

Assessing Formative Assessment:
Nursing Students' Perceived Use and the Relation with Their Needs and Motivation

Master thesis

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Abstract

Formative assessment has been recognized as an effective way to facilitate nursing students' learning. It enhances autonomous motivation and contributes to the fulfilment of basic psychological needs. The self-determination theory (Ryan & Deci, 2000) endorses this relation and states that fulfilment of basic psychological needs facilitates autonomous motivation. This study aims to explore the mediating role of basic psychological needs in the relation between formative assessment strategies and motivation within the context of nursing education.

For this purpose, a qualitative study based on questionnaires was conducted in a sample of 118 first-year nursing students. The questionnaires concerned the perceived use of formative assessment strategies, autonomous and controlled motivation (SRQ-a) and basic psychological needs (BPNSFS). Regression analyses were used to investigate the mutual relations between the constructs and the mediation model.

Results showed both autonomous and controlled motivation were predicted by the perceived use of formative assessment strategies. Learning tasks negatively predicted autonomous motivation and self-assessment positively predicted controlled motivation. The basic psychological need for autonomy was predicted by the perceived use of formative assessment strategies, of which both success criteria and teacher feedback yielded significant positive results. The basic psychological need for autonomy was negatively related to autonomous motivation. The proposed mediation model was not confirmed.

Results suggest nursing students' perception of both the learning activities and the teacher, as well as the proficiency with which teachers deploys the formative assessment strategies, determine the extent to which formative assessment strategies support nursing students' fulfilment of basic psychological needs and motivation.

Keywords: formative assessment strategies, basic psychological needs, autonomy, competence, relatedness, autonomous motivation, controlled motivation, nursing education.

Assessing Formative Assessment: Nursing Students' Perceived Use and the Relation with Their Needs and Motivation

Formative assessment has been recognized as one of the most effective ways to facilitate nursing students' learning (Cauley & McMillan, 2010; Duers & Brown, 2009; Sadler, 1998). Formative assessment aims at improving the students' performance by providing feedback on their learning process (Dunn & Mulvenon, 2009) and is ideally followed by active processing and action by the student (Sadler, 1989). Under certain conditions, formative assessment improves students' engagement (Cauley & McMillan, 2010; Dochy, Segers, & Sluijsmans, 1999), performance (Black & Wiliam, 1998; Hattie & Timperley, 2007; Shute, 2008) and accelerates their learning (Elliott & Higgins, 2005; Sadler, 1998).

Contrarily to a formative function of assessment, assessments with a summative function are concerned with summarizing or evaluating the students' performance, for example by grading it, for the purpose of assessing academic progress (Dunn & Mulvenon, 2009). The summative function of assessment therefore remains central in measuring students' achievement (Koh, 2008) and does not aim to have an immediate effect on learning (Sadler, 1989). In short, assessment is considered formative when it primarily aims at facilitating and improving the students' learning process (Koh, 2008; Shute, 2008).

Motivation, specifically autonomous motivation, has been identified as an important facilitator for learning (Cauley & McMillan, 2010; Niemiec & Ryan, 2009). Moreover, formative assessment has shown to enhance nursing students' motivation (Cauley & McMillan, 2010; Dochy et al., 1999; Elliott & Higgins, 2005; Ryan & Deci, 2000) as well as their sense of ownership, autonomy (Cauley & McMillan, 2010; Dochy et al., 1999; Ryan & Deci, 2000) and competence (Dochy et al., 1999; Ryan & Deci, 2000). A widely recognized theory that endorses this relationship is the Self-Determination Theory (SDT; Deci, Vallerand, Pelletier, & Ryan, 1991; Ryan & Deci, 2000). The SDT states that contextual events, such as receiving feedback, conduce towards fulfilling the students' basic psychological needs: autonomy, relatedness and competence. Satisfying these needs facilitates the internalization of their behaviour, or the extent to which they are autonomously motivated.

Formative assessment is widely applied as a means of instruction in education today, yet little is known about the mechanisms behind its effectiveness and the way it contributes to motivation or the fulfilment of the basic psychological needs, which are inherent to motivation and learning (Deci et al., 1991). This study aims to provide more insight into the use of formative assessment and its relation with students' basic psychological needs and

motivation. Besides examining the mutual relations between these constructs, a model is proposed in which the fulfilment of basic psychological needs as a recognized predecessor of motivation, mediates the influence of the use of formative assessment strategies on motivation.

The study is conducted in the context of nursing education, as formative assessment and feedback remain understudied within this specific context (Agius & Wilkinson, 2004; Koh, 2008), while the ability to learn informally (Koh, 2008) and to develop critical thinking skills (Agius, 2014) is essential for professional nurse practitioners. Nursing students need to grow accustomed to receiving, engaging with and providing feedback, for the sake of quality improvements at both individual and institutional levels (Agius & Wilkinson, 2014), for which experience with formative assessment would prepare them. This study therefore aims to provide more understanding with regards to the use of formative assessment within nursing education.

Theoretical Framework

Formative Assessment

Formative assessment is defined by Black & Wiliam as a practice in which:

Evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited. (2009, p.9)

According to Cauley & McMillan (2010), deploying assessment formatively stimulates students' learning when it is frequent, specific and immediate; it allows the students to focus on their personal development and allows the teachers to personalise their instructions, it gives students concrete information on how to improve their performance and its timing assures the assessment is meaningful. This corresponds to Wiliams' (2011) claim that effective formative assessment informs the students not only of the presence of a gap between their current and desired performance but also on the kinds of activities which are likely to result in improving their performance. Furthermore, for assessment to actually support learning, it requires to be provided in a way that encourages the learner to engage in actions to improve performance (Wiliam, 2011).

Formative assessment strategies. To assess students' performance, Wiliam & Thompson (2007), have described five key formative assessment strategies. In their model, they identify three agents – teacher, learner and peer – and three processes of learning; establishing where the learners are in their learning, where they are going and what needs to

be done to get them there. Together, this has resulted in five aspects of formative assessment as depicted in Figure 1.

	Where the learner is going	Where the learner is right now	How to get there
Teacher	1 Clarifying learning intentions and criteria for success	2 Engineering effective classroom discussions and other learning tasks that elicit evidence of student understanding	3 Providing feedback that moves learners forward
Peer	Understanding and sharing learning intentions and criteria for success	4 Activating students as instructional resources for one another	
Learner	Understanding learning intentions and criteria for success	5 Activating students as the owners of their own learning	

Figure 1. Aspects of formative assessment. Reprinted from “Developing the theory of formative assessment” by P. Black and D. Wiliam, 2009, *Educational Assessment, Evaluation and Accountability*, 21, p8.

The aspects of formative assessment strategies, as depicted in Figure 1, illustrate that both the teacher and the student carry responsibility in the students’ learning process. The underlying idea is that the teacher facilitates an effective learning environment while the student is responsible for his learning process within that environment (Black & Wiliam, 2009). By applying formative assessment strategies, teachers encourage students to take ownership of their own learning (Cauley & McMillan, 2010). Particularly aspects of formative assessment which include peer-feedback and self-assessment, for which the students function as an instructional resource for their peer and their own respectively, conduce towards the development of students’ sense of autonomy (Black & Wiliam, 2009). Increasing students’ sense of ownership and autonomy can improve their self-efficacy, responsibility, motivation and awareness of the quality of their performance (Cauley & McMillan, 2010; Dochy et al., 1999; Ryan & Deci, 2000). Especially when the attention is focussed on the students’ progress and when successes are attributed to their effort or ability, this can result in increased engagement and motivation and improved performance on a next task (Hattie & Timperley, 2007; Shute, 2008).

However, students do not always recognize formative assessment strategies. What influences students’ learning is not the way formative assessment strategies are practiced objectively, but the way the students perceive their learning environment (Stroet, Opendakker, & Minnaert, 2013). A study by Mulliner & Tucker (2017) suggests that students have a different perception of what feedback entails when compared to their teachers. Moreover, even when feedback is recognized as such, the impact and effectiveness of it also

depend on the student perceptions of the provider (Poulos & Mahony, 2008). Because of this, the current study will focus on the perceived use of formative assessment strategies by the students rather than the objective use thereof.

Self-Determination Theory

All aspects of activation and intention, which are vital for learning to take place (Wiliam, 2011), are comprised within the term ‘motivation’, i.e. the driving force behind peoples’ behaviour (Ryan & Deci, 2000). As depicted in Figure 2, the SDT arranges types of behaviour along an autonomy continuum, corresponding to the degree of internalisation. The continuum ranges from amotivation, which is equal to no internalisation, via extrinsic motivation to intrinsic motivation, which equals full internalisation (Deci et al., 1991; Ryan & Deci, 2000). Both extrinsic and intrinsic motivation are regulated intentionally, but they are concerned with different regulatory processes (Deci et al., 1991).

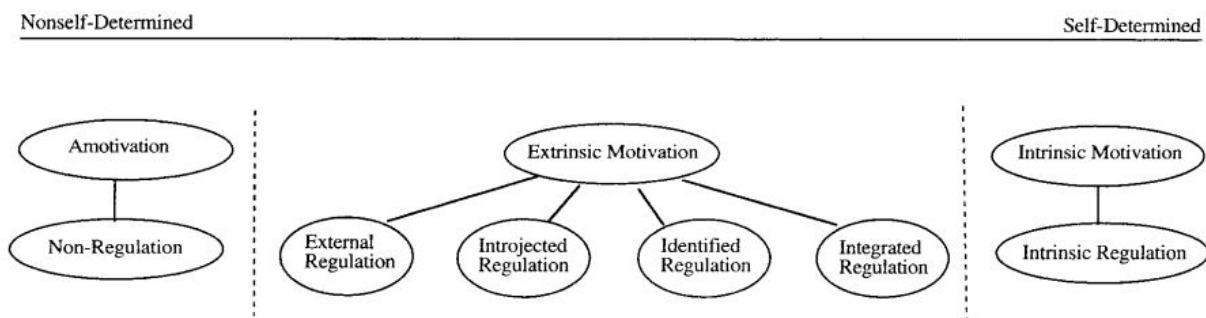


Figure 2. The self-determination continuum showing types of motivation and the corresponding regulation of behaviour. Adjusted reprint from “Self-determination theory and the facilitation of intrinsic motivation, social development and well-being” by R. M. Ryan and E. L. Deci, 2000, *American psychologist*, 55, p72.

Controlled and autonomous motivation. Motivated behaviour is autonomous to the extent that it is one’s own choice to engage in it, whereas it is controlled to the extent to which the behaviour is motivated by compliance or defiance (Deci et al., 1991; Ryan & Deci, 2000). Behaviour which is motivated entirely autonomous corresponds to the concept of intrinsic motivation whereas behaviour which is fully controlled by external factors, corresponds to the concept of extrinsic motivation. The extent to which a student experiences autonomous and controlled motivation is associated with their age (Fazey & Fazey, 2001; Martinek, Hofmann, & Kipman, 2016). Within a first-year undergraduate sample, Fazey & Fazey (2001) found that younger students experienced significantly higher levels of controlled motivation in comparison to mature students, who report higher levels of autonomous motivation. With regard to the concept of perceived locus of causality,

autonomous motivated behaviour is concerned with a locus of causality located internal to the self, whereas in controlled behaviour this is located externally (Deci et al., 1991).

Controlled motivation comprises both external and introjected regulation. Externally regulated behaviour is engaged in to comply with a demand, gain a reward or avoid punishment. In other words, it refers to behaviour with an external locus of causality. Introjected regulation of behaviour is driven by the desire to gain an internal reward (e.g. pride) or to avoid internal punishment (e.g. guilt). Even though the motivator is internalized to a degree, there is no actual choice involved (Deci et al., 1991; Ryan & Deci, 2000).

Autonomous motivation constitutes identified regulation and intrinsic motivation (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). In identified regulation of behaviour, the goal is personally valued and is engaged in willingly because it serves a certain instrumental purpose. Intrinsically motivated behaviour is fully internalized and therefore engaged in out of the inherent satisfaction of the activity itself (Deci et al., 1991; Ryan & Deci, 2000).

Basic psychological needs. The SDT assumes that people are innately motivated to internalize behaviour. The success of this internalization process depends on one's competencies (Ryan & Deci, 2000) as well as his social context. The contextual conditions, or basic psychological needs, that have been identified to facilitate the internalization are competence, autonomy (or self-determination) and relatedness (Deci et al., 1991; Ryan & Deci, 2000). The need to feel competent involves the understanding of how to reach certain goals and the ability to perform the necessary actions to attain those goals. The need for relatedness refers to the development of secure relationships with other people (Deci et al., 1991) and the need for autonomy is concerned with choice and self-direction (Ryan & Deci, 2000) or, in other words, the capability to initiate and regulate one's own behaviour (Deci et al., 1991). As the social context is recognized as an important facilitator for internalization of behaviour (Deci et al., 1991; Ryan & Deci, 2000), support of the students' basic need for competence, relatedness and autonomy consequently facilitates autonomous motivation (Deci et al., 1991; Niemiec & Ryan, 2009; Ryan & Deci, 2000; Stroet et al., 2013).

Research Questions

Formative assessment strategies as proposed by Wiliam & Thompson (2007) are widely used by teachers as an instruction tool to support their students' learning process. This study aims at providing more insight into the relationship between the students' perceived use of different formative assessment strategies, the fulfilment of students' basic psychological needs and students' motivation by investigating a mediation model (see Figure 3, for

proposed model) within the context of nursing education. In this model, the relationship between the perceived use of different formative assessment strategies and motivation is mediated by students' basic psychological needs. The research question in this study is: *What is the mediating role of nursing students' basic psychological needs towards their perceived use of formative assessment strategies and their motivation?* To answer this question, the following research questions are proposed:

- Research question 1: How is the use of formative assessment strategies perceived by nursing students?
- Research question 2: What is the influence of the perceived use of formative assessment strategies on students' motivation?
- Research question 3: What is the influence of the perceived use of formative assessment strategies on the fulfilment of students' basic psychological needs?
- Research question 4: What is the influence of the fulfilment of students' basic psychological needs on students' motivation?
- Research question 5: Is the influence of the perceived use of formative assessment strategies on motivation mediated by the fulfilment of the students' basic psychological needs?

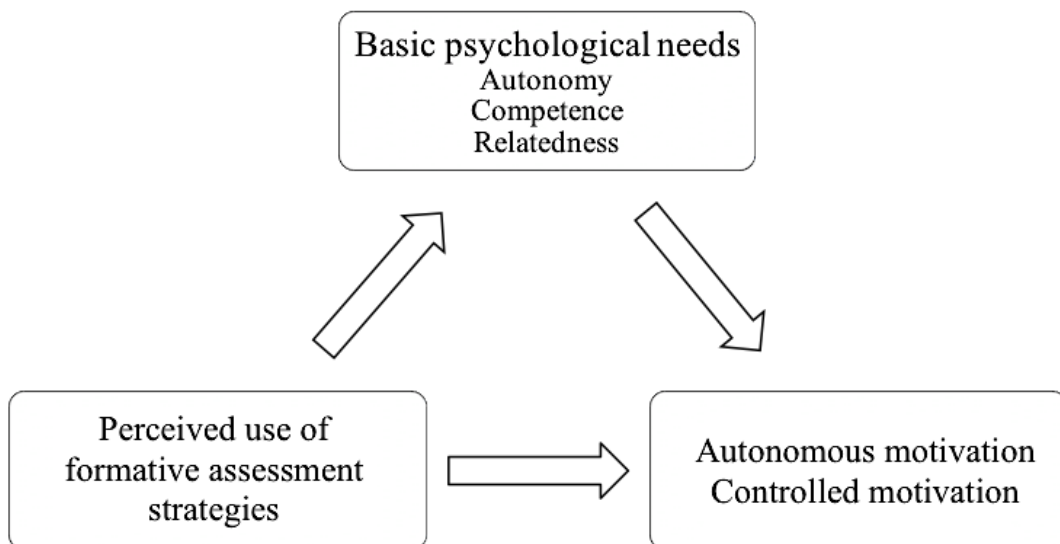


Figure 3. Proposed mediation model in which basic psychological needs mediate the relationship between perceived use of formative assessment strategies and motivation

Method

Research Design and Procedure

To answer the research questions, a quantitative study based on questionnaires was conducted. First, the reliability and usability of the instruments have been estimated in a pilot study. This pilot study was conducted with a convenience sample of 28 first-year students from the occupational therapy program ($N = 7$) and the real estate program ($N = 21$) of the same college as where the main study was conducted. The participants were on average 20 years old ($SD = 1.77$; range 17-23); 50% were female. Most participants reported HAVO (64%) or MBO (29%) as prior education. These students anonymously filled in the questionnaires and provided feedback on the usability of the questionnaires, which took approximately 40 minutes. Based on feedback of the participants, it was decided to flip the answer scales of the questionnaires in the main study so that a higher number on the scale represents 'more' agreement with the item, as to provide a more intuitive experience.

The main study was conducted in a sample of 118 nursing students of a college in the Netherlands. This nursing program is exemplary for its explicit use of formative assessment strategies in its renewed curriculum, in which weekly formative assessment exercises have been incorporated. The participants were selected by convenience sampling, as all students present in class were asked to participate. One student refused to participate due to privacy reasons. The main study was carried out during the final lesson in a series of four 'theoretical weeks' (in contrast to other 'skills weeks') within a specific course, so that the students had experienced all formative assessment that would be practiced within the theoretical weeks of the course. During these theoretical weeks, attendance was not mandatory. All 10 classes of first year students were visited by the researcher, who was first introduced by the teacher and then explained the purpose of the study to the students. Next, all students received an information sheet about the study, the paper-based questionnaires and an informed consent form. The researcher as well as the teacher were present during the time the respondents anonymously filled in the questionnaires, which took approximately 20 minutes.

Instrumentation

Perceived use of formative assessment strategies. To measure the perceived use of formative assessment strategies, a questionnaire has been developed by using the *Questionnaire Formative Assessment Student* (Wolterinck, n.d.) as a foundation. This questionnaire is based on the validated *Assessment for Learning Audit Instrument* (AfLAI; Lysaght & O'Leary, 2013), which is used to assess teachers. The AfLAI reflects the formative assessment strategies, as proposed by Wiliam & Thompson (2007; Figure 1). The

items used from this questionnaire were adjusted to fit the current context and sample. To assure the current questionnaire addressed all aspects of the formative assessment strategies, 29 additional items were developed regarding the formative assessment strategies, inspired by a teacher guide on formative assessment by Wylie & Lyon (2013). This resulted in a pilot questionnaire consisting of 49 items on a 5-point Likert scale ranging from 1 (completely not true) to 5 (completely true), and 10 open questions.

Based on the results of the pilot study, principal component analysis indicated a three- or six component model. However, it was decided to use the five-component model instead ($R^2 = 59.4$) as the three and six components were not univocally interpretable and Wiliam & Thompsons' (2007) theory indicates a five-component model. Initial reliability analyses of the scales, with all 49 items included, yielded strong Cronbach's alpha's ranging between .74 - .93. However, as item reduction was necessary from a practical standpoint, items were deleted based on their Cronbach's alpha if item deleted and item-total correlations, until a maximum of seven items per scale remained. This resulted in five scales with alpha's ranging between .75 - .95. The principal component analysis indicated the remaining items divided over five components accounted for 67,6% of variance.

Additionally, as all open questions in the pilot study evoked short answers which did not yield much insight, it was decided to include only two open questions at the end of the questionnaire in the main study. Both questions concerned the experience of formative assessment in general, whereas in the pilot study two open questions were allocated to each of the formative assessment strategies specifically. As it was decided these two open questions would only serve an evaluative function for the college, the results were not included in the analyses of the main study.

The item reduction procedure resulted in a 31-items questionnaire, which was used in the main study. Seventeen of these items originated from the *Questionnaire Formative Assessment Student* (Wolterinck, n.d.). The 31 items were divided over the five scales corresponding to the formative assessment strategies as proposed by Wiliam & Thompson (2007; Figure 1): six items on learning intention and criteria for success, seven items on learning tasks, seven items on teacher feedback, five items on peer feedback and six items on self-assessment. The descriptive results are reported in Table 1 and the scale correlations are reported in Table 2. The questionnaire as it was used in the main study is included in Appendix C.

Motivation. To assess the students' perceived control, a Dutch version of the validated *Self-Regulation Questionnaire – academic*, an adapted version of the Academic

Self-Regulation Questionnaire (SRQ-a) by Ryan & Connell (1989), was used. This self-report questionnaire consists of 16 items, divided over four scales, with each scale corresponding to a different type of motivation; external regulation, introjected regulation, identified regulation and intrinsic motivation. The items are scored on a 5-point Likert scale, ranging from 1 (completely not important) to 5 (very important). By averaging the scores on introjected and external regulation on the one hand and intrinsic motivation and identified regulation on the other, scores for controlled and autonomous motivation scales are obtained. The items were adapted, so they referred to students' motivation during the specific course.

In the pilot study, the SRQ-a yielded strong reliability scores for the controlled and autonomous motivation scales. In accordance with the theory, the scree plot clearly indicated two components ($r = -.24$, $p = .221$), which together accounted for 40,4% of variance. The descriptive statistics are reported in Table 1. The questionnaire as it was used in the main study is included in Appendix D.

Psychological need satisfaction. To examine the extent to which the students' basic psychological needs are fulfilled, an adapted and Dutch version of the validated *Basic Psychological Need Satisfaction and Frustration Scale* (BPNSFS; Chen et al., 2015) was used. It consists of 23 items, divided over six scales, with three scales corresponding to the frustration and three to the satisfaction of the basic needs; autonomy, relatedness and competence. The items are scored on a 5-point Likert scale, ranging from 1 (completely not true) to 5 (completely true). The items were adapted, so they referred to students' basic psychological needs during the specific course. The descriptive results are reported in Table 1 and the and the scale correlations are reported in Table 3. The questionnaire as it was used in the main study is included in Appendix E.

Data Analysis

First, the data were screened for missing data, which were not identified. Outliers were not identified as it was deemed possible to score only 1's or 5's on all scales of the questionnaires. Moreover, all data were processed manually and no individual answer patterns were regarded as deviant.

To answer research question 1, paired t-tests were conducted for all 10 possible combinations of formative assessment strategies, to determine their relative perceived prevalence. Next, multiple linear regression analyses were performed using block-wise selection and the enter method, with age added as control variable, followed by all scales of the predictor variable. An oblimin rotation was used as most scales were weakly correlated. For research question 2, this analysis was conducted twice, for both autonomous and

controlled motivation as outcome variable and by using the five formative assessment strategies as predictor variables. For research question 3, the same analysis was performed for each of the three basic psychological needs (autonomy, relatedness and competence) as outcome variable and the five formative assessment strategies as predictor variables. For research question 4, two multiple regression analyses were conducted, for both autonomous and controlled motivation as outcome variable and with all three basic psychological needs as predictor variables. For all multiple regression analyses that yielded significant results, the coefficients of the model were consulted by means of post hoc analysis.

To investigate the mediation effect of research question 5, the five formative assessment strategies were combined into a single variable. Only the scales of students' basic psychological needs which yielded significant results in the regression analyses of both research question 3 and 4 were used as predictor variable. As outcome variable, only the type of motivation which yielded significant results in the regression analyses of both research question 2 and 4 was used as outcome variable. Simple linear regression analyses were performed using block-wise selection and the enter method, with age added as control variable in the first two analyses and the perceived use of formative strategies in the third analysis as well, followed by the predictor variable.

Table 1

Descriptive statistics of the perceived use of formative assessment strategies, students' motivation and students' basic psychological needs in pilot study

Construct	Scale	<i>M</i>	<i>SD</i>	α	Item-total <i>r</i>
Perceived use of formative assessment strategies	Success criteria	2.37	0.53	.75	.36 - .62
	Learning tasks	2.27	0.66	.80	.45 - .67
	Teacher feedback	2.66	0.80	.88	.52 - .82
	Peer feedback	2.79	1.05	.95	.84 - .91
	Self-assessment	3.35	0.98	.86	.63 - .78
Motivation	Autonomous	2.52	0.53	.87	.17 - .71
	Controlled	2.74	0.52	.84	-.24 - .70
Basic psychological needs	Autonomy	2.36	0.41	.59	.16 - .47
	Relatedness	1.93	0.81	.92	.69 - .80
	Competence	2.29	0.71	.82	.34 - .73

Table 2

Scale correlation matrix for perceived use of formative assessment strategies questionnaire in pilot study

	SC	LT	TF	PF	SA
Success criteria	1.00				
Learning tasks	.11	1.00			
Teacher feedback	.51**	-.09	1.00		
Peer feedback	.03	-.20	.19	1.00	
Self-assessment	.28	-.13	.44*	.65**	1.00

Note: SC = success criteria, LT = learning tasks, TF = teacher feedback, PF = peer feedback, SA = self-assessment, * $p \leq .05$ ** $p \leq .01$

Table 3

Scale correlation matrix of Basic Psychological Need Satisfaction and Frustration Scale in pilot study

	Autonomy	Relatedness	Competence
Autonomy	1.00		
Relatedness	.36	1.00	
Competence	.19	.39*	1.00

Note: * $p \leq .05$ ** $p \leq .01$

Results

Participants

The sample in the main study consisted of 118 first-year students of the nursing program at a college in the Netherlands. The participants were at average 19 years old (standard deviation [SD] = 2.9; range, 17-36); 86% female. As expected, homogeneity based on age was not confirmed for autonomous motivation, $F(13,104) = 2.132, p \leq .05$. Most participants reported HAVO (72%), VWO (11%) or MBO (11%) as their prior education. Homogeneity based on previous education was confirmed for all variables.

Quality of the Questionnaires

Perceived use of formative assessment strategies. The five scales together accounted for 64.0% of variance. The descriptive results are reported in Table 4 and the scale correlations are reported in Table 5.

Motivation. Reliability analyses yielded a weak statistic of .21 for the autonomous motivation scale. Based on the alphas if the items were deleted, their item-total correlation and the pattern matrix, it was decided not to include items 11 ('I work on my classwork because I want to learn new things') and 15 ('I work on my classwork because I enjoy doing my classwork') in the analyses of the main study. The two scales together, after removing

item 11 and 15, accounted for 35,4% of variance ($r = -.29, p \leq .01$). The descriptive results are reported in Table 4.

Basic Psychological Needs. The BPNSFS yielded strong reliability scores for the relatedness and competence scales. The autonomy scale yielded a weak reliability ($\alpha = .48$). Based on the alpha if the item would be deleted ($\alpha = .60$), its item-total correlation ($r = -.134$) and the content of the item ('I felt I had freedom and choice in the things I did') it was decided to remove item 1 from the questionnaire in the main study. In accordance with the theory, the scree plot indicated three components, which together account for 51,1% of variance. In the main study, the two scales together accounted for 47,5% of variance. The descriptive results are reported in Table 4 and the scale correlations are reported in Table 6.

Table 4

Descriptive statistics of the perceived use of formative assessment strategies, students' motivation and students' basic psychological needs in main study

Construct	Scale	<i>M</i>	<i>SD</i>	α	Item-total <i>r</i>
Perceived use of formative assessment strategies	Success criteria	3.21	0.91	.83	.53 - .72
	Learning tasks	3.43	0.83	.87	.57 - .78
	Teacher feedback	2.54	0.86	.89	.56 - .78
	Peer feedback	3.31	0.91	.93	.74 - .88
	Self-assessment	2.24	0.78	.82	.25 - .76
Motivation	Autonomous	2.27	0.52	.88	.46 - .70
	Controlled	2.07	0.38	.80	.15 - .61
Basic psychological needs	Autonomy	3.26	0.67	.77	.41 - .61
	Relatedness	4.18	0.66	.84	.39 - .72
	Competence	3.64	0.59	.80	.42 - .64

Table 5

Scale correlation matrix for perceived use of formative assessment strategies questionnaire in main study

	SC	LT	TF	PF	SA
Success criteria	1.00				
Learning tasks	.66**	1.00			
Teacher feedback	.66**	.58**	1.00		
Peer feedback	.33**	.28**	.43**	1.00	
Self-assessment	.33**	.29**	.42**	.21*	1.00

Note: SC = success criteria, LT = learning tasks, TF = teacher feedback, PF = peer feedback, SA = self-assessment, * $p \leq .05$ ** $p \leq .01$

Table 6

Scale correlation matrix of Basic Psychological Need Satisfaction and Frustration Scale in main study

	Autonomy	Relatedness	Competence
Autonomy	1.00		
Relatedness	.05	1.00	
Competence	.26**	.34**	1.00

*Note: * $p \leq .05$ ** $p \leq .01$*

Perceived Use of Formative Assessment Strategies

Paired t-tests were performed to compare all possible combinations of formative assessment strategies with each other, to investigate their relative perceived prevalence. These results, as reported in Table 7, show all but two pairs differ significantly from each other on a level of $p \leq .001$. These two pairs did not yield significant results; success criteria combined with peer feedback, $t(117) = 1.02, p = .309$, and learning tasks combined with peer feedback, $t(117) = 1.27, p = .207$. The assumptions of normality and normality of difference scores were met.

When relating these results of the paired t-tests to the mean scores of the perceived use of formative assessment strategies, as reported in Table 4, this indicates that both learning tasks and peer feedback were perceived most, although peer feedback scores did not significantly differ from those of success criteria. Self-assessment was perceived the least, followed by teacher feedback.

Table 7

Paired t-test scores for scales of perceived use of formative assessment strategies (research question 1)

	Success criteria	Learning tasks	Teacher feedback	Peer feedback	Self-assessment
Success criteria					
Learning tasks	3.31**				
Teacher feedback	9.94**	12.38**			
Peer feedback	1.02	1.27	8.80**		
Self-assessment	10.69**	13.46**	3.77**	10.85**	

*Note: for all paired t-tests, degrees of freedom (df) = 117, ** $p \leq .001$*

Influence of Formative Assessment Strategies on Motivation

Two multiple regression analyses were calculated to predict the students' autonomous and controlled motivation based on their perceived use of formative assessment strategies,

when controlling for age. The assumptions of normality, linearity, homoscedasticity and multicollinearity were met. For autonomous motivation, age yielded significant results, $F(1,116) = 10.02, p \leq .01$, with $R^2 = .08$ and adjusted $R^2 = .07$. The model including the scales of perceived use of formative assessment strategies also yielded significant results, $F(6,111) = 4.79, p \leq .001$ with $R^2 = .21$ and adjusted $R^2 = .16$. For controlled motivation, age alone did not yield significant results, but the addition of the scales of perceived use of formative assessment strategies did; $F(6,111) = 4.07, p \leq .001$ with $R^2 = .18$ and adjusted $R^2 = .14$. This indicates autonomous as well as controlled motivation are significantly predicted by the perceived use of formative assessment strategies and explain 21% and 18% of variance respectively when controlled for age. Age alone explains 8% of variance of autonomous motivation, which is a relatively small effect, and 13% of variance is predicted by the perceived use of formative assessment strategies, which is interpreted as a medium effect (Field, 2013). As shown in Table 8, post hoc analysis shows that only the predictor learning tasks had a significant, and negative, contribution to the prediction of students' autonomous motivation when controlling for age. For controlled motivation, only self-assessment has a significant contribution to its prediction, however, this relationship is positive.

Table 8

Two multiple regression models analysing perceived use of formative assessment strategies as predictor of students' autonomous and controlled motivation (research question 2)

Model	Scale	Autonomous motivation			Controlled motivation		
		<i>b</i>	<i>SE</i>	β	<i>b</i>	<i>SE</i>	β
1	Age	-.05**	.02	-.28	.00	.01	-.01
2	Age	-.05***	.02	-.29	-.01	.01	-.05
	Success criteria	.07	.07	.12	.00	.06	.01
	Learning tasks	-.17*	.07	-.28	.04	.06	.08
	Teacher feedback	-.06	.08	-.09	.08	.06	.17
	Peer feedback	-.08	.05	-.13	-.06	.04	-.15
	Self-assessment	-.04	.06	-.06	.15**	.05	.31

Note: unstandardized regression coefficients are reported, SE = Standard Error, * $p \leq .05$ ** $p \leq .01$ *** $p \leq .001$

Influence of Formative Assessment Strategies on Basic Psychological Needs

The students' basic psychological needs for autonomy, relatedness and competence were each regressed on the perceived use of formative assessment strategies (controlling for age). The assumptions of linearity, homoscedasticity and multicollinearity were met. The assumption of normality violated for both autonomy and relatedness (both Shapiro Wilk

values $p \leq .05$). However, as multiple regression does not require normal distributions (Moore, McCabe, & Graig, 2009), no further actions were taken. Only autonomy; $F(6,111) = 7.69, p \leq .001$ with $R^2 = .29$ and adjusted $R^2 = .26$, yielded significant results. Both relatedness; $F(6,111) = 0.92, p = .481$ with $R^2 = .05$ and adjusted $R^2 = .00$, and competence; $F(6,111) = 1.59, p = .156$ with $R^2 = .08$ and adjusted $R^2 = .03$, did not. Age did not yield significant results in the prediction of either three variables. This indicates only autonomy as a basic psychological need is significantly predicted by the perceived use of formative assessment strategies, which explains 29% of variance and can be interpreted as a large effect (Field, 2013). As shown in Table 9, post hoc analysis shows both success criteria and teacher feedback have a significant positive relationship with students' autonomy.

Table 9

Multiple regression model analysing the perceived use of formative assessment strategies as predictor of students' basic psychological need for autonomy (research question 3)

Model	Scale	<i>b</i>	<i>SE</i>	β
1	Age	.02	.02	.09
2	Age	.01	.02	.02
	Success criteria	.18*	.09	.24
	Learning tasks	-.07	.09	-.09
	Teacher feedback	.23*	.09	.30
	Peer feedback	.09	.07	.13
	Self-assessment	.06	.08	.07

Note: unstandardized regression coefficients are reported, * $p \leq .05$

Influence of Basic Psychological Needs on Motivation

Two multiple regression analyses were calculated to predict students' autonomous motivation and controlled motivation based on students' basic psychological needs, when controlling for age. The assumptions of normality, linearity, homoscedasticity and multicollinearity were met. As in research question 1, age only significantly predicts autonomous motivation, $F(1,116) = 10.02, p \leq .01$, with $R^2 = .08$ and adjusted $R^2 = .07$. The model including students' basic psychological needs yielded significant results for the prediction of autonomous motivation as well; $F(4,113) = 4.96, p \leq .001$ with $R^2 = .15$ and adjusted $R^2 = .12$. For controlled motivation, students' basic psychological needs did not yield significant results; $F(4,113) = 1.85, p = .124$ with $R^2 = .06$ and adjusted $R^2 = .03$. This indicates only autonomous motivation is significantly predicted by students' basic

psychological needs. The model explains 15% of variance when controlling for age, which is a medium effect, and 7% of variance on its own, which can be interpreted as a relatively small effect (Field, 2013). As shown in Table 10, post hoc analysis shows autonomy has a significant and negative relationship with students' autonomous motivation, when controlling for age.

Table 10

Multiple regression model analysing students' basic psychological needs as predictor of students' autonomous motivation (research question 4)

Model	Scale	<i>b</i>	<i>SE</i>	β
1	Age	-.05**	.02	-.28
2	Age	-.05**	.02	.27
	Autonomy	-.15*	.07	-.19
	Relatedness	-.09	.07	-.11
	Competence	-.06	.08	-.07

Note: unstandardized regression coefficients are reported, * $p \leq .05$ ** $p \leq .01$

Mediation effect of Basic Psychological Needs on Relation Between Formative Assessment Strategies and Motivation

As the perceived use of formative assessment strategies yielded significant results in the prediction of both autonomy and autonomous motivation, and autonomy yielded significant results in the prediction of autonomous motivation in the previous analyses, a mediation model was proposed in which the effect of the perceived use of formative assessment strategies on students' autonomous motivation is mediated by students' autonomy. For this analysis, the five scales of formative assessment strategies, of which most correlate sufficiently (see Table 3 for correlations), were combined into one ($M = 2.94$, $SD = 0.65$).

Mediation was tested following the steps outlined by Frazier, Tix and Baron (2004). First, students' autonomous motivation was regressed on the perceived use of the formative assessment strategies combined (controlling for age, $b = -.05$, $p \leq .01$), which yielded significant results, $b = -.26$, $p \leq .01$. Next, students' basic need for autonomy was regressed on the perceived use of the formative assessment strategies combined (controlling for age, $b = .13$, $p = .368$, BCa CI [-0.03 – 0.03]), which also yielded significant results, $b = .53$, $p \leq .001$, BCa CI [0.36 – 0.67]. For both analyses, the assumptions of linearity and

homoscedasticity were met. As the assumption of normality was violated for autonomy, bootstrapping was used in the second analysis.

A third multiple regression analysis was conducted to assess the relation between students' autonomy and their autonomous motivation (controlling for both age and the perceived use of formative assessment strategies combined). As the analysis yielded a non-significant effect for students' autonomy, $b = -.06$, $p = .468$, this indicates the effect of the perceived use of formative assessment strategies combined on students' autonomous motivation is not mediated by students' basic need for autonomy. The assumptions of normality, linearity, homoscedasticity and multicollinearity for this analysis were met. The main results of the mediation analysis are summarized in Figure 4.

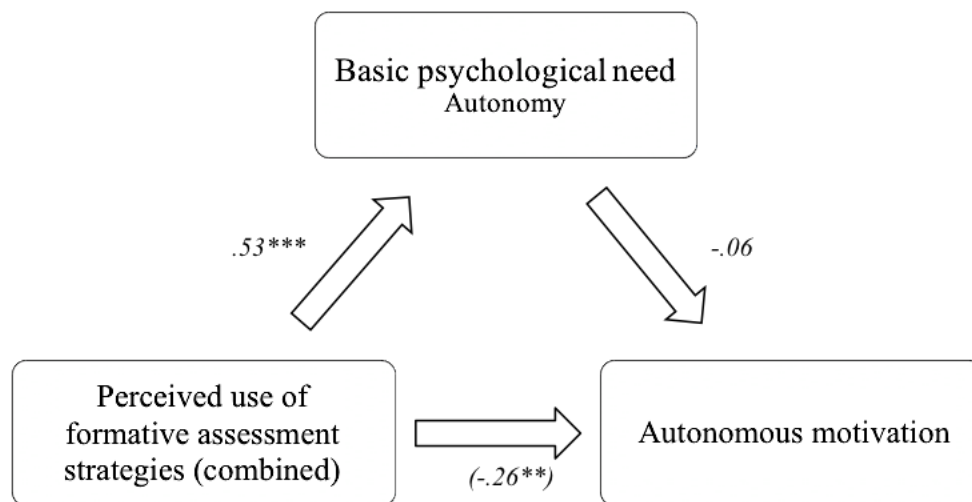


Figure 4. Results of mediation analyses (research question 5), unstandardized regression coefficients are reported, ** $p \leq .01$ *** $p \leq .001$

Discussion

Formative assessment has been recognized as one of the most effective instruments to facilitate nursing students' learning and has shown to contribute to the fulfilment of student' basic psychological needs. According to the self-determination theory, the fulfilment of student' basic psychological needs facilitates the internalization of behaviour and autonomous motivation. However, little is known about the mechanisms behind the effectiveness of formative assessment strategies and the way it contributes to motivation or the fulfilment of the basic psychological needs. Moreover, the use of formative assessment within the context of nursing education is understudied. The present study proposed a mediation model in which the effect of the perceived use of formative assessment strategies on motivation is mediated by the fulfilment of basic psychological needs. This model was

studied with a sample of college nursing students. Even though some mutual relations between the constructs in the model have been confirmed, a mediation effect was not found.

First, the nursing students' perceived use of formative assessment strategies was examined. This analysis showed learning tasks, peer feedback and success criteria have been perceived the most, followed by teacher feedback and self-assessment. As there are weekly formal learning tasks scheduled in the new curriculum, aimed specifically at formative assessment (they are even referred to as 'formative moments'), and teachers are instructed to explicitly remind the students of the learning goals and success criteria during class each week, this could explain why students report having perceived much of these formative assessment strategies. Moreover, since the assignments of the course during which the study was conducted mostly concern small formative group assignments, this could explain why the students have reported perceiving much peer feedback and less self-assessment, as the latter would typically be applied to individual performance.

Second, the effect of the perceived use of formative assessment strategies on motivation was studied. In line with previous research, nursing students' motivation, both autonomous and controlled, was predicted by the perceived use of formative assessment strategies (Cauley & McMillan, 2010; Dochy et al., 1999; Elliott & Higgins, 2005; Ryan & Deci, 2000). However, in post hoc analyses for both types of motivation, just one formative assessment strategy significantly contributed to their prediction. For autonomous motivation this concerned learning tasks, which showed a negative relationship to the outcome variable. This indicates that the more students perceive formative learning tasks aimed at improving their understanding, the less autonomous motivation they report. For controlled motivation, only self-assessment significantly contributed to the prediction, which means the more students perceive the use of self-assessment, the more controlled motivation they report. A possible explanation for these findings is that the students were left no choice but to engage in the learning tasks and self-assessment activities, which were most likely initiated by the teacher and might not have deemed relevant to the students themselves. This absence of choice in the matter suppressed their sense of autonomy, which is associated with reduced autonomous motivation (Stroet et al., 2013).

Third, the effect of the perceived use of formative assessment strategies on the fulfilment of students' basic psychological needs was studied. This relationship was only confirmed for autonomy, which supports Cauley & McMillan's (2010) findings on how the use of formative assessment strategies fulfils the need for autonomy. The post hoc analysis showed only significant positive relationships for both success criteria and teacher feedback,

which means that the more students perceive the clarification of success criteria and the use of teacher feedback, the more autonomy they report. This finding contradicts Black & Williams' (2009) emphasis on peer-feedback and self-assessment as being the main contributors for autonomy. However, as suggested before, the current sample might have experienced a suppression of their autonomy in relation to these activities (Stroet et al., 2013). In support of the current findings, offering a rationale for learning activities and behaviour, such as clarifying success criteria and providing teacher feedback, supports students' autonomy and internalization for these activities as it helps them understand why it is useful and worth their effort (Reeve, 2009).

The perceived use of formative assessment strategies did not yield significant results with concern to the need for relatedness and competence. In their meta-analysis, Stroet et al. (2013) found that students' feelings of competence are enhanced when structure is provided, which is defined as providing guidance, encouragement and informational feedback. In turn, relatedness is concerned with the interpersonal relationships between students and with their teachers, which entails the perceived involvement, dependability and affection. Both competence and relatedness are positively associated with motivation and engagement (Stroet et al., 2013). Possibly, the formative assessment strategies have not provided the students with these elements of structure and relatedness sufficiently as to have a significant effect on their fulfilment. Further investigation into supporting the needs for competence and relatedness by means of formative assessment strategies is therefore indicated.

Fourth, the effect of the fulfilment of students' basic psychological needs on motivation was studied. This relationship was found for autonomous motivation. The post hoc analysis shows only autonomy has a significant and negative contribution to the prediction of autonomous motivation, which means the more students' need for autonomy is supported, the less autonomously motivated they feel. This finding is not in line with previous research, which strongly indicates autonomy is positively related to autonomous motivation (Cauley & McMillan, 2010; Dochy et al., 1999; Elliott & Higgins, 2005; Ryan & Deci, 2000). Why this relation was not found is, therefore, open to further scrutiny and would be a recommendation for future research.

Finally, the mediation effect of the basic psychological need for autonomy on the relationship between the perceived use of formative assessment strategies combined and autonomous motivation was studied. However, this effect was not found.

A first issue of concern is the timing of the study. From a methodological standpoint, it was decided to question the students about their experiences during the course in the last

class meeting, the week before they would have their exam. However, both students' motivation and the fulfilment of their basic psychological needs dependent on environmental events, which influence their motivation. For example, deadlines and pressured evaluations diminish feelings of autonomy and undermine intrinsic motivation because they conduce towards an external perceived locus of causality (Gagné & Deci, 2005; Ryan & Deci, 2000). In this light, the reported motivation and basic psychological needs scores might not be fully representative of the students' experiences during the course, due to the rapidly approaching exam date. In support of this, participants' autonomous and controlled motivation scores both average on the left side of the 5-point Likert scale, which appears rather low. To avoid this possible effect, taking control measures at an earlier point in time and within the same sample could be considered to control for timing.

The BPNSFS and the SRQ-a, both extensively validated questionnaires, explained a relatively small amount of variance in the current study and items from both questionnaires have been removed during this research as they weakened the scales' reliability and coherence. Both questionnaires were adapted to fit the nursing program curriculum. However, based on the results in the current study, it could be questioned whether they should have been adapted more thoroughly, for example by also taking the nursing students sample into account. Furthermore, the questionnaire on formative assessment has been developed especially for this study and has therefore not been reviewed or validated yet. Even though a pilot study has been conducted and all scales report solid Cronbach's alphas, not all mutual correlations are sufficient. Until the reliability and validity of the questionnaire have been confirmed, the actual quality remains unclear.

Another limitation of the design was that, even though the nursing program places a strong emphasis on formative assessment in their renewed curriculum, they have only started this program as of the current school year. This means the teachers have only had a short period to get familiar with the use of formative assessment strategies before the study was conducted. Even though this study shows the students have clearly recognized the use of formative assessment strategies by their teachers, their effect on the fulfilment of their basic psychological needs and motivation might not yet have reached its full potential. For example, teachers may be missing opportunities to maximize formative impact (Yorke, 2003). However, when teachers have developed more awareness of their formative actions, this can contribute to their ability to reflect on their performance (Yorke, 2003). Moreover, when they have had more time to become proficient in applying formative assessment strategies, they will be able to use them more purposeful within the classroom setting

(Bennett, 2011). In turn, this could result in larger effect on the fulfilment of the nursing students' basic psychological needs and their motivation.

Furthermore, the nature of the relation the teachers have established with the students, their interaction and communication skills, their view on formative assessment strategies and their experienced stress levels all influence the frequency by which they use formative assessment strategies and the way they implement them in their teaching (Cowie & Bell, 1999; Yorke, 2003). On the other hand, the students' perception of the ability and credibility of the teacher also affects the impact and effectiveness of feedback (Polous & Mahony, 2008), and might even have a larger effect on their motivation and engagement than the actual teaching behaviour. However, the actual teaching also has a meaningful effect, as previous research has shown that students taught by different teachers tend to differ more in terms of motivation than students who were taught by the same teacher (Stroet et al, 2003). As in the current study some classes were taught by multiple teachers during the course while others were only taught by one, it was not possible to investigate the teacher effect with respect to the perceived use of formative assessment strategies. However, it is recommended that future studies take the teacher into account when studying the effect of the use of formative assessment strategies.

This study has added to the scientific body of knowledge with concern to formative assessment strategies, basic psychological needs and motivation in general, as well as to the understanding of the specific mechanism between these constructs within the nursing context. Moreover, the results suggest the effectiveness of the use of formative assessment strategies depends on the proficiency of the teachers in applying these strategies in the classroom as well as by the beliefs of the teachers and students with concern to these formative assessment strategies. By educating teachers on using these formative assessment strategies in a manner that is perceived as constructive and supportive of the students' basic psychological needs and motivation, formative assessment strategies have the potential to enhance the nursing students' learning process.

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Appendix A: FETC form

A. Formulier aanvraag goedkeuring ethische commissie

Deel 1 Samenvatting onderzoek

Onderzoeksvragen of hypothesen van het onderzoek
<p>Onderzoeksvraag: Hoe wordt het gebruik van formatieve toetsing ervaren door de studenten en op welke manier beïnvloed het de voldoening van hun psychologische basisbehoeften en hun motivatie?</p> <p>Hierbij wordt verwacht dat de studenten die meer formatieve toetsing ervaren, ook meer voldoening van hun psychologische basisbehoeften en meer motivatie rapporteren. Daarnaast wordt een positieve beoordeling van de studenten over de formatieve toetsing verwacht.</p>
Onderzoeksmethode – type onderzoek met onderbouwing
<p>Er zal gebruik worden gemaakt van een mixed design. Eerst zullen de studenten vragenlijsten invullen over formatieve toetsing die ze ervaren in de les, in hoeverre er aan hun psychologische basisbehoeften wordt voldaan en in hoeverre ze motivatie voor het vak ervaren. Vervolgens zal de ervaring van de formatieve toetsing en de invloed ervan op de psychologische basisbehoeften en motivatie verder worden geëxploreerd door een aantal studenten te interviewen over het onderwerp.</p>
Onderzoeksmethode – respondenten
<p>Kruis aan, wie zijn de respondenten?</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> 18 jaar of ouder en wilsbekwaam; <input type="checkbox"/> 18 jaar of ouder en wilsonbekwaam; <input checked="" type="checkbox"/> 12 t/m 17 jaar en in staat tot het geven van geïnformeerde toestemming; <input type="checkbox"/> 12 t/m 17 jaar en niet in staat tot het geven van geïnformeerde toestemming; <input type="checkbox"/> jonger dan 12 jaar. <p>Het onderzoek zal worden uitgevoerd onder alle 1^e jaars studenten van de opleiding verpleegkunde van de Hogeschool Rotterdam. Deze groep bestaat uit 325 studenten met een leeftijd van 17-19 jaar. Aangezien niet iedereen in de les aanwezig zal zijn (deze is niet verplicht) en er ook een deel niet zal willen meedoen aan het onderzoek, wordt verwacht dat het uiteindelijke sample voor het kwantitatieve gedeelte van het onderzoek uit ongeveer 150 respondenten zal bestaan. Al deze studenten zullen een informed consent aangeboden krijgen om te tekenen. Alleen van de vragenlijsten waarbij het informed consent is getekend, zal de data worden gebruikt.</p> <p>Aan alle respondenten zal ook gevraagd worden of ze bereid zijn tot een interview. Voor het kwalitatieve gedeelte van het onderzoek wordt een sample van 12 respondenten beoogd.</p>
Onderzoeksmethode – dataverzameling
<p><u>Vragenlijsten</u></p> <ol style="list-style-type: none"> 1) Om te meten welke formatieve toetsing er volgens de respondenten in de lessen zijn gebruikt, zal een aangepaste versie van de <i>Questionnaire Formative Assessment Student</i> (Wolterinck, z.j.) gebruikt worden. Deze vragenlijst is gebaseerd op de Assessment for Learning Audit Instrument (AfLAI; Lysaght & O’Leary, 2013), die wordt gebruikt voor docenten. De originele vragenlijst bestaat uit 5 schalen, waarvan er 4 van toepassing zijn op formatieve toetsing. Deze vier schalen samen bestaan uit 21 items die gescoord worden op een 5-punt Likertschaal van 1 (altijd) tot 5 (nooit). De schalen betreffen de volgende onderwerpen: ‘delen van leerdoelen en succes criteria’, ‘bevragen en discussies in de klas’, ‘feedback’ en ‘peer- en zelfassessment’. De items zullen worden aangepast zodat ze verwijzen naar de ervaren formatieve toetsing binnen het vak. 2) Om te meten in hoeverre er aan de psychologische basisbehoeften van de respondenten is voldaan, zal de <i>Basic Psychological Need Satisfaction and Frustration Scale</i> (Chen et al, 2015) gebruikt worden. Deze vragenlijst bestaat uit 24 items, verdeeld over 6 schalen die overeen komen met de verzadiging en frustratie van de drie basisbehoeften; autonomie, competentie en betrokkenheid. De items worden

gescoord op een 5-punts Likertschaal van 1 (helemaal onwaar) tot 5 (helemaal waar).

- 3) Om de motivatie van de respondenten te meten zal de *Self-Regulation Questionnaire – Academic* gebruikt worden. Dit is een aangepaste versie van de *Academic Self-Regulation Questionnaire (SRQ-a)*; Ryan & Connell, 1989). Deze vragenlijst bestaat uit 16 items, verdeeld over 4 schalen; externe regulatie, geïntrojecteerde regulatie, geïdentificeerde regulatie en intrinsieke motivatie. De items worden gescoord op een 5-punts Likertschaal van 1 (heel onbelangrijk) tot 5 (heel belangrijk). De items zullen worden aangepast, zodat ze verwijzen naar de ervaren motivatie binnen het vak.

Interviews

De participanten zullen bevestigd worden over de formatieve toetsing die ze hebben ervaren in het vak en hun mening hierover, als ook over de invloed die het heeft op hun gevoel van autonomie, competentie, betrokkenheid en motivatie.

De dataverzameling brengt geen risico's met zich mee voor de participanten.

Onderzoeksmethode – verwerking gegevens

Kwalitatieve data

Om de onderzoeksvraag te beantwoorden zal gebruik worden gemaakt van enkelvoudige en eventueel ook een meervoudige regressieanalyse.

De vragenlijsten zullen anoniem worden ingevuld en achteraf worden voorzien van een respondentnummer. Hiermee zal de data vervolgens worden verwerkt en opgeslagen.

Kwantitatieve data

Door middel van het coderen van de interviews zal de data worden geanalyseerd. Hierbij zullen de interview topics als begincodering worden gebruikt, waarna specificering mogelijk is op basis van de inhoud van de data.

De studenten die bereid zijn om een interview te doen, zullen aan het einde van de vragenlijst gevraagd worden om hun emailadres in te vullen in de vragenlijsten. Het is nodig om de kwantitatieve data aan de participanten van de kwalitatieve data te kunnen koppelen, zodat het sample van de kwalitatieve data met betrekking tot de ervaren formatieve toetsing kan worden vastgesteld. Vervolgens zal het formulier met het emailadres worden verwijderd en zal de vragenlijst een willekeurig respondentnummer toegewezen krijgen. Zodoende is de data niet langer te herleiden tot de participanten die zijn geïnterviewd.

Deel 2 Ethische toetscriteria

1. Belasting proefpersonen/ invasiviteit (max. 3 punten)	
Belasting proefpersonen/ invasiviteit moet niet té of onredelijk hoog zijn	Er is sprake van een hogere mate van belasting/invasiviteit, naarmate: <ul style="list-style-type: none"> • er meer (merkbaar of onmerkbaar) gevraagd van proefpersonen, in termen van: <ul style="list-style-type: none"> - activiteit - moeite - persoonlijke/privacy-gevoelige informatie - confrontatie - pijn - misleiding/achterhouden informatie
<i>a. Risico-inschatting</i> In hoeverre is dit punt van toepassing/aan de orde in het voorgesteld onderzoek?	1a. Niet van toepassing.
<i>b. Risico-dekking</i> Hoe anticipeer je op deze risico's in het voorgestelde onderzoek? Denk aan a) spaarzaamheid in de opzet van het onderzoek (niet meer gegevens dan noodzakelijk), b) nette procedures tijdens uitvoering (bijv. briefing, debriefing, beloning van personen etc.)	1b. De participanten krijgen voor aanvang duidelijk uitgelegd wat er van ze verwacht wordt. Er zal voor dit onderzoek niet naar persoonlijke gegevens gevraagd worden en alle data zal anoniem verwerkt worden. De participanten ontvangen geen beloning voor deelname.

2. Informatievoorziening en toestemming (max. 3 punten)	
Informatievoorziening en toestemming van proefpersonen moet voldoende en juist zijn	Grotere zorgvuldigheid op het gebied van informatievoorziening en toestemming is vereist naarmate: <ul style="list-style-type: none"> • de belasting/invasiviteit groter is • proefpersonen zelf kwetsbaarder zijn (bijv. in termen van leeftijd, geestelijke of lichamelijke toestand, afhankelijkheid)
<i>a. Risico-inschatting</i> In hoeverre is dit punt van toepassing/aan de orde in het voorgesteld onderzoek?	2a. Niet van toepassing
<i>b. Risico-dekking</i> Hoe anticipeer je op deze risico's in het voorgestelde onderzoek? Denk aan zorgvuldige (actieve/passieve) informed consent procedure onder proefpersonen en/of (wettelijke) vertegenwoordigers of betrokkenen	2b. De participanten krijgen een informed consent aangeboden voorafgaand aan deelname aan het onderzoek.

3. Gegevens (max. 3 punten)	
3. Gegevens moeten vertrouwelijk en veilig worden behandeld en opgeslagen	Grotere zorgvuldigheid op het gebied van omgang met gegevens is vereist naarmate: <ul style="list-style-type: none"> • informatie gevoeliger/persoonlijker is • danwel op bepaalde manieren consequenties zou kunnen hebben wanneer dit niet veilig
<i>a. Risico-inschatting</i> In hoeverre is dit punt van toepassing/aan de orde in het voorgesteld onderzoek?	3a. Niet van toepassing
<i>b. Risico-dekking</i> Hoe anticipeer je op deze risico's in het voorgestelde onderzoek? Denk aan zorgvuldige procedure en structuur voor opslag van ruwe en verwerkte data (bijv. conform data protocol FSW)	3b. De data zal anoniem verwerkt worden.

4. Data verzameling (max. 1 punt)	
4. Data verzameling moet noodzakelijk en voldoende relevant zijn	Grotere zorgvuldigheid op het gebied van dataverzameling is vereist naarmate: <ul style="list-style-type: none"> • steekproef minder representatief en/of kleiner is • de (precieze) uit te voeren analyses van de gegevens nog onduidelijk of onbepaald zijn • de mate en soort van opbrengst en/of waarde voor het wetenschappelijk of maatschappelijk veld beperkt of nog onduidelijk is
<i>a. Risico-inschatting</i> In hoeverre is dit punt van toepassing/aan de orde in het voorgesteld onderzoek?	4a. Niet van toepassing
<i>b. Risico-dekking</i> Hoe anticipeer je op deze risico's in het voorgestelde onderzoek? Denk aan: - sample onderzoek, kans op uitval (attrition), generalisatie waarde, - pilots, bepalen van analysestappen, analyse modellen en poweranalyse om te zien of er voldoende (maar ook niet veel, zie 1) gegevens worden verzameld - inschatting gebruik onderzoeksrapport, impact op wetenschap/veld, plannen van valorisatie-activiteiten	4b. Er wordt verwacht dat de sample voldoende groot is voor de analyses die zullen worden uitgevoerd. Welke analyses dit zijn, is vooraf bekend. Het rapport zal met name gebruikt worden door de Hogeschool Rotterdam, in het evalueren van het gebruik van formatieve toetsing in het curriculum van het 1 ^e jaar van de opleiding verpleegkunde. Ook het Platform Leren van Toetsen zal het rapport gebruiken; ze voegen het toe aan hun onderzoeksdatabase en zullen het wellicht gebruiken als basis voor vervolgonderzoek.

Appendix B: Confirmation form

FETC – Academic Professional 2016 – 2017

Beoordelingsformulier Aanvraag goedkeuring ethische commissie	
Datum: 15 februari 2016	Naam student: Martine Kohlen
Beoordeeld door: Sylvia Peters	Eindcijfer: 5,5

1. Belasting proefpersonen/ invasiviteit (max. 3 punten)	Aantal punten
<i>a. Risico-inschatting</i> In hoeverre is dit punt van toepassing/aan de orde in het voorgesteld onderzoek?	0
<i>b. Risico-dekking</i> Hoe wordt geanticipeerd op deze risico's in het voorgestelde onderzoek?	1
<i>Opmerkingen</i> De risico's worden niet voldoende gesignaleerd, maar er wordt in voldoende mate ingespeeld op de risico's.	

2. Informatievoorziening en toestemming (max. 3 punten)	Aantal punten
<i>a. Risico-inschatting</i> In hoeverre is dit punt van toepassing/aan de orde in het voorgesteld onderzoek?	1
<i>b. Risico-dekking</i> Hoe wordt geanticipeerd op deze risico's in het voorgestelde onderzoek?	1
<i>Opmerkingen</i> De risico-inschatting over de belasting rond de informatievoorziening is tamelijk beperkt bij de doelgroep van het onderzoek. Er wordt een informed consent procedure voorgesteld.	

3. Gegevens worden vertrouwelijk en veilig behandeld en opgeslagen (max. 3 punten)	Aantal punten
<i>a. Risico-inschatting</i> In hoeverre is dit punt van toepassing/aan de orde in het voorgesteld onderzoek?	1
<i>b. Risico-dekking</i> Hoe wordt geanticipeerd op deze risico's in het voorgestelde onderzoek?	1
<i>Opmerkingen</i> De informatie is in beperkte mate privacy-gevoelig. De data wordt geanonimiseerd. Over de opslag wordt verder geen informatie toegevoegd.	

4. Data verzameling moet noodzakelijk en voldoende relevant zijn (max. 1 punt)	Aantal punten
<i>a. Risico-inschatting</i> In hoeverre is dit punt van toepassing/aan de orde in het voorgesteld onderzoek?	0,5
<i>b. Risico-dekking</i> Hoe wordt geanticipeerd op deze risico's in het voorgestelde onderzoek?	
<i>Opmerkingen</i> De dataverzameling is beperkt tot een bepaalde doelgroep. De representativiteit wordt voorafgaand aan de dataverzameling gecontroleerd. Er wordt melding gemaakt van de wetenschappelijke en praktische implicaties.	

Appendix C: Perceived Use of Formative Assessment Strategies

1	2	3	4	5	
Helemaal niet waar	Niet echt waar	Soms waar/ Soms niet waar	Beetje waar	Helemaal waar	
Tijdens de afgelopen vier kennisweken....					
1. Was de docent duidelijk over het doel dat hij/zij met het huiswerk en de opdrachten in de les wilde bereiken.	1	2	3	4	5
2. Waren de eisen waaraan mijn huiswerk en opdrachten in de les moesten voldoen gekoppeld aan de leerdoelen.	1	2	3	4	5
3. Waren de eisen waar mijn huiswerk en opdrachten in de les aan moesten voldoen duidelijk.	1	2	3	4	5
4. Zijn de eisen waaraan mijn huiswerk en opdrachten in de les aan moesten voldoen expliciet met mij gedeeld.	1	2	3	4	5
5. Heeft de docent de leerdoelen in begrijpelijke taal uitgelegd.	1	2	3	4	5
6. Is er tijd besteed aan het bespreken van de leerdoelen.	1	2	3	4	5
7. Stelde de docent vragen om informatie te krijgen over mijn voorkennis over een onderwerp.	1	2	3	4	5
8. Stelde de docent mij open vragen die dieper denken bevorderden.	1	2	3	4	5
9. Zijn er werkvormen in de les gebruikt die dieper denken bevorderen.	1	2	3	4	5
10. Ging de docent verder op het onderwerp in als ik een verkeerd antwoord gaf.	1	2	3	4	5
11. Gebruikte de docent mijn antwoorden op zijn/haar vragen om op verder te bouwen in zijn/haar uitleg.	1	2	3	4	5
12. Stelde de docent mij open vragen die ervoor zorgde dat ik diep over de lesstof moest nadenken.	1	2	3	4	5
13. Kreeg ik voldoende tijd om een antwoord te formuleren op de complexere vragen die de docent mij stelde.	1	2	3	4	5
14. Maakte de feedback van de docent me duidelijk wat ik al had bereikt ten opzichte van het leerdoel	1	2	3	4	5

15. Vertelde de feedback van de docent wat de volgende stap voor mij was om het leerdoel te bereiken	1	2	3	4	5
16. Wist de docent wat mijn sterke en zwakke punten waren	1	2	3	4	5
17. Gebruikte de docent de informatie over mijn voortgang in zijn/haar feedback	1	2	3	4	5
18. Stimuleerde de docent mij na te denken over hoe ik verder zou moeten werken aan de opdrachten in de les	1	2	3	4	5
19. Bleek uit de feedback van mijn docent wat mijn volgende stap moest zijn in de opdracht	1	2	3	4	5
20. Was de feedback van mijn docent motiverend om verder te werken aan de opdracht	1	2	3	4	5
21. Vond ik de feedback die ik van mijn medestudenten kreeg bruikbaar	1	2	3	4	5
22. Vond ik de feedback die ik van mijn medestudenten kreeg kwalitatief goed	1	2	3	4	5
23. Heeft de feedback die ik van mijn medestudenten kreeg me verder geholpen om de stof te begrijpen	1	2	3	4	5
24. Heeft de feedback die ik van mijn medestudenten kreeg me verder geholpen bij het huiswerk en de opdrachten in de les	1	2	3	4	5
25. Vond ik de feedback die ik van mijn medestudenten kreeg waardevol	1	2	3	4	5
26. Heeft de docent mij gestimuleerd om mijn eigen voortgang bij te houden, bv. met een logboek	1	2	3	4	5
27. Heeft de docent mij gestimuleerd om mijn eigen huiswerk of eigen opdrachten in de les te beoordelen	1	2	3	4	5
28. Was er tijdens de les tijd gereserveerd voor het beoordelen van ons eigen huiswerk of onze opdrachten in de les	1	2	3	4	5
29. Vond ik het een waardevolle activiteit om mijn eigen huiswerk of eigen opdrachten in de les te beoordelen	1	2	3	4	5
30. Heeft het beoordelen van mijn eigen huiswerk of eigen opdrachten in de les me geholpen in het begrijpen van de lesstof	1	2	3	4	5
31. Heeft het beoordelen van mijn eigen huiswerk of eigen opdrachten in de les me geholpen om mezelf te verbeteren	1	2	3	4	5

Appendix D: SRL-a

1 Niet waar	2 Niet echt waar	3 Beetje waar	4 Waar
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Waarom maakte ik mijn huiswerk tijdens de afgelopen vier kennisweken?

1. Ik deed mijn huiswerk, omdat ik wilde dat de docent mij een goede leerling vond.	1	2	3	4
2. Ik deed mijn huiswerk, omdat ik in de problemen kwam als ik het niet deed.	1	2	3	4
3. Ik deed mijn huiswerk, omdat het leuk was.	1	2	3	4
4. Ik deed mijn huiswerk, omdat ik mij slecht voelde als ik het niet deed.	1	2	3	4
5. Ik deed mijn huiswerk, omdat ik het onderwerp wilde begrijpen.	1	2	3	4
6. Ik deed mijn huiswerk, omdat dit van mij verwacht werd.	1	2	3	4
7. Ik deed mijn huiswerk, omdat ik hier plezier aan beleefde.	1	2	3	4
8. Ik deed mijn huiswerk, omdat het voor mij belangrijk was.	1	2	3	4

Waarom deed ik het werk in de klas tijdens de afgelopen vier kennisweken?

9. Ik deed het werk in de klas, zodat de docent niet boos op mij werd.	1	2	3	4
10. Ik deed het werk in de klas, omdat ik wilde dat de docent mij een goede leerling vond.	1	2	3	4
11. Ik deed het werk in de klas, omdat ik graag nieuwe dingen wilde leren.	1	2	3	4
12. Ik deed het werk in de klas, omdat ik mij zou schamen als ik het niet af had.	1	2	3	4
13. Ik deed het werk in de klas, omdat het leuk was.	1	2	3	4
14. Ik deed het werk in de klas, omdat dat een regel was.	1	2	3	4
15. Ik deed het werk in de klas, omdat ik hier plezier aan beleefde.	1	2	3	4
16. Ik deed het werk in de klas, omdat ik het belangrijk vond.	1	2	3	4

Waarom probeerde ik moeilijke vragen in de klas te beantwoorden tijdens de afgelopen vier kennisweken?

- | | | | | |
|---|---|---|---|---|
| 17. Ik probeerde moeilijke vragen in de klas te beantwoorden, omdat ik wilde dat andere leerlingen mij slim vonden. | 1 | 2 | 3 | 4 |
| 18. Ik probeerde moeilijke vragen in de klas te beantwoorden, omdat ik mij schaamde als ik het niet zou proberen. | 1 | 2 | 3 | 4 |
| 19. Ik probeerde moeilijke vragen in de klas te beantwoorden, omdat ik hier plezier aan beleefde. | 1 | 2 | 3 | 4 |
| 20. Ik probeerde moeilijke vragen in de klas te beantwoorden, omdat dit van mij verwacht werd. | 1 | 2 | 3 | 4 |
| 21. Ik probeerde moeilijke vragen in de klas te beantwoorden, om erachter te komen of ik de stof beheerste. | 1 | 2 | 3 | 4 |
| 22. Ik probeerde moeilijke vragen in de klas te beantwoorden, omdat dit leuk was. | 1 | 2 | 3 | 4 |
| 23. Ik probeerde moeilijke vragen in de klas te beantwoorden, omdat dit voor mij belangrijk was. | 1 | 2 | 3 | 4 |
| 24. Ik probeerde moeilijke vragen in de klas te beantwoorden, omdat ik wilde dat de docent aardig tegen me was. | 1 | 2 | 3 | 4 |

Waarom deed ik mijn best op school tijdens de afgelopen vier kennisweken?

- | | | | | |
|---|---|---|---|---|
| 25. Ik deed mijn best op school, omdat dat van mij verwacht werd. | 1 | 2 | 3 | 4 |
| 26. Ik deed mijn best op school, zodat de docenten mij een goede leerling vonden. | 1 | 2 | 3 | 4 |
| 27. Ik deed mijn best op school, omdat ik hier plezier aan beleefde. | 1 | 2 | 3 | 4 |
| 28. Ik deed mijn best op school, omdat ik problemen krijg als ik dit niet deed. | 1 | 2 | 3 | 4 |
| 29. Ik deed mijn best op school, omdat ik mij slecht voel als ik dit niet deed. | 1 | 2 | 3 | 4 |
| 30. Ik deed mijn best op school, omdat ik het belangrijk vond. | 1 | 2 | 3 | 4 |
| 31. Ik deed mijn best op school, omdat ik trots op mezelf was als ik het goed deed op school. | 1 | 2 | 3 | 4 |
| 32. Ik deed mijn best op school, omdat ik misschien een beloning kreeg als ik het goed deed. | 1 | 2 | 3 | 4 |

Appendix E: BPNSFS

1	2	3	4	5
Helemaal niet waar	Niet echt waar	Soms waar/ Soms niet waar	Beetje waar	Helemaal waar

Tijdens de afgelopen vier kennisweken....

- | | | | | | |
|--|---|---|---|---|---|
| 1. Voelde ik me uitgesloten uit de groep waar ik bij wilde horen. | 1 | 2 | 3 | 4 | 5 |
| 2. Voelde ik me gedwongen om veel oefeningen te doen waar ik zelf niet voor zou kiezen. | 1 | 2 | 3 | 4 | 5 |
| 3. Had ik ernstige twijfels of ik oefeningen wel goed kon doen. | 1 | 2 | 3 | 4 | 5 |
| 4. Voelde ik me nauw verbonden met klasgenoten die belangrijk voor me zijn. | 1 | 2 | 3 | 4 | 5 |
| 5. Had ik het gevoel dat de oefeningen aansloten bij wat ik zelf zou willen. | 1 | 2 | 3 | 4 | 5 |
| 6. Voelde ik me onzeker over mijn vaardigheden. | 1 | 2 | 3 | 4 | 5 |
| 7. Had ik de indruk dat de klasgenoten waarmee ik tijd doorbracht een hekel aan me hadden. | 1 | 2 | 3 | 4 | 5 |
| 8. Had ik er vertrouwen in dat ik de oefeningen goed kon doen. | 1 | 2 | 3 | 4 | 5 |
| 9. Voelde ik me verplicht om te veel oefeningen te doen. | 1 | 2 | 3 | 4 | 5 |
| 10. Voelde ik dat de klasgenoten waar ik om geef, ook geven om mij. | 1 | 2 | 3 | 4 | 5 |
| 11. Voelde ik me in staat om mijn doelen te bereiken. | 1 | 2 | 3 | 4 | 5 |
| 12. Had ik het gevoel dat de manier waarop ik les kreeg, was zoals ik zelf ook wil. | 1 | 2 | 3 | 4 | 5 |
| 13. Voelde ik dat de relaties die ik met klasgenoten had slechts oppervlakkig zijn. | 1 | 2 | 3 | 4 | 5 |
| 14. Voelde ik me bekwaam in wat ik deed. | 1 | 2 | 3 | 4 | 5 |
| 15. Voelde ik me onder druk gezet om bepaalde dingen te doen. | 1 | 2 | 3 | 4 | 5 |
| 16. Voelde ik me teleurgesteld in veel van mijn prestaties. | 1 | 2 | 3 | 4 | 5 |
| 17. Voelde ik me verbonden met de klasgenoten die om mij geven en waar ik ook | 1 | 2 | 3 | 4 | 5 |

om geef.

- | | | | | | |
|--|---|---|---|---|---|
| 18. Voelden de meeste oefeningen en opdrachten die ik deed aan alsof 'ze moesten'. | 1 | 2 | 3 | 4 | 5 |
| 19. Voelde ik dat ik moeilijke taken met succes kon voltooien. | 1 | 2 | 3 | 4 | 5 |
| 20. Had ik het gevoel dat klasgenoten die belangrijk voor mij zijn koud en afstandelijk waren tegen mij. | 1 | 2 | 3 | 4 | 5 |
| 21. Voelde ik dat wat we deden in de les me oprecht interesseerde. | 1 | 2 | 3 | 4 | 5 |
| 22. Voelde ik me als een mislukkeling omwille van de fouten die ik maakte. | 1 | 2 | 3 | 4 | 5 |
| 23. Had ik een warm gevoel bij klasgenoten waarmee ik tijd doorbracht. | 1 | 2 | 3 | 4 | 5 |