Eliciting classroom motivation : not a piece of cake

Nuland, H.J.C. van

Spicing up motivation is not that straightforward

This thesis attempted to contribute to the quest of practitioners and researchers to find guidelines on how to establish a healthy motivational orientation in the classroom. This is not an easy objective. There are many theories and concepts regarding motivation. We provided an overview in Chapter 2 of 36 motivation theories to gain more insight into what motivation is and how it works in the classroom. In Chapter 3 we highlighted motivation constructs derived from different motivation perspectives that can predict classroom performance together. Further, we presented the effects of a motivational intervention on intrinsic motivation, persistence, self-regulatory skills and performance (Chapter 4); we distinguished between the effects for boys and girls (Chapter 5); and investigated the applicability of self-determination theory across situations (Chapter 6). This chapter will start by presenting and elaborating on our results. We will again use the metaphor of the motivation cake that was introduced in the first chapter of this thesis to illustrate our conclusions. Subsequently, we will discuss study limitations and present our suggestions for future research as well as the theoretical and practical implications of the present thesis.

7.1. Recapitulation of the results of the present thesis

The current thesis tried to address five specific research questions in order to answer the general question underlying this thesis: What is motivation and how can it be elicited in the classroom? In the following sections the endeavor to formulate straightforward answers to our research questions is presented. These five specific research questions correspond with the five empirical chapters of this thesis. For sake of clarity, the results will be presented in separated sections.

7.1.1. Chapter 2: How have different theories of motivation contributed to our knowledge on how the motivation system works in the classroom?

The review study in Chapter 2 addressed the question of how different theories of motivation have contributed to our knowledge of how the motivation system actually works in the classroom. There are many theories, as our literature analysis showed. We described 36 different (mini)theories on motivation, with central concepts such as instincts, needs, drives, will, expectancies, perceived competence, fear of failure, self-efficacy, personal interest, desire, and flow, and divided the theories into five perspectives on motivation. These are: early motivation theories (e.g., Freud; Hull; Thorndike; Wundt), socio-cognitive motivation theories with a focus on expectancy and value (e.g., Atkinson; Bandura; Eccles), theories with a focus on intrinsic motivation (e.g., Deci; Harter; Hidi; Ryan), and, finally, theories

with a focus on goals (e.g., Elliot; Dweck, Nicholls). We also included integrated perspectives on motivated behaviour (e.g., Boekaerts and Zimmerman) that are usually categorized as self-regulation theories. Most of the constructs within the five perspectives are abstract and it is difficult to explain to students and teachers what they can do to make actual use of, for example, their instincts, needs, and flow. One source of complexity is that some of the constructs from different perspectives overlap and have been given different labels. For example, a fundamental trust in one's competence can be retrieved in self-efficacy theory, expectancy x value theory, and self-determination theory. Empirical results emanating from these different theories inform us that this mechanism acts as an internal resource and favourably affects the learning process. However, a learning environment is never optimal for all students, meaning that students do not all feel fully energized in a specific learning environment. For this reason, it is important that researchers are able to detect how the different mechanisms work in practice. This will allow them to explain to teachers how different learning environments may facilitate or inhibit learning for specific types of students. It is crucial to take theories of motivation to the classroom and study students' motivation in concert with their strategy use. Indeed, we would like to encourage the development of such integrative theories. Instead of increasing the distance between theory and practice and focusing exclusively on the development of a single motivation theory, researchers need to build a bridge between different motivation theories and between theory and practice. This is the final goal that we have tried to contribute to with this thesis.

7.1.2. Chapter 3: Which motivation constructs derived from different motivation perspectives predict performance on a novel task best?

The research question we addressed in Chapter 3 contributed to our understanding of which motivation constructs derived from different motivation perspectives best predict performance in the classroom. Motivation constructs from self-determination theory (Deci & Ryan, 1985), self-regulation theory (Zimmerman, 2001), and achievement goal theory (Harackiewicz, Barron, Pintrich, Elliot, & Trash, 2002) were investigated in tandem. Based on a body of research, we believe self-determination theory, self-regulation theory, and achievement goal theory to be the most promising theories for predicting situation specific motivation and performance. A large amount of educational research reports on these motivation theories, but they have hardly been tested jointly, and it is still unclear how the various variables interact in the classroom. We collected data in secondary education with a novel, online, individual problem solving task and digitalized questionnaires, during one lesson period (45 minutes). Hierarchical regression analysis revealed that intrinsic motivation (experiencing the task as interesting and enjoyable) played a key role in performance, provided that effort regulation and metacognitive skills were both high. Thus, this study highlights that theoretical insights from various theories need to be combined in order to get a better grasp of what happens in the classroom. Indeed, our results indicated that intrinsic

motivation in itself is not enough to attain a good performance. Instead, a moderate score on performance avoidance, together with the ability to remain motivated and effectively regulate and control task behaviour, is needed to attain a good performance. Having access to high time management skills also contributed to better performance and having a low performance approach orientation contributed to higher systematicity performance.

From this study, we concluded that self-regulatory skills should be trained in order to have intrinsically motivated students perform well in the classroom. Interventions designed to improve students' self-regulatory skills and school achievement have already been proven effective (see for instance Schunk & Ertmer, 2000). Those interventions should be continued, since the present study showed that intrinsic motivation only leads to a better performance if effort regulation and meta-cognitive skills are both high. This conclusion is particularly relevant for students in pre-vocational secondary education since we know that these students experience considerably more motivation problems than students in any other educational context in the Netherlands (e.g., Dijsselbloem, 2008; Van der Veen & Peetsma, 2009).

7.1.3. Chapter 4: Can we elicit intrinsic motivation in pre-vocational secondary education with motivational why- and how-information?

With the study described in Chapter 4, we tried to boost the intrinsic motivation of students in pre-vocational secondary education. This construct is derived from self-determination theory (SDT) and research within this framework emphasizes the importance of creating a favourable learning environment that elicits intrinsic motivation. *Intrinsic motivation* is the natural tendency to engage in activities for the inherent joy an activity gives; it flourishes performance, persistence and is a prerequisite for psychological well-being (Deci & Ryan, 1985; Ryan & Deci, 2000). Increased intrinsic motivation coincides with more autonomous and self-determined behaviour, which results in higher well-being caused by the satisfaction of the underlying psychological needs (i.e., autonomy, competence, and relatedness; Deci & Ryan, 2000). Many studies have evidenced that intrinsic motivation leads to favourable behaviour, including persistence, preference for understanding, and curiosity, which in turn result in better performance (Ryan & Deci, 2000). A lack of motivation has negative consequences such as student dropout (Legault, Green-Demers, & Pelletier, 2006) and teacher burnout (Grayson & Alvarez, 2008). This is an important problem in everyday education. It is also a research problem since many studies on motivation are set up with volunteers or with participants in higher education who tend to have higher intrinsic motivation scores. Considering the benefit for students' wellbeing on the long-term, we tried to boost students' intrinsic motivation and described the results of our intervention in Chapter 4.

We attempted to elicit intrinsic motivation with motivational why- and how-information and tried to replicate the promising findings accrued at other school levels. This motivational why-information either emphasized the intrinsic value or

the extrinsic value of the specific task. The motivational how-information contained information on strategies to become and remain motivated during the task. The intervention was based on strategies derived from the motivation and self-regulation models developed by Zimmerman (2000) and Ryan and Deci (2000). These strategies aimed at influencing the task-specific motivational beliefs and perceptions that students hold about the usefulness of the task, the tasks goal and how to approach the task. Appealing of this type of intervention is that the motivational information is easy to incorporate in the classroom and that former research has retrieved positive findings. For instance, Martens et al. (2010) reported positive effects of intrinsic why-information in higher education. Vansteenkiste et al. (2004; 2006; 2008) reported positive effects of intrinsic why-information during language tasks in higher education and for voluntary participation in gymnastics in secondary education. All together, the results both in higher education and secondary education reported by other researchers promised a clear-cut solution for motivational problems in pre-vocational secondary education. Nevertheless, we realized at the onset of our intervention that the results reported by other researchers had been obtained with non-curricular tasks and had used students who expressed an interest in a task presented on one occasion. We set up to replicate the promising findings with the notion in mind that it could prove to be less straightforward in pre-vocational secondary education.

Our intervention was incorporated in the normal curriculum. Students worked individually on a language task on the computer. They were randomly assigned to one of five conditions and received written motivational information after being introduced to the language task. The conditions were intrinsic why-information, extrinsic why-information, how-information, a combination of intrinsic why- and how-information, and a combination of extrinsic why- and how-information. A control condition completed the experimental design. For details on our intervention see Chapter 4. Our results showed no effects of the experimental conditions on self-regulatory skills, intrinsic motivation, performance, and persistence for a language task.

Why did the adolescents who participated in a compulsory language class in our study respond differently to the experimental manipulations than students involved in for example the Vansteenkiste et al. studies? Secondary education students are generally more extrinsically oriented and are not used to intrinsic and how-information. As such, they may have doubted the intrinsic information and neglected the how-information as being beside the point. It is a challenge for motivation researchers to design their interventions in such a way that students perceive the interventions the way they are intended. Given the low intrinsic motivation in secondary education, this is by no means an easy job. It is also advisable that researchers distinguish between different subgroups when looking for effective interventions. The next chapter addresses this point in more detail.

7.1.4. Chapter 5: Do boys and girls differ in their response to intrinsic and extrinsic motivational information?

In Chapter 5 we addressed the question whether boys and girls differ in their response to intrinsic and extrinsic motivational information. There are good reasons for this. The internationally acknowledged problem of declined motivation during secondary education (Eccles & Midgley, 1985) is particularly manifest in boys (Riordan, 1999). The students participating in the studies reported on in Chapter 5, were provided with either intrinsic or extrinsic motivational information twice. At the first occasion, students were unfamiliar with the task and at the second occasion, students were informed that they were about to perform a similar task. Data collected in pre-university secondary education, were used as a reference sample in Chapter 5. We retrieved the expected gender effects with girls enjoying an unfamiliar task more than boys, and girls outperforming boys when working on a familiar language task. This aligns with findings reported by other researchers that girls in general enjoy language tasks more than boys and that girls perform better on these tasks (e.g., Chiu & McBride-Chang, 2006; Riordan, 1999; Rosen, 2001). Further, providing either intrinsic or extrinsic information about the rationale of a specific task also yielded a gender effect. Similar to the general findings described in Chapter 4, we did not find any effects for girls, but found surprising results for boys. In contrast to the findings reported by other researchers, Chapter five clearly showed that providing *extrinsic* motivational information can have positive effects on intrinsic motivation. In pre-vocational education, boys who were provided with *extrinsic* motivational information enjoyed the unfamiliar task more than boys who were not provided with motivational information. We suggested that an emphasis on social comparisons and on showing off a good performance might increase the challenge and fun in doing unfamiliar tasks for boys. So, an incentive that is labelled 'extrinsic' in the literature may become an intrinsic one provided the circumstances are right. Other researchers also questioned the alleged negative effect of extrinsic incentives, emphasizing that these incentives may increase intrinsic motivation (Konheim-Kalkstein & Van den Broek, 2008). Recently, researchers in neuroscience pointed out that adolescents are hypersensitive to reward due to the developmental stage of their brain (Van Leijenhorst et al., 2009). We believe that in general, boys have a higher preference to engage in competitive play (e.g., computer games) than girls do (Colley & Comber, 2003). Indeed, former research in a vocational training context revealed that boys have a higher preference for superiority goals than girls and that girls score higher on mastery and social support goals (Boekaerts & Hijzen, 2006).

Questionnaire data in our study confirmed that boys in a pre-vocational secondary education context score higher on superiority goals than girls. We did not retrieve the interaction effect of motivational information with gender on intrinsic motivation within the familiar task context, which probably indicates that boys show this preference only when dealing with new and competitive tasks. Boys might benefit from extrinsic information on the short-term, but the effect on the long-term (i.e., within familiar tasks) might disappear or even become negative.

We have to conclude that influencing motivational orientation in the classroom is not that straightforward. The conclusion that teachers can best promote intrinsic goals, even when students' original orientation is extrinsic (Vansteenkiste et al., 2008), has to be reconsidered in light of our findings, particularly considering male students.

7.1.5. Chapter 6: Is the model derived from self-determination theory applicable across situations?

Finally, in Chapter 6, we investigated the applicability of the model derived from self-determination theory across different situations. Self-determination theory (Deci & Ryan, 1985) assumes that healthy motivation needs to be intrinsic in nature and that the basic needs competence, autonomy and relatedness are prerequisites for intrinsically motivated behaviour. Intrinsically motivated students in turn show more persistence and understanding of classroom material. SDT has often been tested with unfamiliar and novel tasks, with relatively intrinsically motivated participants who are requested to execute a task at only one occasion. However, the classroom reality is often quite different: tasks are repeated over and over and many students experience these repeated tasks as boring (Niemiec & Ryan, 2009). Moreover, in everyday education, adolescent students even experience peer pressure to voice a negative attitude towards such tasks and school in general (Ryan, 2000), and they have lower intrinsic motivation than younger students (Eccles et al., 1993). Chapter 6 describes the extent to which the theoretical SDT model holds true for secondary education students while working on a familiar and an unfamiliar task. We distinguished between familiar (repeated) and unfamiliar (new) tasks and tested a model where intrinsic motivation mediated the effect of basic needs on persistence and performance at two data waves (see Figure 1 in Chapter 6). Structural equation analysis showed that the partial mediation model fitted the data significantly better than the full mediation model (as predicted by SDT), irrespective of the participants' familiarity with the task at hand (see Figure 3 in Chapter 6). Persistence was positively affected by perceived competence and intrinsic motivation at both waves. Performance was only directly affected by perceived competence. Chen and Jang (2010) also failed to find support for motivation to predict learning outcomes in an online learning environment. We suggested that the effect of intrinsic motivation on performance might be a long-term effect: intrinsically motivated students will gradually understand the subject matter better, which in turn may further their performance in the long-term. We also retrieved a direct path between perceived competence and persistence (partial mediation).

Interestingly, not all effect estimates were identical across waves. When the participants were familiar with the task at hand, participants who perceived their relatedness and/or autonomy as high became less intrinsically motivated for the task. We cautiously suggested that students working on an unfamiliar task might be challenged by its novelty, which prompts them to explore the task enthusiastically. The missing aspect of novelty during a familiar task might trigger

a lower *need* for autonomously exploring the task. When the fulfillment of the need for autonomy is at a satisfactory level, students might enjoy the task better. With regard to the need for relatedness, students who feel highly related to their classmates, might be more intrinsically motivated during an unfamiliar task, because they feel safe to explore the novel task. However, when students are familiar with the task and the novelty of the task is gone, this effect might become negative. Students who feel highly related to their classmates might become less intrinsically motivated during a familiar task, because the peer group pressures them to have a negative attitude towards repetitive tasks, as is 'common' in classrooms with a strong extrinsic orientation. Conversely, students who do not feel highly related to their classmates, probably do not feel pressured by their peer group, and might have sincerely reported that they experienced the task as enjoyable. Although our suggestions might intuitively have some face validity, we would like to emphasize that this is only an attempt to interpret the puzzling findings. Finally, the need for competence and its effect on intrinsic motivation did not vary across learning episodes. In line with SDT, students' perceived competence was positively associated with their reported intrinsic motivation. Nevertheless, our findings demonstrate the importance of students' psychological needs in their functioning in the classroom. They also demonstrate that these relations are rather complex.

7.2. From results to conclusions

It is clear that the results in the present thesis pointed out that eliciting intrinsic motivation is not always straightforward. In order to draw conclusions, these results will be discussed in greater detail in the following sections. We will use the metaphor of the motivation cake introduced in Chapter 1 to illustrate our conclusions.

7.2.1. Building bridges between different perspectives on motivation

In our view the vast amount of information that is presently available on motivation can best be conceptualized as a huge motivation cake that consists of many different slices, which refer to the different motivation theories that have been developed over the years. In other words, each motivational mini-theory represents one slice of the motivation cake. Hence, the motivation cake consists of 36 different slices that share some basic ingredients. For instance, all slices have a basis of cake dough, which in some cases is referred to as pie, in other cases as pastry and in still others as flan. Translated to our discussion on motivation, we for example view self-determination theory (i.e., pie), achievement motivation theory (i.e., pastry) and goal-orientation theory (i.e., flan) as influential theories. These theories represent three out of five perspectives as we described in Chapter 2. Hence, the construct 'motivation' is considered to be the dough of the motivation cake and all sorts of variations of the pie, pastry and flan are seen as different bases of the motivation theories.

When we look more closely at the 36 slices we note that some slices share the same ingredients. For example, several of the slices have cream and some of these slices contain fruit as well. More concretely, we note that 'fundamental trust in one's competence' is a basic ingredient of many motivation theories. If we equate this construct with 'cream', we might conclude that cream is retrieved in the self-determination theory slice with a pie basis; within the expectancy x value theory with a variant of the pastry basis; and within self-efficacy theory also with a variation on the pastry basis. In a similar vein, if we consider the concept *needs* as fruit, we may argue that quite a few slices contain some fruit. For example, Festinger's cognitive consistency theory explains motivated action as a result of the *need* to make cognitions and behaviour consistent. The needs in Festinger's slice of the motivation cake can be considered to be pineapple, which is not commonly used as a fruit topping. Furthermore, slices that include intrinsic motivation consider motivation as the inherent *need* to feel competent and to interact effectively with the environment. The need represented in these slices can be labelled as apple; a more commonly used fruit for cake topping.

In the previous paragraph we used the cake metaphor to illustrate that each motivation minitheory uses different ingredients to make the theory palatable. Teachers and educators select one or more slices from the motivation cake to motivate their students. They might do so on the basis of the different ingredients taking into account the students' tastes and preferences. Although we certainly do not claim that some of the slices of the motivation cake can generally be considered appetizing and others as inedible, we argue that the appropriateness of the slices depends on the students' taste and the situation. The combination of the individual student's taste, with the teacher's taste and the given context determine the applicability of the different slices. For example, the slices with intrinsic motivation might not be appropriate in learning situations where students are striving for success because they want to obtain a good mark to please their parents. When teachers select a slice of the motivation cake they should ask themselves whether it is in accordance with their students' current goals. As was shown in Chapter 4, the intrinsic motivation flavour is not appetizing in learning situations that elicit extrinsic goals.

Some teachers prefer to serve an apple crumble piece of the motivation cake to their students, whereas others favour caramel flavoured slices. Some teachers present their favourite slices at all times, even though these slices are not the most suitable for the situation. Other teachers are inclined to switch between slices, because they want to challenge their students' taste buds every now and then. We would recommend that teachers reflect on their students' preferences in combination with the learning tasks and the learning situation and select the slices of the motivation cake accordingly. This is not an easy job. As pointed out in Chapter two, the various conceptualizations of motivation represented within the 36 different cake slices make it difficult to choose the slices that are tasteful to the students in that particular learning situation. Yet, selecting the slices with the

ingredients that students find appetizing will ensure that eating the cake will enhance their motivation.

We have already pointed out that it is difficult to compare research results when motivation researchers use different labels to refer to similar motivation constructs. Researchers should focus on concrete principles of motivation that can help teachers and educators to foster motivation in their students. With Chapter two we presented a great deal of information about motivated behaviour, but we still have a lot to learn concerning the mechanisms that energize students in the classroom in such a way that learning is enhanced. Instead of increasing the distance from theory to practice and focusing exclusively on the development of a single motivation theory, researchers need to build a bridge between different motivation theories to fill the gap between theory and practice. Theorists from different theoretical perspectives should work together and share ideas on how to establish more understanding of motivation processes and classroom performance. Therefore, the empirical study described in Chapter three was designed to explore the interplay of the ingredients derived from three different slices of the motivation cake that predict performance on an unfamiliar task.

7.2.2. Intrinsically motivated students' need for effort regulation, time management, and meta-cognitive ingredients

In Chapter 3, we aimed to integrate constructs from three recent single perspective theories, in order to better understand how performance can be predicted within secondary education. Our research showed that intrinsic motivation in itself is not enough to predict performance. Ingredients from two other slices of the motivation cake predict performance in intrinsically motivated students. Intrinsic motivation (i.e., crème au beurre) from the self-determination theory slice, together with a balanced level of performance approach (i.e., custard) and performance avoidance (i.e., bavarois) of the goal-orientation slice, and meta-cognitive; time management; and effort regulation skills (i.e., walnut, hazelnut and pistachio) derived from the self-regulation theory slice combine so as to predict performance.

Our findings underline the notion that researchers from different perspectives should work together to be able to phrase guidelines for educational practice. Adherents from different slices of the motivation cake should work together to provide recipes that teachers can use to fulfil their students' situation-specific cake need. It is easy to see that uninformed teachers overload unmotivated students with randomly chosen pieces of the motivation cake. Conversely, well-informed teachers could welcome their students with pieces of cake that have been proven to be tasteful at other parties (e.g., higher education). Whereas Chapter three reported on the ingredients for intrinsically motivated students to perform well on a task, the remaining chapters of this thesis focused on the ingredients to establish intrinsic motivation. In other words, Chapter three focused on the combination of crème au beurre with custard, bavarois, and nuts in order to predict performance. The remaining chapters of this thesis focused on the combination of

ingredients that pre-vocational secondary education students' perceive as prerequisites for an appetizing crème au beurre pie.

7.2.3. Spicing up students' intrinsic motivation with motivational information

Although it is questionable that all students favour the same slices of the motivation cake, one promising strategy to boost students' motivation is to provide motivational information up front which is investigated with the studies reported in Chapters four and five. Without losing sight of the whole motivation cake, it is advisable that researchers zoom in on students' preferences for eating one or maybe two slices of the cake simultaneously. In Chapter four we highlighted the ingredients of two slices of the motivation cake in an attempt to spice up students' motivation. We tried to replicate the promising findings from research within the self-determination theory and self-regulation theory perspective into pre-vocational secondary education. The intrinsic and extrinsic why-information ingredients we provided from the self-determination theory slice and the how-information ingredients from the self-regulation theory slice of the motivation cake were not beneficial for students' enjoyment and interest in the task at hand. Our results showed that the pieces of cake that have been proven to be tasteful at other parties (e.g., higher education) are not enjoyed in the same manner in a pre-vocational secondary education context. The cake preferences of our participants seemed to be independent of our staged emphasis on the ingredients from the self-determination and self-regulation theory slices. Whereas, Chapter 3 showed that ingredients from the self-determination theory slice and the self-regulation slice together can predict performance, the results of Chapter 4 show that when these ingredients are 'forced' upon students, they do not automatically crave for more crème au beurre.

The results in Chapter four imply that optimising motivation and performance in an educational context is not that straightforward. It is disappointing that we cannot provide a clear recipe on how to elicit intrinsic motivation. Nevertheless, Chapter four contributes to our understanding of motivation in educational practice. The mean intrinsic motivation of this large group of students proved to be below the scale average. Their need for the intrinsic motivation ingredient from the self-determination theory slice of the motivation cake is probably not on the expected level. Students in pre-vocational secondary education do not fancy the amount of crème au beurre that we expected. We should ask ourselves whether it is even realistic to assume that those students will ever welcome a whole piece of the SDT and SRT slices of cake in an extrinsic oriented classroom. Eating cake is probably more likely to result in the satisfaction of students' extrinsic motivation. Further, it remains questionable if all students favour the same slices of the motivation cake. In Chapter five we attempt to zoom in into boys' and girls' different cake eating preferences.

7.2.4. Gender differences in cake eating preferences

Chapter five reported on the intervention according to the ingredients of the SDT slice of cake and whether it had a different impact for boys than for girls. We found

that boys and girls differ with respect to their response to motivational information. Boys in pre-vocational education, who were provided with extrinsic motivational information, enjoyed the unfamiliar task more than boys who were not provided with motivational information. This suggests that emphasizing social comparisons and showing off a good performance may increase the challenge and fun in doing unfamiliar tasks in boys. Hence, when boys are offered a slice of cake that they find delicious, they probably enjoy the party better. Nevertheless, in general it's the girls that throw the better parties (i.e., have the best performance scores), with or without motivation cake. Recall, that we did not retrieve the positive effect of extrinsic motivational information on boys intrinsic motivation for a familiar task. This suggests that boys who are enthusiastic about a specific piece of cake at one party might not enjoy the taste at another party.

Fascinatingly, Chapter five also pointed out that Dutch students in pre-university education are not that different from students in pre-vocational secondary education with regard to their motivation and in their response to motivational information. Chapter five provided valuable information for educational practice. It addressed relevant issues of increased motivational problems in education, especially amongst boys. Although our results indicate that influencing adolescents' motivation is feasible, we must conclude that inducing intrinsic motivation is not as straightforward as expected. In Chapter six we studied the interplay of SDT cake ingredients at different occasions.

7.2.5. The motivation cake: Different occasion, different perception of flavour

Whereas Chapter five described gender differences within a context, Chapter six described the different responses of the same group of students across learning situations. Although SDT claims to be a universal theory, our research contradicts the notion that motivation works similarly across situations. Hence, combining the ingredients from the self-determination theory slice (i.e., autonomy, competence, relatedness, intrinsic motivation, performance and persistence) at two different occasions does not necessarily result in students' exact same perception of flavour. The interplay of the ingredients might change dependent on external circumstances (e.g., task familiarity). Students might perceive the flavour of the SDT slice differently at the second occasion, because eating the slice at the first occasion had raised certain expectations. The interplay of the ingredients depends on external circumstance, such as the heat of the oven, the quality of the fruit, the amount of sugar used, but also on whether students feel hungry or not. Hence, when SDT is put to the test in situations that are commonly found in educational contexts (students with low intrinsic motivation having to do tasks that are repeated over and over, and negative peer group pressure towards learning) then there is no guarantee that the assumed relations in the model are present.

7.2.6. Spicing up motivation is not that straightforward

It is not a piece of cake to choose the most effective motivation theory within and across situations from all different possibilities. This even raises the question

whether we should try to attempt to provide general guidelines that are applicable to general situations. Where general situations don't exist, the general student is probably an illusion. With the results from this thesis in mind, it is questionable whether one should have general assumptions and expectations about mechanisms underlying individual motivational processes in the classroom. The first challenge is that not all *teachers* favour the same slices of motivation cake. Furthermore, not all *students* favour the same piece of motivation cake. Another challenge is that external circumstances influence the interplay of the different cake ingredients. This interplay might result in a different preference for flavours at different occasions. For example, if students have just eaten something sweet, they might prefer a bitter taste (e.g., bitter chocolate cake) or a sour taste (e.g., cheese cake). To sum up, the conclusion has to be drawn that eliciting intrinsic motivation is not a piece of cake. Moreover, students in pre-vocational secondary education might pursue different goals than we believe or want. Intrinsic motivation might be beneficial for students' well-being on the long-term, but it is in peoples' nature to prefer unhealthy things. We have no reason to believe that this mechanism is absent in adolescent students.

However, it is impossible to decide which slices are generally unhealthy. In the literature intrinsic motivation is presented as the ultimate form of motivation (Deci & Ryan, 1985; Deci & Ryan, 2000; Ryan & Deci, 2000). Based on the results of this thesis, we claim that all slices can both be healthy and unhealthy. A slice that is healthy at one occasion, can be unhealthy at another occasion, and a slice that some students find delicious may be disliked by others. Depending on a combination of a great deal of factors (teacher's preference, individual students' preferences, classroom context, task difficulty level and familiarity), practitioners should decide which slice(s) is/are the most appropriate to offer. Therefore, teachers should become familiar with their individual students' motivational needs in an attempt to detect which specific ingredients from the motivation cake are necessary and sufficient to foster motivation. It is up to educational researchers to facilitate this complex selection process. Theorists that represent different slices of the motivation cake should work together and share ideas on how to establish more understanding of motivation processes and classroom performance. Then a start could me made with transferring theoretical insights into the curriculum of teacher education.

7.3. Conclusions

The following general conclusions are drawn from the findings reported in the respective chapters of this thesis: (1) researchers need to build bridges between various motivation theories and between theory and practice, (2) intrinsically motivated students' performance is contingent on their meta-cognitive strategies, effort regulation and time management skills, (3) motivational why- and how-information does not generally influence pre-vocational secondary education students' intrinsic motivation, performance, persistence and self-regulatory skills, (4) extrinsic motivational information intrinsically motivates boys in pre-vocational

secondary education for an unfamiliar task, (5) relations within the hierarchical SDT model in a pre-vocational secondary education classroom context appear to be complex when task familiarity is introduced into the model, (6) eliciting intrinsic motivation is not straightforward. In the remainder of this chapter we will discuss the limitations of our studies and elaborate on issues for future research and provide some theoretical and practical implications.

7.4. Limitations and issues for future research

The research reported and discussed in the current thesis has some limitations and raises issues for future research. Therefore, this concluding section addresses some suggestions for future research, partly related to particular limitations of the present study.

7.4.1. Definition of intrinsic motivation

In this thesis we repeatedly referred to intrinsic motivation. We started this thesis by arguing that the definition of motivation is in the eye of the beholder. This also applies to the definition of intrinsic motivation. We consider intrinsic motivation to be task specific and believe it to be experienced when a student perceives a specific task as enjoyable and interesting. This definition is in line with how many (but not all) other researchers view and measure intrinsic motivation. We have shown in Chapter five that students, particularly boys, can also enjoy a specific task for extrinsic reasons.

Our definition of intrinsic motivation is very similar to the definition of situational interest and to autonomous motivation. Situational interest is derived from the four-phase model of interest development (Hidi, 2006; Hidi & Renninger, 2006). Situational interest is the first phase of the developmental thread that links a state of interest to the development of interest as a predisposition. Hidi and Renninger consider situational interest to be environmentally triggered, and to involve an affective reaction and focused attention. The affective reaction in Hidi and Renningers definition aligns with the perception of the task as enjoyable and interesting in our definition of intrinsic motivation. The focused attention determines whether situational interest evolves into the second phase of maintained situational interest. Stage three is the emerging individual interest and stage four is the individual interest where situational interest has become a predisposition. What we tried to measure in our intervention could be considered akin to situational interest.

Another possibility is to align our motivation label with the definition of ‘autonomous motivation’. This term was introduced by Ryan and Deci (2000) and represents the type of extrinsic motivation on the motivation continuum that is the closest to intrinsic motivation. In the classroom, students are mostly not pursuing tasks for the inherent joy the task itself provides (another definition of intrinsic motivation), but simply because the teacher tells them to. This suggests that students in pre-vocational secondary education might pursue different goals than we believe they do or want them to and that we should align our interventions with

the goals that the students themselves bring into the classroom. Although the operationalisation of intrinsic motivation we used is commonly used in the studies set up from the self-determination perspective, referring to situational interest or autonomous motivation could avoid misinterpretation of our intentions. It might be profitable for motivation researchers to establish agreement in what ways the term situational interest, maintained interest and individual interest are similar and dissimilar from intrinsic motivation. Also, in what way these labels are related to autonomous motivation.

7.4.2. Subtle intervention

We should ask ourselves whether it makes sense to stimulate intrinsic motivation by written statements emphasizing fun and short-term usefulness of the task. This results in the second limitation of our research. We used a subtle way to influence intrinsic motivation, persistence, performance and self-regulatory skills by providing motivational information. The appeal of this method is that it is relatively easy to incorporate in the classroom and that is has been proven successful in other contexts. Nevertheless, it can be questioned whether our statements can influence intrinsic motivation. Especially, when the information is phrased as if the teacher is telling the students why the assignment is important. Although we retrieved similar results with motivational information that was phrased as a conversation between two peers who had already performed the assignment, it may probably be more fruitful to manipulate the actual learning environment by generating real chances for the development of intrinsic motivation.

Although not easy to realize, but in line with SDT, one example of manipulating the learning environment is to actually increase students' autonomy. Some authors have pointed to the possibilities that new learning technologies might have in this respect. ICT (information & communication technology) may make it easier for teachers to individualize education and to increase the variability of learning tasks (Simons, Van der Linden & Duffy, 2000, for an overview). In an attempt to transform students' passive study behaviour into more active engagement, new learning concepts have emerged, such as independent learning, self-regulated learning, informal learning, active learning, problem-based learning and work-based learning. Future research could point out the merit of these alternative learning environments.

Another promising intervention is emphasizing the personal relevance of a specific topic for the near future (Peetsma & Van der Veen, 2009). This successful intervention tries to raise awareness on future relevance of what students learn at school. Within this intervention, students have to visualize possible futures for themselves. During interviews and role-playing, students establish: (1) a realistic idea about future possibilities; (2) awareness of which goals to reach and what to avoid; (3) a clear idea of the small manageable steps necessary to attain a certain goal; and (4) awareness of the personal relevance to the possible futures being held out. The first part of the intervention uses an imaginary future in sport and the

second part uses an imaginary future in music (see Peetsma & Van der Veen, 2009). This intervention is largely indirect and put into a school career context by discussing the situation as if it were for a virtual classmate. At the end of the intervention, students are asked about the personal relevance of the virtual classmate's situation for their own future. This intervention has been proven effective in eliciting motivation in pre-vocational secondary education.

7.4.3. Self-reports

A third limitation of our study is that we primarily made use of self-reports to collect information on the motivation variables. Although their use is highly common and standard within educational research, the use of self-reports has been questioned recently. Karabenick and colleagues (2007) discussed the problem of self-reports' validity. There might be a discrepancy between the assumptions made by researchers using self-reports and participants' interpretation of the self-report items. The challenge of using self-reports is that we cannot be completely sure how the items are interpreted. Furthermore, self-reports are not always congruent with for instance trace measures of motivational variables. Trace measures are the traces that students leave behind when they work on an electronic assignment (e.g., the number of times they attempted revising a written text). When the behavioural traces do not correspond with the self-report items, it is questionable whether both measure the same thing. For example, the number of times a student attempts to revise a sentence, indicates the amount of persistence and should be congruent with the score on the self-report scale that collected the information on the student's persistence. Research methodologies should possibly be more fine-grained to capture all relevant information. For example, the development of detailed, on-line monitoring of students' cognitions, feelings, and actions could possibly contribute to the understanding of how motivation principles actually work in the classroom (Minnaert, Boekaerts & De Brabander, 2007). Single items can pop up before, during and after a task and collect detailed information on motivational changes. In turn, dynamic tests of performance instead of the static performance test score that we used, could contribute to a better understanding of the learning process (Resing, 2006). Whereas, information collected with self-reports and test score performance measures result in valuable snapshots of motivation and performance at one point in the process, data from computerized adaptive testing combined with data from on-line monitoring of motivation could increase our knowledge of the broader spectrum of learning processes.

Furthermore, computerized instruction, combined with the availability of advanced statistical software packages, such as neural network analyses, provide the opportunity to assess and analyze numerous different variables concurrently and explore the underlying mechanisms of motivated behaviour in the classroom. Finally, we would like to point to the merit of newly introduced techniques in educational research such as functional magnetic resonance imaging (Van Leijenhorst et al., 2009). Whereas adolescents do not simultaneously experience the same stage of development (Westenberg, 2008), these advanced techniques can

provide more insights into the developmental stage of the adolescent brain. Eventually, this 'laboratory' knowledge could service field research in the actual classroom. For example, when researchers in neuroscience have found that the developmental stage of adolescents' brain results in hypersensitivity to reward (Van Leijenhorst et al., 2009), field researchers could use this knowledge to design effective interventions.

7.5. Theoretical and practical implications

The results of this thesis underline the importance of ecological valid research (Minnaert & Vermunt, 2006). To make valid predictions about intrinsic motivation and behaviour, researchers have to enter the actual classroom. Evidently, research outside the classroom during experimentally controlled designs can contribute to the understanding of general mechanisms. However, research within the classroom can provide situation specific guidelines that help practitioners to understand how to influence their students' individual motivation. Unfortunately, results from one situation cannot be a priori generalized to another situation. Therefore, practitioners should work together with researchers and pursue small-scaled ecological valid research in order to help themselves and their students to enjoy their time in school. This asks for another role of the teacher and for the researcher. This asks for educational researchers to adopt a subservient attitude. Whereas, at present it is more common for a researcher to initiate research, we argue that it should be more common for the teacher to initiate research that they consider to be necessary for their students to flourish (Martens, 2010).

To sum up, this thesis pointed out that motivational research in the classroom should be a co-operation between practitioners, students and educational researchers. Challenges in educational practice are often too complex to try and solve with one simple straightforward solution, derived from one single theory. Eliciting intrinsic motivation should be a process of baking, sharing, and eating motivation cake together. A process of adjusting and improving the selected recipe over and over again, so that every student can have the privilege of enjoying his school years.

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