separately and scores the word by frequency and context. This way, the different texts would be divided into clusters. AI enables the inclusion of all respondent answers, and no individual-based bias exists since the AI classifies a response based on the detected words.

Assessment and evaluation

Questions 1 and 7 from the survey probed how articulating the importance of a course affects student motivation with quantitative results outlined in Table. 2, and illustrated in Figure 1. Overall, there has been a positive shift in the average mean in responses. Using a paired t-test proves that the change is statistically significant, suggesting a substantial effect caused by the wording. The use of the word “high-quality” shifts students’ interests. The paired scatter plot in Figure 1 shows that most students updated their beliefs to a higher value. While some did lower or keep the response, the overall trend is positive, which suggests the effect is, in fact, natural. Clarifying that the course in question would train participants to create scientific figures “to a high quality” noticeably increased student motivation to take the course. The width of the lines in Figure 1 represents the number of persons making the transition.

Table 2. shows the means for the answers on questions 1 and 7 respectively and the p-value of a paired t-test for the two questions is also shown clearly < 0.05 indicating statistically significant difference between the two.

Question	Mean	p-value
1	2.93	0.00003
7	3.22	

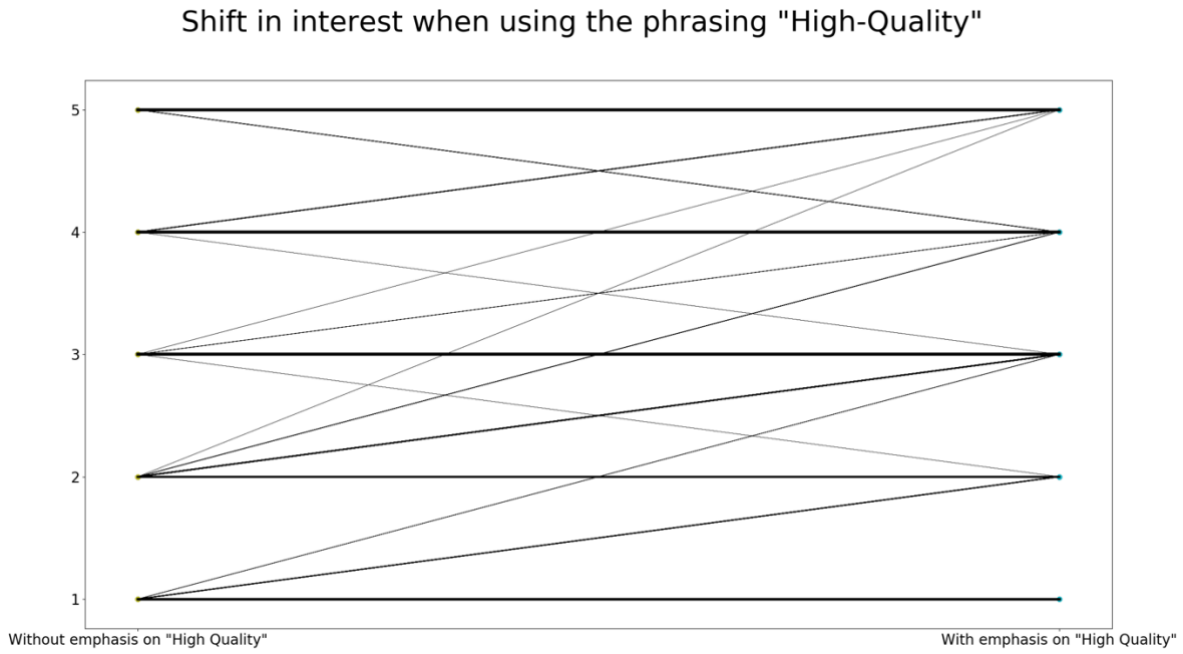

Figure 1. Assessment of how articulation of course value affects student motivation. The figure is a paired scatter plot which shows the overall shift in the response rate. While a small minority of students lowered their answers, the majority increased their answers or kept them the same. This is illustrated by the width of the lines.

Figure 2 shows the results from Question 2 of the survey, which examined the dominant reasons why students embark on university studies in general. Many students responded that they were at university to learn, while about half as many were motivated by future employment prospects. A minority, about 5%, were unsure of their reason for taking a university education.

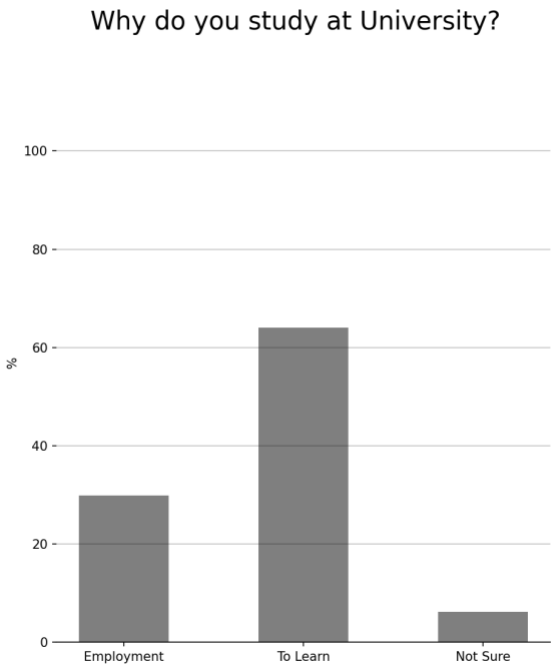

Figure 2. The results on students' motivation for studying at University based on Question 2 of the questionnaire to assess if the underlying motivation is of extrisic- (employment) or intrisic (to learn) character. A third option is also present (not sure) where students can not identify a specific goal.

To understand what motivates students to participate in a given course, Question 3 of the survey requested a binary response: external factors such as grades or internal factors such as learning. While students most definitely fall on a spectrum of motivation, this question aimed to illicit the strongest for each student. Figure 3 summarises the results and shows that most students study to learn or enjoy a challenge. Half as many students are driven by external factors.

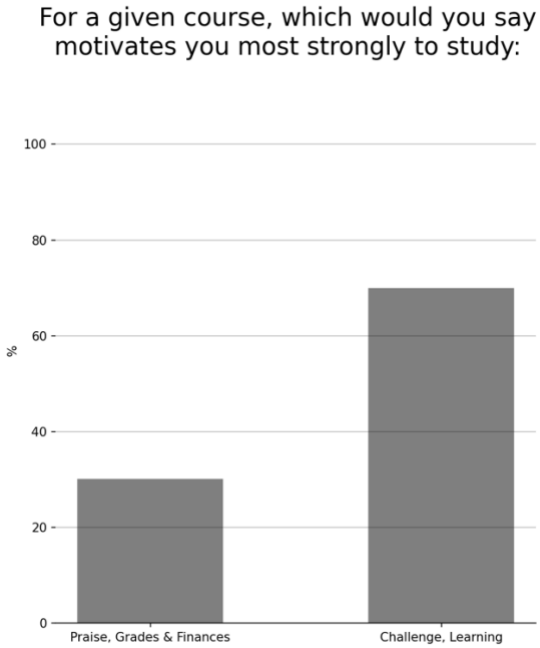

Figure 3: Assessment of the source of motivation amongst university students for a given course. The bar chart depicts the responses from survey Question 3. The first category (praise, grades, and finances) represents extrinsic motivation while the second category (challenge, learning) represents intrinsic motivation.

Figure 4a presents a depiction of responses to Question 4a of the survey, which gauged the overall motivation level of the students. Many students answered with three or above. A finite proportion of students reported a complete lack of motivation. Figures 4b and 4c represent a subdivision of the responses in 4a into “extrinsically motivated” and “intrinsically motivated” students based on the responses to Question 2 (Figure 2). The intrinsically motivated students tend to have higher motivation

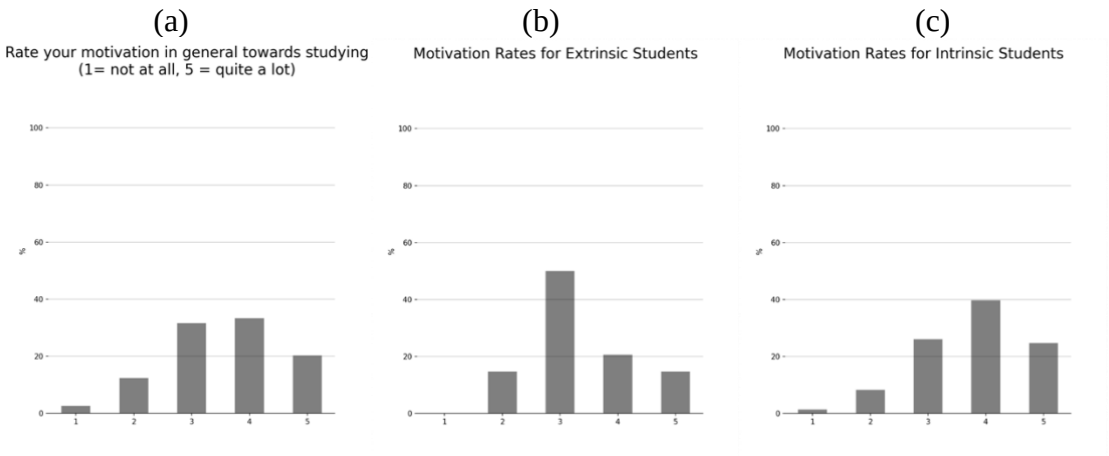

Figure 4. The distribution of unversity students’ motivation in general towards studying scaled between 1 and 5, where 1 corresponds to “not motivated at all” and 5 corresponds to “very motivated”. This assessment is based on the answers from Question 4A. In (a), we have results for the total population surveyed and (b) and (c) show a subdivision into “intrinsically” and “extrinsically” motivated, based on Figure 2.

Using Question 5 of the survey, we investigated how competent students feel they are and Figure 4b shows the results. The general trend is like that observed in Figure 4. About 15% of students reported inadequate competence.

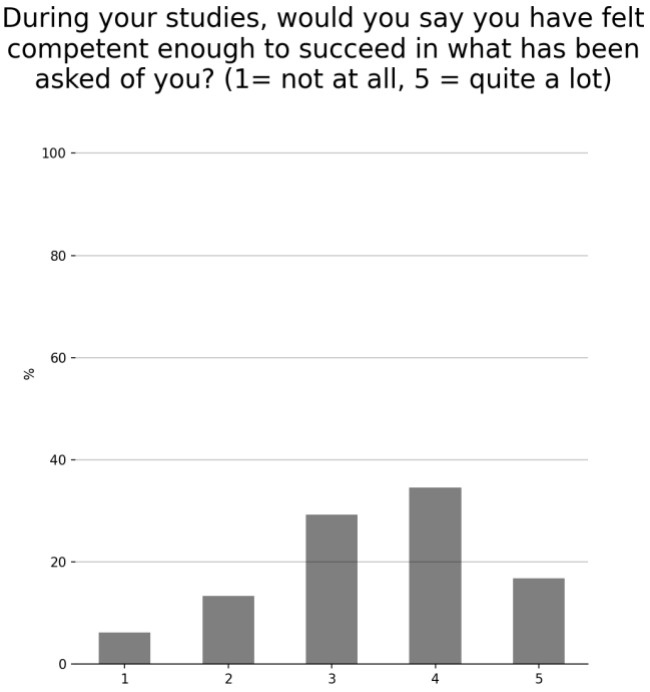

Figure 5. Assessment of students’ impression of their own competence on a scale 1 to 5, where 1 is “not at all” and 5 “very competent”. The results are based on the answers of Question 4B.

The extent to which students feel in control of their success was studied using Question 4C of the survey and the results are visualized in Figure 6. The overall pattern is again like the results of Figure 4. Approximately 15% of students feel little to no control over their performance.

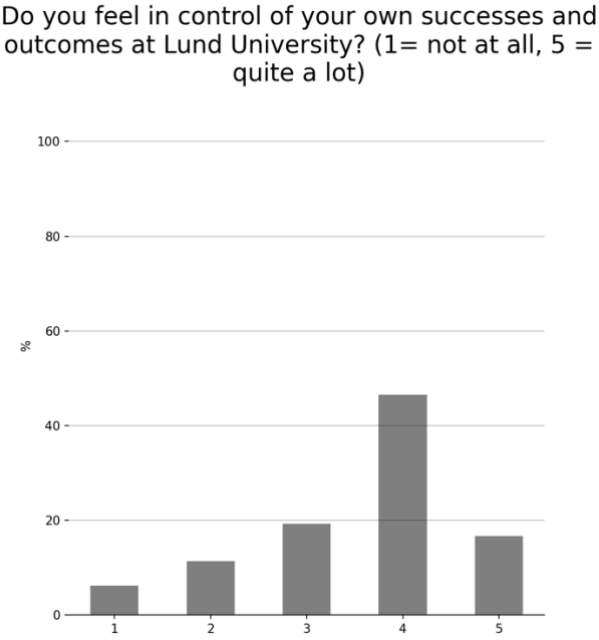

Figure 6. Assessment of students' impression of control on their own success (autonomy) on a scale 1 to 5, where 1 is "no control at all" and 5 "very mcuh in control". The results are based on the answers of Question 4C.

The degree to which students feel connected to their peers was gauged using Question 4D of the survey and the outcome is presented in Figure 7. The distribution of responses is uniform, with about as many students feeling connected as those that feel disconnected.

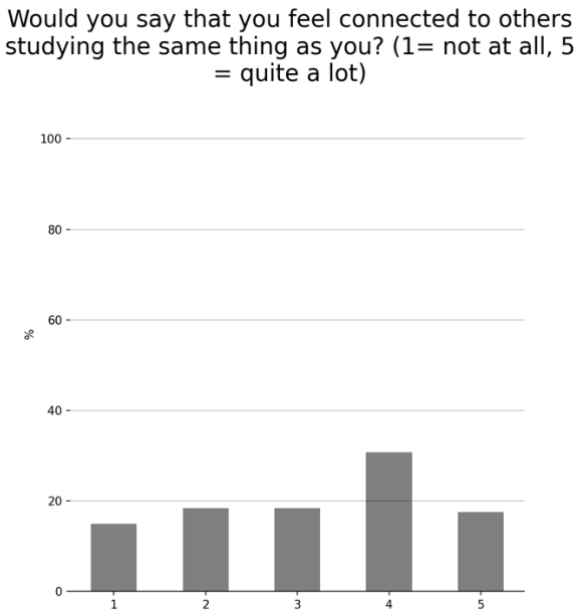

Figure 7. Assessment of students' impression of relatedness to other students while learning measured on scale from 1-5, where 1 represents "no feeling of connection" and 5 "a strong feeling of connection". The data is based on the answers from Question 4D.

Question 5 of the survey measured the extent to which student believe the course they take will be of value for their careers. The distribution of responses exhibits the same behaviour Figures 4-7.

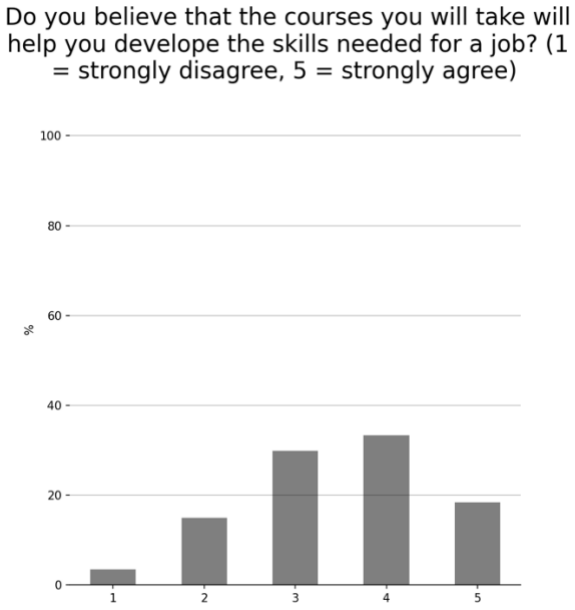

Figure 8. Assessment of students' impression of the value for their taken courses. Data is based on answers of Question 5.

Four main categories of motivation-killers as seen by the students are presented in Figure 9. The data was produced from analysis of Question 6 by an AI. The categories include lack of relatedness, which had the highest proportion of responses, too high workload and bad teaching which occurred at the same frequency. The last category, other, contains a wide variety of explanations which failed to be grouped with the number of clusters used.

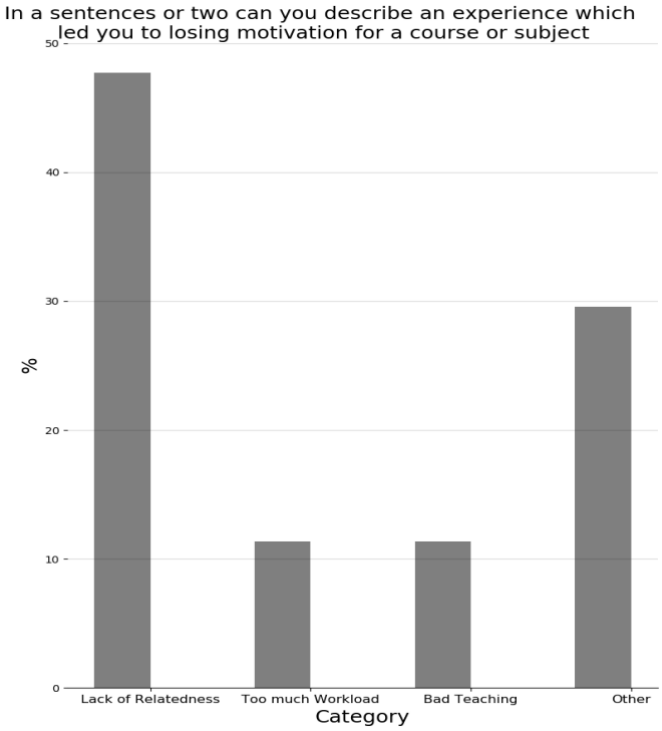

Figure 9. Assesment of the most common reasons for students' loss of motivation. The data of this figure is based on the open-ended Question 6.

Proposed workflow for improving motivation

The survey did not include all theories raised in the background to affect students' motivation. There was a compromise between either including all theories in terms of different questions in the survey which would have resulted in a longer survey, hence fewer participants, or select specific theories to make the survey shorter and increase the number of participants. The latter was chosen to ensure a high response rate and thus a more reliable survey.

Based on the results from the questionnaire and the theories addressed, implementations in terms of a workflow have been suggested and presented in Figure 10. The workflow consists of four steps related to the trends observed in the results.

The survey started and ended with examples of a course description to investigate whether articulating the utility and value of a course would increase students' interest in the specific course, which showed a positive trend towards increased interest if keywords were added. Therefore, step one of the suggested workflow involved updating course descriptions with use of new keywords to exhibit the value and utility of the course.

This was followed by two broad questions on whether students feel motivated (Question3) and then a more specific Question (Question 4A) regarding their type of motivation, namely intrinsic and extrinsic motivation. The trends observed from these two did not add any additional value to the suggested workflow rather than guiding in the understanding of survey participants.

As was mentioned in the survey design, Questions 2 and 3 aimed to stratify the student population into extrinsic or intrinsic subgroups. Following these were four questions targeting the self-determination theory and its three primary concepts regarding intrinsic motivation, namely, competence, autonomy, and relatedness (questions 4B, 4C, 4D). The results from the survey revealed that students in general feel competent enough and in control of their learning, hence competence and autonomy were satisfied looking at most of the answers. Relatedness on the other hand, showed a more uniform answer distribution and found to be the largest contributor to students' lack of motivation. This got implemented explicit in the workflow and got presented as step two in the workflow.

To preserve the noted trends regarding competence and autonomy from question results 4B and 4C, step three was suggested to the workflow. Step four was added in recognition of the importance of giving students a chance to reflect on their own learning.

Suggested workflow

First step: Add keywords about implementation and value of the course distinctly in the course description to promote interest

The first step is looking over the course description and translating it into a relatable and captivating title or description with explicit goals and implementation.

Second step: Encourage active learning during class to promote relatedness

An incorporation of active student learning with their peers is a good approach to have. This can be done by implementing the flipped classroom and allow student discussions.

Third step*:* Incorporate feedback to all assignments to stimulate self-determination

With continuous feedback from teachers encouraging students to elaborate in proper directions. This will reinforce a student's self-efficacy and expectations hence self-determination and intrinsic motivation.

Fourth step: Encourage students self-reflect over their own learning

In the last step of the workflow students should be encouraged to self-reflect on their learning outcomes. Several studies have stated that self-reflection is a tool for motivating and enhancing learning but also for fostering autonomy (Noels, 1999; Belobrovy, 2018). By allowing students to reflect on their own learning progress in eg. a portfolio of short summaries, we are promoting self-dependency and self-efficacy and thus, intrinsic motivation.

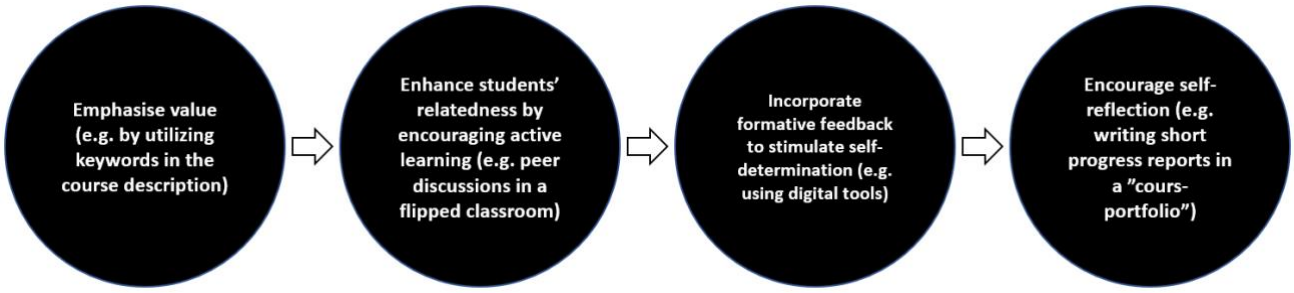

Figure 10. The proposed workflow including four steps all of which were formulated in relation to the findings of the conducted survey and acknowledged motivation theory.

Discussion

Factors contributing to student motivation run deep and contain a substantial degree of variation. A motivated student is an autonomous one, which will propel their understanding to a much higher level of competency. The results have shown decisive importance for clearly articulating what is taught. This importance is paramount because most students believe they will learn skills necessary for their careers. Additionally, the stratification of a student's intrinsic or extrinsic motivation plays a role in overall motivation. Variances in motivation may be coupled with concepts such as connection to a student's study environment as this is a driver to how one's studies are perceived overall. Moreover, some underlying issues of bias need to be addressed. Finally, we clarify why the workflow efficiently uses motivation theory. Motivation is a powerful force for a student and, if enacted effectively, can lead to positive learning outcomes.

An appealing effect of increasing motivation is the enhancement in autonomy. An educator's role is to instruct students and instil in them the belief that the skills they have developed are their own. Therefore, motivated students will more readily apply themselves to further interact with their course work; the additional time spent working autonomously with the content themselves will enhance their competency and understanding without further input from the teacher. Motivation creates two notable effects, the students learn what is required, and the student's efforts mitigate the teacher's role in correcting errors. Therefore, a teacher should expect that the initial exertion will activate student autonomy when applying this workflow, saving time overall.

As a part of students' intrinsic motivation, the relatability or value of a specific course can play a significant role. The aim of questions 1 and 7 was to emphasize the importance of articulating the value of a course. As seen in Figure 1, the interest in taking the course was notably shifted towards higher interest responses when the course's application was articulated. A striking result is that a simple rewording of Question 1 in the survey produced a noticeable improvement in motivation. The notable change ties nicely to (Wigfield & Eccles', 2000) value-expectancy theory, where students' value strongly influences their motivation. Clarifying the practical importance of the course helped more students appreciate the value of the course. To improve motivation, clear goals, use and value for the course is necessary (Cook et al., 2016). This result is additionally validated through the results of Question 5. Most participants agreed that they believed that they would formulate skills needed for their future careers. This suggests that students believe that their courses are relevant for a future career.

Overall, Questions 2 and 3 have separated the data into two populations of students: extrinsically and intrinsically motivated populations. Both populations are substantial, and one should expect to see both in any learning environment. However, intrinsic, and extrinsic students exhibit various levels of overall motivation. This difference is powerfully apparent when observing the subsets of the respondents in Question 4. Extrinsic students' appear to score lower than their intrinsic classmates indicating that they tend to be more apathetic towards their studies. The presence of apathy could leave students vulnerable to a lack of engagement in their studies if their courses do not effectively facilitate their external motivations. One can take away from these findings that intrinsic students are overall more motivated to study, and those who would classify themselves as extrinsic are less motivated. Coupled with the fact that this means that the intrinsic students will be motivated overall provides an impetus to facilitate a student to become intrinsically motivated to approach their studies instead. Facilitating intrinsic motivation will improve engagement in in-class activities and improve learning outcomes.

Engagement is also closely tied to a connection with others and is a significant factor for student motivation (Ambrose et al., 2010). With results from Question 4D, the connection for participants to other students seems diverse. Connection to other students can be interpreted as a social feature or a feeling of belonging in a particular environment of people. As a teacher, adding social activities such as a discussion during lecture time can promote students to connect. Figure 5 highlights that relatedness may be a crucial factor in explaining the lack of motivation amongst students. This suggestion is strongly supported by the findings presented in Figure 9, which shows that approximately 46 % of students lack motivation due to a lack of interrelation bands with other students and teachers. The categorization seen in Figure 9 was done by a thorough AI-based analysis of the open-ended answers to Question 6, for which many of the answers were found to have links to a lack of relatedness. Relatedness is also highlighted in self-determination theory as one of the vital psychological needs that must be satisfied to transition from extrinsic to intrinsic motivation. In addition, relatedness plays a vital role in internalization (Ryan & Deci, 2000), thus promoting students' feeling of competence, which promotes both intrinsic motivation and a growth mindset.

Caution is advised when adapting content for the enjoyment of students. Students who enrol in university do so to either follow or test their interests. A course specifically designed to be exciting or entertaining may warp a student's perception of their studies and give them false pretences of what they should expect. Our results show that content that illustrates value is what motivates students. A student will find a course interesting if the content is taught clearly,

and they genuinely find the concepts interesting. Following the workflow will enable a teacher to achieve this better.

While the findings of this report show illustrative trends of teaching theory, there are some biases mentioned. The first is majority bias. It is essential to point out the students that do not conform to the trends. Almost one-fifth of respondents exist in the tails of the distributions that were created. These tails constitute a sizeable portion of students. Looking at the results, one might conclude that students feel in control of their learning outcomes and ability to succeed. However, the needs of the minority that exist in these tails should also not be overlooked. These students are the most vulnerable. Furthermore, one disadvantage regarding surveys, especially a survey concerning motivation, is survey bias. The responses could correspond to the group of students who are already motivated and interested in learning new things and self-development. Hence, the group of students that lack motivation could be missing in this sample of participants. Thereby, this survey may not represent the entire population intended to investigate.

The workflow presented in this report compresses and reformulates the issues into a usable tool for teachers. When creating a lab, exercise or lecture series keeping the workflow in mind should lead to an overall increase in student motivation in the course. The initial step any educator should take is ensure that their content is worded clearly with a conscious use of keywords. Keywords indicate to students that what they are learning will create an autonomous skill set that they can use outside the classroom. Once the students know the content is useful, focus on building relatedness through active learning. A student should engage with the content and reward student engagement through constructive feedback to stimulate student motivation. Finally, have students reflect on their work; this enables them to think about what they have worked with and form deeper values with their teaching. Following these steps is a simple and adaptable approach that any teacher can use as a checklist when creating learning content.

Student motivation is a vital component of the teaching process. Many factors exist which contribute to its existence within a student's drive. A student's autonomy, specificity in instructions, the desire to formulate usable skills, encourage intrinsic motivation, and promote connection are essential in producing an effective learning environment. Caution is advised not to create content that distracts student learning, but to focus on teaching content clearly and effectively. University education should be for all, and it should help positively expand young minds and using the workflow of this report will help with that endeavour.

References

Ambrose, S.A. (2010), How learning works: Seven research-based principles for smart teaching. Jossey-Bass.

Ames, C. A. (1990). Motivation: What teachers need to know. Teachers College Record.

Anna Belobrovy (2018), Conference: ACE2018, Stream: Learning Experiences, Student Learning & Learner Diversity,Reitaku University, Japan

Atkinson, J. (1964). An introduction to motivation. Princeton, NJ: Van Nostrand.

Atkinson, J. W. (1957). Motivationsl deteminants of risk taking behaviour. Psychological Review

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman

Barron, K., & Harackiewicz, J. (2001). Achievement goals and optimal motivation: Testing multiple models. Journal of Personality and Social Psychology.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. Psychological Bulletin.

Carver, C. S., & Scheier, M. F. (1998). On the self-regulation of behaviour. Cambridge: Cambridge University Press.

Check, J., & Schutt, R. K. (2012). Research methods in education. Thousand Oaks, CA: Sage.

Cook, D. A., & Artino, A. R., Jr (2016). Motivation to learn: an overview of contemporary theories. Medical education.

Dweck CS, Leggett EL. (1988), A social-cognitive approach to motivation and personality. Psychol Rev.

Dweck, C. S. (2006). Mindset: The new psychology of success. Random House.

Dweck, C., & Leggett, E. (1988). A social-cognitive approach to motivation and personality. Psychological Review.

Ford, M. E. (1992). Motivating humans: Goals, emotions and personal agency beliefs. Newbury Park, CA: Sage Publications, Inc.

Harrison C. “Tip Sheet on Question wording”. Fact sheet. Harvard University. Massachusetts, USA. 2007. Web.

Harter, S. (1981), Effectance Motivation Reconsidered Toward a Developmental Model. Human Development.

Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. Developmental Psychology.

Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. Educational Psychologist.

Liu, W. C., Wang, J. C. K., & Ryan, R. M. (2016). Understanding Motivation in Education: Theoretical and Practical Considerations. In: W. B. Liu, J. C. K. Wang, & R. M. Ryan (Eds.) Building Autonomous Learners Perspectives from Research and Practice using Self-Determination Theory.

Maehr, M.L., Meyer, H.A. (1997). Understanding Motivation and Schooling: Where We've Been, Where We Are, and Where We Need to Go. Educational Psychology Review.

Maslow, A. H. (1970a). Motivation and personality. New York: Harper & Row.

McGregor, H., & Elliot, A. (2002). Achievements goals as predictors of achievement-relevant processes prior to task management. Journal of Educational Psychology.

Meece, J., & Holt, K. (1993). A pattern analysis of student's achievement goals. Educational Psychology.

Mitchell, TR. (1982). Motivation: New directions for theory, research and practice. Academy of Management Review.

Noels, K.A., Clément, R. and Pelletier, L.G. (1999). Perceptions of Teachers' Communicative Style and Students' Intrinsic and Extrinsic Motivation. The Modern Language Journal.

Ponto J. (2015). Understanding and Evaluating Survey Research. Journal of the advanced practitioner in oncology.

Ryan , T.A. (1970). Intentional Behaviour. New York: Ronald Press.

Ryan, R.M., Deci, E.L. (2000). Intrinsic and extrinsic motivations: classic definitions and new directions. Contemp Educ Psychol.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. The American psychologist.

Ryan, R.M, Deci E.L. (2000). Intrinsic and extrinsic motivations: classic definitions and new directions. Contemp Educ Psychol.

Turner, K. (2019). One-To-One Learning and Self-Determination Theory. International Journal of Instruction.

Valle, A., Cabanach, R., Nunez, J., Gonzales-Pienda, J., Rodriguez, S., & Pineiro, I. (2003). Multiple goals, motivation and academic learning. British Journal of Educational Philosophy.

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. Psychol Rev.

Wigfield ,A., & Eccles, J. (1992). The development of achievement task values: A theoretical analysis. Developmental Review.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-Value Theory of Achievement Motivation. Contemporary educational psychology.

Process report

Before drafting this report, we had a brainstorming session to discuss and distribute the tasks among us. Arthur, Ahmed, and Sajad were responsible for collecting the materials and look for the theories that could help us in gaining a better understanding of the relevant motivation theories and their concrete applications. Meanwhile, Nicholas and Lovisa oversaw setting up surveys and designing questionnaires targeting university students. Later we had another meeting to discuss the survey results and agreed on the report workflow.

Feedback report

The reviewers suggested a change of title to "Enhancing student motivation: a suggested workflow based on theory and survey data." The wording of the title is a matter of taste, and we feel that our current title better mediates the "suggestive" nature of the study. The reviewers mentioned an issue of repetition, for example the definition of autonomy in the background section. This has been given attention and autonomy is now defined only once in the second paragraph of the background section. The feedback group mentioned that some parts of the background was worded more like a conclusion and should be moved or rephrased and referenced and the example they gave was: "It goes without saying that goals with higher value are more likely to be prioritised than those with a lower value". That sentence has been reworded into a statement of fact rather than a deductive argument. Missing references were indicated at some places of the background all of which have been added. The background section came across as text-heavy to the reviewers. We made a general attempt at streamlining the text by removing repetitive sections. The reviewers commented on the lack of description of the respondents. They mentioned that the number of participants, who they were, what faculty they belonged to, if they were master students or undergraduates and how they were chosen should have been stated. The reviewers also criticized the missing information about how the survey was distributed and if it was anonymized or not. All this information has now been added in three paragraphs under the section of study design.

The reviewers requested some mention of proper statistical analysis. They also suggested we change the language of our description of the figures to reflect the qualitative nature of the study. Both of these suggestions were accepted and implemented. The reviewers suggested a better visualisation method to the plot of figure 1. They suggested a paired scatter plot with connecting lines to illustrate the potential changes in response. They also suggested to include a paired T-test to establish the significance in the difference between the answers before and after including the specific phrasing. We acted on both suggestions and included a paired scatter plot and a table with the means and p-value of the conducted paired T-test in the revised report. The reviewers commented on the nature of question 3 in the survey, that it builds up for a binary answer "either intrinsically- or extrinsically motivated". We have added a description in the report addressing that while the students may land on a wide spectrum of motivation, we aimed at mapping the most dominating type for the participants. The reviewers also shed light on a philosophical question stating, "do students have high motivation because they have intrinsic motivation, or do they have intrinsic motivation because they are highly motivated?". While share the belief of the depth of the asked question we do not believe that it falls within the scope of the study. The reviewers missed motivation to the suggested steps of the workflow

which has been added based on the survey results. An additional motivation why only some theories are mentioned in the suggested workflow has also been added in the workflow section as requested in the feedback. The reviewers criticized the lack of page numbers, an in consistent numbering on questions of the questionnaire and wrong referencing. All these have been remedied. The reviewers noted that the discussion was lacking in a few areas. Notably a discussion of how a teacher could actually use the workflow. The reviewers requested a discussion more clearly directed at autonomy and they also suggested adding some potential drawbacks of adapting course content to cater to students' interests. All these suggestions were accepted and implemented. The reviewers also felt that the report was top-heavy, with the background being much larger than the discussion. We have expanded the discussion to even out the report.