The Missing Link Between Student Capabilities and Motivation: Perceived Self-Efficacy

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Abstract – In recent years, the lack of students' motivation has become critical all over the world because of the decrease in work opportunities for young people without general or vocational secondary education. Currently, there is an interest in the ways in which teachers in youth education can foster students' development of competencies and motivation. This paper explores the premise that teachers should move beyond competencies and motivation and consider the perceived self-efficacy that represents the 'missing link' between the two student characteristics. The paper deals with two research questions: how can teachers generate knowledge about perceived self-efficacy, and which aspects of the perceived self-efficacy are the most important in relation to learning outcome?

Keywords: Perceived self-efficacy, teacher analytics, meta-analysis, blended e-learning.

1. INTRODUCTION

Since a driving force in learning is the need to master situations in one's live [1], students without proper motivation for pursuing education are at risk. In recent years, problems associated with lack of this kind of motivation have become more critical because of the decrease in work opportunities for young people without general or vocational secondary education. Thus, there is a growing interest in influential factors in self-regulation of motivation and lifelong learning. In particular, there is a demand for knowledge about the ways in which teachers can foster their students' motivation for learning.

The educational research has only been able to provide some of the answers to meet this need for knowledge among practitioners. For example, the reflective practitioner has been a key issue in teacher professional development from the mid-1980's [2]. Reflection on learning progression and outcomes, however, cannot fully overcome motivational problems. The teachers also need a common base of knowledge regarding efforts that foster the students' motivation and outcome expectations in youth education.

Currently, there is a gap in the knowledge about the teachers' impact on motivational factors. The shift in focus in education from input to output cannot overcome this gap in knowledge and neither can the shift in focus from teaching to learning. It is, of course, important that the teachers focus on student learning outcomes, but so far it has not been sufficient to overcome the problems related to students' lack of motivation for pursuing a youth education.

On the basis of various well-being strategies for education, most upper secondary schools regularly evaluate students' well-being. It helps to improve the learning environments; in particular, it helps to create a climate of confidence in the digital learning environments. However, so far it has not proved sufficient in overcoming problems related to poor motivation.

This paper explores the premise that the teachers should go beyond competencies and motivation and consider the perceived self-efficacy. It represents the 'missing link' between the two student characteristics (Fig. 1). Moreover, it has been recognised by researchers as a very influential factor in the self-regulation of motivation and learning activities [3].
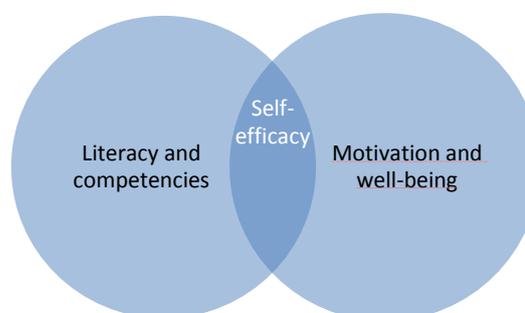

Figure 1. Perceived self-efficacy

Perceived self-efficacy refers to students' beliefs in their capability to produce given attainments [4], and it highly depends on whether the students expect to be able to cope with the various learning tasks [5]. In classes or groups of students, there is normally a spectrum of beliefs: at one end are rather pessimistic beliefs; at the other end are the beliefs of students with higher self-efficacy. Often, such beliefs about whether or not learning activities will go well become self-fulfilling prophecies that reduce or increase the individual outcomes.

Self-efficacy alone cannot explain these outcomes. However, it is considered the most

reliable indicator of student performance. Compared with other factors, it is the one that correlates best with the learning outcome [6].

The teachers thus need reliable knowledge about what it is essential to do in order to strengthen the perceived self-efficacy of their students. This kind of knowledge helps them to plan organised learning activities. In particular, it is valuable when the teachers want to implement blended e-learning activities where they cannot overlook student motivation or workability in the same way as in f2f-interaction.

2. AIMS AND HYPOTHESES

In this paper, I present research findings concerning perceived self-efficacy in learning environments with a 1:1 ratio between computers and students in Central Jutland Region in Denmark.

The research aim is to provide scientific knowledge about the ways in which teachers create data on perceived self-efficacy in order to foster student learning in upper secondary education. There are two research questions: 1) How can teachers generate knowledge about perceived self-efficacy? 2) Which aspects of the perceived self-efficacy are the most important in relation to learning?

The students' beliefs that they can solve the next task and the next again, affect their development of literacy according to current objectives of school work, and their development of a broad range of the 21st century competences that are the guiding principle of lifelong learning [7]. A simple conceptual model that represents the relationship between an independent variable *learning activity,* a dependent variable *learning outcome*, and a mediating variable *perceived self-efficacy* is shown in Figure 2.
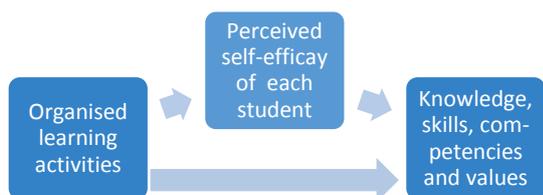

Figure 2. Conceptual model

The model mentions organised learning activities that are "planned in a pattern or sequence with explicit or implicit aims" [8]. It illustrates the impact of the teachers who, of course, should influence the various learning experiences, i.e. the independent variable. In addition, they should influence the mediating variable, the student self-efficacy. The greater it becomes, the greater the confidence regarding successful competence development.

3. DATA ON PERCEIVED SELF-EFFICACY

In general, this model has been implemented to a limited extent at upper secondary schools in

Denmark [9]. However, many innovative teachers are aware of their influence on students' self-efficacy. To generate data on this influence, I identified innovative teachers at eight secondary schools. Then, I provided a questionnaire regarding students' learning experiences to students from 25 classes at these schools. A total of 446 students answered the questions, which corresponds to a response rate of 76 pct.

The response options were numbers between 1 and 9 as shown in Figure 3. On this scale, answers equal to or higher than (5) represent a positive experience that varies from 'in some degree' to 'very much'.

Figure 3. Answer options

Each response is, of course, associated with some uncertainty. With 95 pct. probability, the true value is contained in a range that is the specified value +/- 0.2. The average response value is 5.3 and the standard deviation is around 2.

The students answered 30 questions about the perceived help from their teacher in 1:1 classrooms. According to students' responses, they appreciate the online interaction with their teachers because it helps them to understand and solve their assignments. In addition, they appreciate the provision of differentiated tasks and questions in this way (Table I).

TABLE I.   STUDENT SURVEY

When working with ICT in education, to what extent does your teacher help you to …	Rate out of 9
understand the requirements of your tasks (e.g., if you have misunderstood something)?	6.1
provide feedback on your writing assignments (e.g., via the school digital learning portal)?	6.1
formulate good questions for your work?	6.0
provide assignments that you usually can solve?	6.0
solve assignments if you find them difficult to solve (e.g., by giving examples of solutions)?	6.0
vary the ways you can achieve your goal (e.g., that you have access to materials in both text form and video)?	5.9

Formative feedback provided by the teachers highlights progress in students' learning underscoring their abilities as opposed to highlighting grave deficiencies in their approaches [10].

To reduce the amount of deficits, the students firstly have to understand the requirements of their tasks. Secondly, the teachers have to provide clear questions for student work. Thirdly, the teachers have to provide assignments, which the students usually can solve, and support them if they find the tasks difficult to solve. Fourthly, the organised

learning activities have to be based on the principle of variation according to which the students can achieve their learning objectives in several ways instead of a one-size-fits-all achievement of learning goals.

As already mentioned, the perceived self-efficacy depends on the students' ability to succeed in particular learning situations or accomplish specific tasks. It is not equivalent to their current knowledge, skills or competencies, but to their actual beliefs about whether they are able to solve their tasks well and experience successful learning activities. The response values regarding the teacher help in this area are shown in Table II.

TABLE II.   STUDENT SURVEY

When working with ICT in education, to what extent does your teacher help you to …	Rate out of 9
appreciate what you learn?	5.6
strengthen your industriousness?	5.6
strengthen your creativity (e.g., you have the opportunity to work with video documentation of what you learn)?	5.6
increase your belief that you can solve your tasks well?	5.5
strengthen your expectations for yourself in school?	5.4
make you complete your homework?	5.4

The table shows that the teachers manage to foster the students' self-efficacy and efforts in various ways, some of which relate directly to student motivation. Two factors are related to this self-efficacy: student appreciation regarding organised learning activities, and student anticipation regarding these activities [1]. The teachers can influence the appreciation of learning outcomes, which then influences the anticipation of up-coming activities. Moreover, the teachers can directly influence these expectations regarding the students' next tasks. In particular, they can increase the students' beliefs that they can solve these tasks well.

Other factors closely related to the perceived self-efficacy include student industriousness and homework. Most often, teachers intend to influence both of these in order to foster progress in their development of competencies. In a 1:1 learning environment, it is, among other things, straightforward to share descriptions and material regarding the learning tasks, student assignments and work in progress, and teacher provided feedback. Therefore, the digitised learning environment is suitable for collaborative learning activities.

The response values regarding this area are shown in Table III. The table shows that the students acknowledge teachers' efforts in organising student cooperation and team work. This includes aspects like interaction, direction and contribution related to group efforts.

TABLE III.   STUDENT SURVEY

When working with ICT in education, to what extent does your teacher help you to …	Rate out of 9
organize group activities so your cooperation with other pupils is good (e.g., group writing in Google Docs)?	5.8
Organize work in groups, so it has the right direction?	5.6
contribute to working well with other students?	5.5

4. SYSTEMATICALLY GENERATING DATA

Besides generating data, the teachers have to consider the best approach to systematically analysing data. Since they benefit greatly from cooperative analytical work with a moderator [11], the best practice may be collaborative rather than individual. According to this model, the teachers work systematically at regular meetings of groups, such as study groups, affinity groups, development networks and professional learning communities. This data team model will be considered in the following paragraphs.

The better-performing countries in the teaching profession do not aim to have a few expert teachers as a result of individual development measures, but promote group solutions [12]. Enhancing the collective capacity of teachers to create and pursue improved learning conditions for their students is generally one of the most successful professional teacher development approaches [13]. By doing so, the world's most improved school systems continue to improve (ibid.).

The various group solutions create an ongoing community dialogue regarding educational challenges in the teachers' own classrooms. More specifically, the teamwork allows the teachers to share and critically interrogate and improve their practice in an ongoing, reflective, collaborative and growth-enhancing way [14].

There is also research evidence suggesting that a collaborative approach to professional teacher development improves student learning [15][16][17]. This kind of snowball effect fosters the development of a shared understanding among teachers, which improves student learning and further improves the professional development [18].

Usually, the teachers' views are also taken more seriously when they are based on facts that represent student achievement [16]. To start this process, the teachers build affinity groups who are given time and are eager to generate and analyse data on students' self-efficacy related to their learning activities. For example, small teams of teachers meet every two or three weeks, employing an explicit data-driven approach to collect and analyse data regarding students' performance and perception of their own capability.

5. IMPORTANT ASPECTS OF PERCEIVED SELF-EFFICACY

Whenever the groups of teachers meet, they have to consider which efficacy aspects are most central to analyse in order to foster student learning. To identify such aspects, the teachers can be informed by results of meta-analysis. In order to elaborate this argument, I will present some results of meta-analyses, which provide evidence suggesting the net impact of various teacher efforts including direct instruction, classroom discussions, worked examples, clear learning objectives, blended and cooperative e-learning, homework, interactive video methods, and formative feedback.

Since the results of meta-analysis are general, there is no guarantee that they will be valid in particular learning events, and they cannot substitute results of local analysis of data on the concrete learning outcomes and the perceived self-efficacy. The teachers in secondary education should, however, consult existing knowledge to ensure they are research-informed before planning to examine student self-efficacy and formulating student questionnaires. In particular, they should focus on efforts that have higher influence on student learning than the average effect-size, which is 0.40 [19].

Teacher's efforts normally include two major groups, one of which consists predominantly of teacher-centred activities and the other predominantly of student-centred activities [18]. Characteristics of teacher-centred activities include: classroom discussion, instruction and exemplifying of the use of disciplinary specific working methods. Regarding this form, the effect size related to student achievement of classroom discussion is 0.82 [19].

It follows that e-learning where the teacher and the students meet regularly has a relatively high impact, and student experiences in this area are thus 'need to know'. One of the reasons that blended e-learning has high impact on learning outcome is that it allows for worked examples as well as direct instruction. Regarding student achievement, the effect size of worked examples and direct instruction is 0.55 and 0.59, respectively (ibid.).

As already mentioned, the students' self-efficacy depends on understandable and relevant task requirements, i.e., teacher clarity. Before a new task, the students want to know what they are doing and what is expected in terms of digital products and/or oral presentations. The effect size of teacher clarity is 0.75 (ibid.).

Characteristics of student-centred activities include: equal, but different, learning activities where the students work alone or co-create with other students. The efforts include increased student time on task in relation to blended e-learning. There is research evidence suggesting that blended e-learning has a higher impact on student learning than pure f2f-education as well as pure online learning [21]. In blended e-learning approaches, the effect size of increased time on task is 0.46. In pure f2f-education, the corresponding influence of increased time on task on student learning outcome is just 0.38, i.e. below the average effect size.

The teachers may wish to implement cooperative learning structures. In general, the effect size of small-group learning is 0.49, and the similar size of cooperative versus individualistic learning is 0.59 [19]. The impact on student learning of homework in youth education is 0.64 [18].

The students in general and vocational youth education access many kinds of digital apps and materials at home. For example, they use learning content that integrates text, numbers, graphs, pictures, video and sound. In general, the effect size related to student achievement of interactive video methods is 0.52 (ibid.).

Another important factor is the teachers' provision of formative feedback to the students. There is research evidence suggesting that the learning effect of formative feedback is higher than the similar impact of summative evaluation and feedback [22]. The general effect size of formative feedback related to student assignment is 0.75 [20].

In summary, the teachers can be research-informed and acquire knowledge about influential factors on the students' challenges and capability development and beliefs regarding these. Such factors include aspects of teacher-centred as well as student-centred learning activities. The research evidence is not a substitute for processes of assessment and measurement of perceived self-efficacy, but it can guide them during these processes.

6. CONCLUSION

The teachers' judgement in youth education is improved when they reflect knowledge about the factors that influence student learning outcomes. In addition, they can generate and analyse data on the impact of school-related factors on students' learning. This paper presents two sources of such data. Firstly, data on the students' development of skills, knowledge, competencies and values; these are, of course, needed in order to meet the various learning objectives and organise proper learning activities. Secondly, data on the student's perceived self-efficacy; their belief in their own ability to succeed and accomplish learning tasks is the factor that correlates best with learning outcome. In consequence, the teachers should generate, analyse and take action upon such data.

I have provided evidence suggesting that the most successful school systems in the world encourage the teachers to build data teams. In the research literature, such teams are, among other things, labelled as study groups, affinity groups,

professional networks and professional learning communities. A common feature is that teachers get time to create, analyse and subsequently act based on the insight from these efforts. When the affinity groups of teachers meet, they consider issues like: which aspects of the perceived self-efficacy are the most important to acquire knowledge about and how to gather the required data on this efficacy?

In this paper, I presented findings from research suggesting a systematic, continuous approach where the teams of teachers focus on and survey all their students. As opposed to informal observations of student motivation in the classroom, the systematic approach gives access to knowledge about the individual students' beliefs and expectations regarding their successful tasks. Furthermore, I have shown how the professionals can delimit this rather broad approach to factors that influence student learning outcomes the most by considering the results of educational meta-analysis.

In many situations, findings from meta-analysis represent a straightforward source of knowledge that groups of teachers can use to inform their examination of various aspects of self-efficacy. Firstly, these aspects include teacher-centred activities, such as clear learning objectives and tasks, direct instruction, classroom discussion, worked examples and the provision of timely, formative feedback. Secondly, they include student-centred learning activities, such as blended and cooperative e-learning, homework and the use of interactive video materials tailored to the preferences of individual students.

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