Contingent support in 1-on-1 interactions: Is there a relationship between studentperception and contingent support?

Ilja Amperse

University of Utrecht

Masterthese

Educational Design and Consultancy, University of Utrecht

student: C. Amperse (3466299)

First Assessor: dr. J.E. van de Pol (until 10th of January, 2014)

First Assessor: B.E. Vaessen, MSc (after 10th of January, 2014)

Second Assessor: dr. M.F. van der Schaaf

Submission date: 31st of January 2014

Abstract

There is more focus on adaption to students' educational needs in Dutch education**.** When support (in 1-on-1 interactions) is adapted to the students' academic ability it can be called contingent. However, students' perception can influence the effectiveness of the support. Empirical research about contingent support is scarce and is never compared to students' perception before. Therefore, in this study the relationship between observations of and the students' perceptions on the contingency of support will be investigated. 99 interactions from 33 teacher-student pairs were used to measure the contingency of the given support. These observations were compared to a questionnaire, which were both based on the contingent shift framework. Each student (*N*=33) filled in a questionnaire on their opinion about the support they did receive from the teacher to which they were paired with. The findings of the selected interactions were compared with the findings of the questionnaire, by conducting a Spearman Rho's correlation. Because of the results of the factor-analysis, a condition with one factor and a condition with three factors were conducted. The results show that none of the conditions were significant, and no nameable correlations between the students' perception and the observed interactions were found in this study. Therefore, no relationship between student perception and contingency in 1-on-1 interactions is found. Future research should focus on the validity of the used instruments and the construct of contingency in the questionnaire.

*Keywords***:** Contingency, student perception, 1-on-1 teacher student interaction, support, contingent shift framework

Introduction

In recent years, there is more attention for addressing the diverse needs of individual students and maximizing the learning opportunity for each individual student (i.e. differentiation). In this context the Dutch Ministry of Education, Culture and Science (2005; 2009) announced 'passend onderwijs' as a recalibration for the care of individual (special needs) students in Dutch education. Summarized, *passend onderwijs* implies the attention for individual needs and making sure every student in Dutch education is entitled to the maximum achievable learning opportunity. In the academic year of 2011-2012 the Dutch Inspectorate of Education (2013) examined the degree of differentiation in schools in the run for *passend onderwijs*. Adapting education to the differences in development of students occurs in six out of ten examined primary schools. The differentiated support and instruction is at pre-vocational schools very poor. On average, 25% of the teachers are differentiating their instruction (Dutch Inspectorate of Education, 2013). Also Reezicht (2012) concludes that more attention for differentiated support is needed because the quality of support in Dutch schools has stagnated.

Van de Pol and Elbers (2013) investigated the adapted support in teacher-student interaction at Pre-Vocational schools. When support is adapted to or contingent upon the students' academic understanding, support is considered effective for student learning. Contingent support is about the adaption of the degree of control the teacher offers which is consistent to the students' academic understanding (Van de Pol & Elbers, 2013). Thus, contingency means a good estimation of the students' academic needs and giving the appropriate amount of support (degree of control). But teachers often overestimate students' understanding, so the support that is been given by the teacher is not contingent upon the students' understanding. When that happens the student does not get the customized support

that he or she needs, and the support will not be effective for this individual student (Van de Pol & Elbers, 2013).

To improve the adaptive support in pre-vocational schools, more research about (how to achieve) contingent support in pre-vocational schools must be done. There is already some evidence that contingent support is effective in promoting student learning (e.g., Van de Pol & Elbers). Yet, varying evidence about the effectiveness of scaffolding (and therefore contingency) is found. As has been said Van de Pol and Elbers (2013) already investigated contingent support in Pre-vocational schools and from their study we know that it is important for a teacher to understand what the students' academic understanding is, otherwise giving support that is contingent upon the students' understanding is hard to achieve. However, it is also known that instruction might only be effective when students experience the instruction as effective, and that can be an explanation for the varying evidence on the effectiveness of contingency. According to Shuell (1996) student perception is proven to be important for the effectiveness of teacher-student interaction. But there is no empirical knowledge about the comparison between students' perceptions of contingency and the observed contingency of support. That's why in this study I aim to find out if there is a relationship between the students' perception of the given support and the observations of the given support itself. Also, this study contributes to the validation of the instruments developed by Van de Pol (2013).

Theoretical Framework

Differentiation

Differentiation is defined by Tomlinson and colleagues (2003) as "an approach to teaching in which teachers proactively modify curricula, teaching methods, resources, learning activities,

and student products to address the diverse needs of individual students and small groups of students to maximize the learning opportunity for each student in a classroom" (p. 121).

The identification of educational needs, which is necessary to differentiate instruction, is usually based on student characteristics. For this identification Tomlinson and colleagues (2003) make a distinction between three main student characteristics which are important for differentiation: (1) student readiness, (2) learning profile, and (3) the student interest. When teachers have identified these characteristics for each student and set differentiated goals, they can differentiate for example by content, process or product (Prast, Van de Weijer-Bergsma, Kroesbergen & Van Luit, in preparation). Carolan and Guinn (2007) indicated that teachers feel resistance for differentiating instruction because of the difficulties of differentiation; they feel like they do not have enough time to offer differentiated education for each student. But according to Carolan and Guinn (2007) most of the teachers already differentiate their education, without knowing. For example, when a boy loves to play with cars they already explain the sum three minus one as three cars at the parking and then one car has to leave, but they do not recognize it as differentiation. According to Carolan and Guinn (2007) it is a myth that the whole organisation of education has to change before it is possible to differentiate within a classroom.

Scaffolding and Contingency

Differentiating within a classroom can be done by scaffolding, which implies that through teacher-student interaction differentiated support can be provided to achieve or accomplish a certain task of particular purpose, when the student can't complete the task on his own without support (Davis & Miyake, 2004; Wood, Bruner & Ross, 1976). This can be done by providing differentiated support by academic level, the students' learning style, interest or students' perception (Davis & Miyake, 2004). Stone (1998) highlights the importance of

interaction during scaffolding. According to Stone (1993) scaffolding is an interactive process between a teacher and a student, where both of them are active participants.

Based on Stone's approach, Van de Pol, Volman and Beishuizen (2010) developed a conceptual model of scaffolding. In this model three main characteristics are important: Contingency, fading and transfer of responsibility. Support that is given can be contingent or non-contingent. The contingent support implies that the support that is been given to the student is adapted upon the students' current academic ability, and the right amount of control is given (Van de Pol, & Elbers, 2013). The support that is given by the teacher can also be non-contingent, then the adaptation upon the students' current academic understanding is not right or a wrong amount of control is used for this student. Table 1 shows these different contingency patterns.

Table 1

Contingency Patterns (Van de Pol & Elbers, 2013).

		Increase of control (Control +)	Decrease of control (Control –)
Non-contingent support	Students' initial understanding is: Teacher ….. students' understanding Degree of challenge: Learning:	good underestimates too little challenge no learning	poor/partial overestimates too much challenge no learning
Contingent support	Students' initial understanding is: Teacher ….. students' understanding Degree of challenge: Learning:	poor/partial correctly estimates appropriate learning	good correctly estimates appropriate learning

Note. The table is a part of the existing table used in Van de Pol and Elbers (2013)

As can be seen in Table 1, when a teacher over- or underestimates the students' understanding while giving the support in teacher-student interaction, and the challenge that is been given does not fit with the students' initial understanding, the support will not be effective and no learning takes place. This is called non-contingent support (Van de Pol & Elbers, 2013). When non-contingent increase of control takes place, the teacher provides too little challenge.

The support that is been given by the teacher is at the level of his or her initial academic understanding; so no further learning takes place and the student stays at his or her academic understanding. Also a non-contingent decrease of control can take place. In this case the teacher overestimates the students' understanding. The teacher gives support at a too complex academic level for this student, the student needs more simplified support to make learning for this student possible (Van de Pol & Elbers, 2013).

When the amount of control and the adaption to students' academic ability is good, contingent learning can take place. The contingent shift principle (Van de Pol, Volman, Oort & Beishuizen, 2013) is one of the factors that influence contingent learning. The contingent shift principle implies that the teacher gives the appropriate amount of support (i.e. degree of control). For example, when a student doesn't understand the matter well, the teacher gives more control. When the student does understand the matter, the teacher gives less control. Besides the degree of control, also not over- or underestimating the educational needs or the student while identifying it and giving the student the right amount of challenge, are the factors that can make sure that the support is contingent. When the support can be called contingent, learning is assumed to take place.

According to Ruiz-Primo and Furtak (2007) contingency in teaching is rare. It is hard for teachers to identify the students' academic understanding, and use that information in teacher-student interaction. The identification of students' academic ability is crucial in contingent teaching, because the judgement of students' initial understanding decides which support is been given to the student, and the support determines whether learning takes place.

Student perception

Based on the contingent shift principle it can be concluded that contingent support is effective. However, students' perceptions are very important to the effectiveness of the support in 1-on-1 teacher-student interactions (Shuell, 1996):

> The manner in which the learner perceives, interprets and processes information in the instructional situation (including the content being learned and the social context in which the instruction occurs) is more important than the actions of the teacher in determining what the student will learn. Ultimately, it is the perception of the student, not the intent of the teacher, which determined the effect that an instructional act has on the student's learning. (p. 734.)

More studies show that student perceptions are important in teacher-student interaction; an example is the work of Goodenow (1993). In his study he found that students' perceptions are predictors of the effectiveness of teacher support.

Also Fauth and his colleagues (2013) studied the importance of student perceptions in the classroom. This study (Fauth et al., 2013) showed that the relationship between student and teacher is a very important predictor of student adjustment. A good relationship between student and teacher (in a supportive climate) will give more positive students' perceptions. This means that when students' perception is important for the contingency of support, also the relationship of the teacher and the student will be important. Conversely, this may also mean that when a teacher is giving support according the students' perception, the student will be more motivated, interested and activated, which possibly will lead to better learning (Fauth et al., 2013).

According to Fauth and colleagues (2013) and the Gates Foundation (2012), research on student ratings is very useful and relevant in the current educational policy context. This

because there is more use of student ratings to monitor teaching practices. A problem for this research is that the psychometric properties (i.e. validity) of the instruments that are used in this kind of research are not always tested well (Gates Foundation, 2012).

Validity

Van de Pol, Elbers and Beishuizen (2012) developed an instrument to measure contingency in teacher-student interaction, which is based on the model of contingent teaching. Because there are not many instruments that measure contingency in teacher-student interaction, more research with this instrument must be done to determine the validation of this new measurement instrument. It is very important determine the validity of a research-instrument, because a not properly tested instrument can cause a threat to construct validity of the research. A threat to construct validity indicates that when an instrument does not have a proper construct validity the instrument may not measure the construct you want to measure. In that case, other variables can have some influence on your measured construct (Messick, 1995; Robson, 2002).

Robson (2002) defines validity as following: "Validity refers to the accuracy of a result. Does it 'really' correspond to the actual state of affairs? Are any relationships established in the findings 'true' or due to the effect of something else?" [p.100]. When conducting research it is important to find out if we are measuring what we want to know, in other words are the test results in accordance with the reality.

In this case also the convergent validity is important. Convergent validity refers to the extent to which instruments in different research are measuring the same, and outcomes or scores of instruments should therefor correspond (Cronbach & Meehl, 1955). It is important for new instruments to correspond in research, but in this case research on contingency in teacher-student interaction is very rare.

Wagner, Göllner, Helmke, Trautwein and Lüdtke (2013) investigated the construct validity of student perceptions and the generalizability of domain-independent assessment. According to Wagner and his colleagues (2013) the use of student ratings is more accepted in research on learning and instruction, but also the question arises if these ratings can be used as valid measures. In their study, they found that students' perceptions of instructional quality are useful for research in this field, but only for the dimensions of class management and class structure. According to Wagner and his colleagues (2013) more research on the validity of students' perception must be conducted.

Research Questions

Research on contingency in classrooms is still in its infancy (Van de Pol & Elbers, 2013; Van de Pol, Elbers & Beishuizen, 2012). Also, varying evidence (Van de Pol & Elbers, 2013) on the effectiveness of scaffolding and contingency is found. Hence, more research on contingency in 1-on-1 interactions is necessary. The focus on the study is therefore to investigate the contingency of support in 1-on-1 teacher-student interactions.

From research we know that also students' perceptions in teacher-student interaction are important predictors of the effectiveness of the support that is been given by the teacher (Goodenow, 1993; Pianta, 1999; Shuell, 1996). There is no research conducted on students' perceptions of contingency. Therefore, in this study I also want to investigate the student perceptions on the given support. This study will find out if the contingency in teacher-student interaction is equivalent tot the extent to students' perception on the given support in teacher-student interaction. Therefore, the main research question arises:

RQ: *To what extent do observations of contingency of support (using the contingent shift framework) and students' perceptions of contingency of support correspond?*

To answer this research question the following sub questions need to be answered:

(1) To what extent is the observed support of teachers' contingent upon students' academic understanding?

(2) To what extent do students experience the teacher's support as contingent?

I expect that the observed support will not always be contingent. In research (Van de Pol, Volman & Beishuizen, 2010) it's found that the effectiveness of scaffolding (thus also contingency) is scarce. Also because of the dynamic nature and complexity of research on scaffolding, scaffolding is difficult to investigate (Davis & Miyake, 2004). However, Van de Pol (2013) developed instruments to measure the contingency of support (1-on-1 interactions) in Pre-vocational schools. Therefore, I assume that the support will not always be contingent upon students' academic understanding.

Probably, almost the same amount of contingent support that will be found in this study, also will be experienced as contingent. From research we know that students' perceptions are very important for the effectiveness of support (Goodenow, 1993; Pianta, 1999; Shuell, 1996). This probably means that students' perception and the contingency of support have are related. Thus, when the support is contingent, students probably experience the support also as contingent.

In this study, both instruments (questionnaire and observation-instrument) are based on the contingent shift framework of Van de Pol and Elbers (2012). Therefor, it is most likely that the convergent validity of this study is in accordance. To confirm the convergent validity of two instruments, the correlation must be as high as possible (1 is equal to each other). The

higher the correlation the more the two tests are in accordance (Field, 2009). When the convergent validity is adequate, it is more likely to find a positive relationship between the observations of contingency of support and the students' perceptions of contingency of support. Because of the corresponding instruments and the importance of student perceptions on support (Goodenow, 1993; Wagner, 2013), I assume that the correspondence between the observations on the contingency of support and the outcomes of the student questionnaires on student perceptions upon the contingency of support is $r_s \geq .30$ because of the sample size that is around the 30 participants in this study (Field, 2009).

Hypothesis: *The contingency of support in 1-on-1 interactions in Pre-Vocational schools and the students' perception on that support will correspond. This means that the outcomes of the correlations will be .30 or higher ($r_s \geq .30$).*

Method

Participants

The data (observations and questionnaires) that are used in this study is derived from the research that Van de Pol (2013) currently is conducting. In her research, 42 Teachers and 104 students from four different Pre-Vocational schools in the Netherlands voluntarily participated. For this study, three teachers and 33 students from three different Pre-vocational schools were randomly assigned.

The three teachers, that were randomly selected, were teachers from different Pre-Vocational schools ($N = 3$). Two out of three teachers were teaching mathematics and the other teacher taught biology. Also two out of three teachers are female and one teacher is male.

The students ($N = 33$) in this study were first grade students in Pre-Vocational Education from different schools ($N = 3$). The age of the students differed between 12 and 14

years old and the average student age was *M*=12,63 years *(*SD = .492). 17 students were boys and 15 students were girls, of one student the gender is unknown.

Design

A quantitative design has been used to investigate if there is any relationship between the contingent (or not contingent) support given by teachers in a 1-on-1 student teacher interaction and the students' perception on the contingency of the support that is given by the teacher. A questionnaire was used to perceive understanding on the students' perception on contingency of the received support in the 1-on-1 interactions. The students filled in a questionnaire on the teacher with whom they were paired with.

Observations of the 1-on-1 teacher-student interactions gave understanding on the contingency of the support. The lesson recordings took place during the lessons, which the selected teacher taught. Interactions from the selected teacher-student pairs during the lessons were randomly chosen to be coded and analysed.

Instruments

Observations of contingency.

For this study, lesson recordings which were conducted by Van de Pol (2013) were used. The lessons of four first grade classes from different Pre-Vocational schools (*N= 4*) were recorded for approximately one week. The interactions that were selected for this study were coded using the contingent shift framework (Van de Pol, Volman, Elbers & Beishuizen, 2012).

Table 2 represents the used coding scheme. As can be seen, for each interaction a student-code and a teacher-code is given. The comparison between the teacher-code and the student-code shows if the support was contingent, not contingent. Some combination of codes cannot tell us if the support was contingent or not contingent. This is de combination with the

dichotomous claims. When students use dichotomous claims (e.g. “yes”, “no”, “uhu”, “o.k.” etc.), the teacher cannot identify the educational needs, so it is impossible to tell if the support is contingent or not contingent.

Table 2

Coding scheme contingency observations

Studentcodes		Teachercodes			
Mode of expression	Level of understanding	Student regulation	Co-regulation	Teacher regulation	Giving Awnser
Claim dichotomous	Poor Good	Can not be determined			
Claim specific	Poor	NC	C	C	NC
	Good	C	NC	NC	C
Demonstration	Poor	NC	C	C	NC
	Good	C	NC	NC	C

Note.

NC = Non contingent

C = contingent

In Table 3 an explanation of the six codes that can be given to the students’ interaction as part of the 1-on-1 interaction is shown. In this case *dichotomous claims* are also coded when the student is not precise about what he or she doesn’t understand. For example, when they do or don’t understand “this” or “it”. *Specific claims* are given to the students’ interaction when the student tells the teacher what he or she doesn’t understand, and then the statement is specific.

The code *demonstration* is given when the student shows that he or she (don't) understands the matter.

Table 3

Explanation of the student-codes

Code	Example
Claim dichotomous	
Poor understanding	I don't understand it
Good understanding	Ah, o.k.
Claim Specific	
Poor understanding	I don't understand why -2 x -2 = 4
Good understanding	Now I understand why -2x-2 = 4
Demonstration	
Poor understanding	-2 x -2 = - 4, so …….
Good understanding	-2 x -2 = 4, right?

Also the teachers' interactions were scored as can be seen in the coding scheme in Table 2. In Table 4 below an explanation of the teacher-codes can be found. The codes are ordered from much regulation from the student and less teacher regulation to none regulation from the student and all teacher regulation.

Table 4

Explanation of the teacher-codes

Code	Example
Student-regulated	*T: Why do you think this is wrong?* *T: What do they ask us here?* The teacher is asking input from the student. Mostly the student comes with the right answer by himself with some guidance from the teacher.
Co-regulated	*T: Do you understand the matter now?* Teacher is explaining the matter to the student; both of them are giving almost the same amount of input. The teacher is guiding and continually checking if the student understands. The student is also asking questions and giving answers.
Teacher-regulated	*T: You need to read this part, and then you search for the answer. Here it is. The kidney is an organ. And then you write 'kidney' down.* High teacher control. The student doesn't get any space to give some input. The teacher is doing the task, says what the student's got to do and is facilitating the task.
Giving answer	*S: I don't understand this* *T: the answer is 7* The teacher gives immediately the answer to the student.

Note.

T = teacher

S= student

Per teacher-student duo, three interactions were randomly chosen to be coded. For each duo three contingency codes which resulted in a joint contingency code for the teacher-student interactions (0=none of the three interaction was contingent, 1 = one interaction was contingent, 2 = two interactions was contingent, 3 = all three interactions were contingent).

Students' perceptions on contingency of support

To determine the students' perception of the degree of contingency of the 1-on-1 support provided by the teacher, a questionnaire developed by Van de Pol (2013) is been used. This questionnaire consist 27 items on a five-point likert scale and measures one construct, namely contingency. The questions in the questionnaire are about the behaviour of the teacher in 1-on-1 interactions. For example, the question 'When I understand the matter very well, the teacher gives me another more difficult task' is part of the questionnaire.

The questionnaire is also based on the contingency patterns of Van de Pol, Volman, Elbers and Beishuizen (2012) and therefore comparable to the observations on contingency of support. The scales that are explained in Table 5, encode each question of the questionnaire. There are three contingent codes, which start with *C*. The three non-contingent codes start wit *NC*. The '+' or the '-' are showing the amount of control given by the teacher, + means more control and '-' means less control. When the teacher is giving less control, thus more student control, the teacher can walk away (wa) or he or she can provide more challenge (mc) for this student.

Table 5

Questionnaire codes based on contingency patterns

Scale	Example
C+	When I don't understand how I can complete the task, the teacher will help me and give me an example how I could complete it.
C- mc	When I understand the matter well, the teacher makes it a bit more difficult for me.
C- wa	When I am working on my own and I am doing well, the teacher is helping other students.
NC+	The teacher explains things to me that I already understand.
NC-wa	When I think the task is really difficult, the teacher is still not helping me to complete it.
NC-mc	While I still do not understand the matter, the teacher is making it more difficult for me.

Note. For this table contingency patterns are used. The contingency patterns are adapted from "Measuring scaffolding in teacher-small-group interactions" by J. Van de Pol, M. Volman, E. Elbers and J. Beishuizen, 2012. In R. Gillies (Ed.), *Pedagogy: New Developments in the Learning Sciences.* Hauppage: Nova Science Publishers.

C+ = contingent with more control

C- mc = contingent with less control, done by giving the student more challenge

C- wa = contingent with less control, done by walking away

NC+ = not contingent, but more control while the student understands it

NC-wa = not contingent, less control. The student needs to figure it out by itself

NC-mc = not contingent, less control. The student receives too much challenge, while not understanding it.

A factor analysis and a reliability analysis for the questionnaire were conducted. Because of the construct of contingency, it was expected that one factor would come out of the factor analysis, namely the degree of contingency.

Procedure

The data for both the observations on teacher-student interaction and the student questionnaires on student perception were already conducted by Van de Pol (2013). All the schools, teachers and students participated voluntarily. For this study a random selection out the four schools, 42 teachers, and 104 students has been done. Three teachers were randomly selected and were each paired with 11 students. A requirement for selecting pairs was that all the pairs had three or more teacher-student interactions.

Each lesson was recorded, with at least two cameras and some recording devices. The interactions in each lesson were selected and were cut from the recordings as single videos. The selected single videos were coded by the coding scheme in Table 2.

After the lesson recordings, the students who received support in teacher-student interaction were asked to fill in the questionnaire for each teacher. The questionnaires and the observations could not be anonymous, because the observations and the questionnaires had to be linked and compared afterwards.

Analysis

The results of this observational research (i.e. lesson recordings and questionnaires) were compared conduction a Spearman's Rho correlation coefficient. When the outcomes will correspond a high correlation (1 = completely corresponding, 0 = not corresponding) will appear (Field, 2009).

Results

The results of this study should give direction for assuming or rejecting the following hypothesis: *The contingency of support in 1-on-1 interactions in Pre-Vocational schools and the students' perception on that support will correspond. This means that the outcomes of the correlations will be .30 or higher ($r_s \geq .30$).*

A Factor analysis is conducted to see if there are more underlying variables in the construct contingency. The expectations of the factor analysis were one construct. Also a scree-plot (Figure 1) to see the amount of factors in the questionnaire is executed.

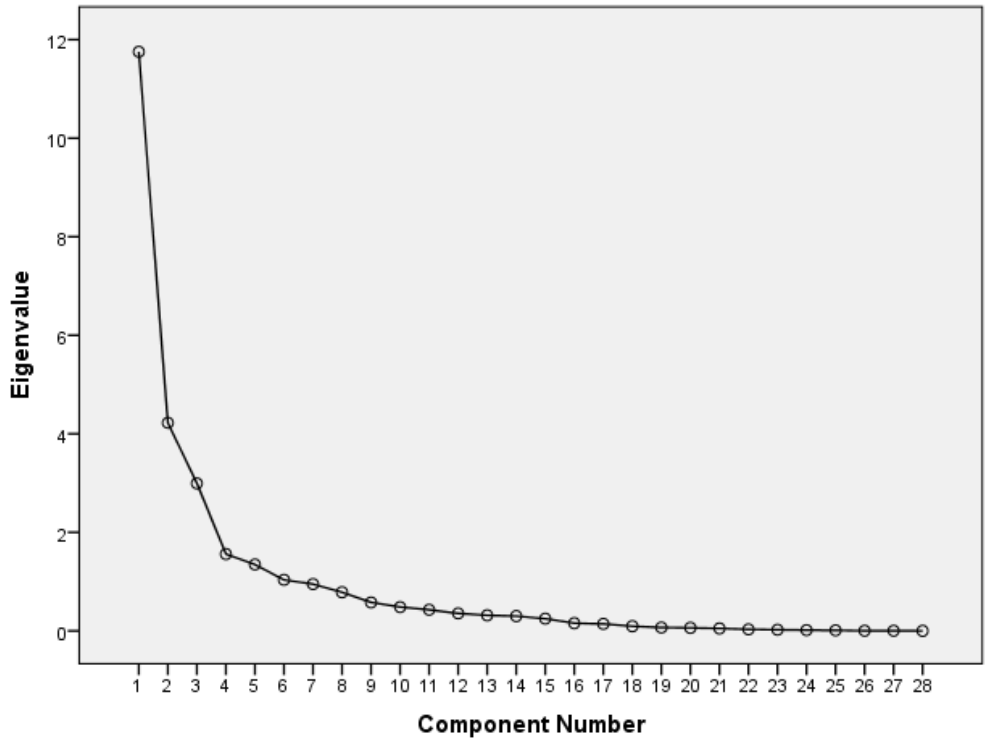

Figure 1. Scree-plot of the questionnaire on students' perception.

Based on the scree-plot the questionnaire consist three factors, when conduction a three factor analysis the factors that are shown in Table 6 appeared. Factor 1 (items *C+, C-wa, NC-mc* and *NC-wa*) had a reliability coefficient of .969, *NC+* (α = .711) and *C-MC* (α = .791) were items alone in a factor.

Table 6

Reliability coefficients of the factors

Scale	Items (*N*)	Example	Reliability coefficient (α)
Factor 1			.969
C+	*6*	When I don't understand how I can complete the task, the teacher will help me and give me an example how I could complete it.	
C- wa	*3*	When I am working on my own and I am doing well, the teacher is helping other students.	
NC-wa	*3*	When I think the task is really difficult, the teacher is still not helping me to complete it.	
NC-mc	*4*	While I still do not understand the matter, the teacher is making it more difficult for me.	
Factor 2			.804
C- mc	*5*	When I understand the matter well, the teacher makes it a bit more difficult for me.	
Factor 3			.853
NC+	*6*	The teacher explains things to me that I already understand.	

Note.

C+ = contingent with more control

C- mc = contingent with less control, done by giving the student more challenge

C- wa = contingent with less control, done by walking away

NC+ = not contingent, but more control while the student understands it

NC-wa = not contingent, less control. The student needs to figure it out by itself

NC-mc = not contingent, less control. The student receives too much challenge, while not understanding it.

Also a Cronbach's alpha for this questionnaire was conducted. The questionnaire showed a Cronbach's alpha of .924, before deleting items. It can be said that the Cronbach's *alpha* is excellent. Thus, all the items with low values (less than .3) on the item-total correlation should be removed (Field, 2009). After removing the reliability coefficient for contingency was .975.

From a statistical point of view, the items with values less than .3 should be removed. However, it appeared that all the items with C-MC and NC+ needed to be deleted. This means that only factor 1 would be left. This was a problem, because the theoretical construct of contingency was not matching with the statistical results after removing the items. Because the items C-MC and NC+ were both another factor than the scales in factor 1, it was decided to conduct a Spearman's Rho correlation on both situations to find out if there was any explanation for the results on the factor analysis and the analysis of reliability.

The Spearman's Rho correlation was conducted to find a correlation between the students' perception on the contingency of the teacher' support and the contingency of the support. One summarized score was used for the students' perception (questionnaire) and the observations resulted in a joint contingency code for the teacher-student interactions (0=none of the three interaction was contingent, 1 = one interaction was contingent, 2 = two interactions was contingent, 3 = all three interactions were contingent).

First an analysis was conducted where all factors were included. Analysis of the data indicated no strong consistency between the questionnaire on student perception and the observed support in 1-on-1 interactions with regard to contingency. There was no significant relationship between the student perception and the support itself, r_s= -.001; p (one-tailed) >.005.

Then, the Spearman's Rho correlation was conducted with the three different factors. As stated above, this was decided because of the outcomes of the factor and reliability analysis. The first factor did not show a significant relationship between the students' perception and the support in a 1-on-1 teacher-student interaction r_s= -.056; *p* (one-tailed) >.005. The second factor showed like the other factors not a significant result r_s= .165; *p* (one-tailed) >.005. The third and last factor also did not show any significant results. r_s= .020; *p* (one-tailed) >.005.

Table 7

Correlation between scores on the questionnaire about contingency and the contingency scores based on the observations, for both the single factor solution and the three factor solution.

Score op contingency	r_s	p
Single-factor	-0.00	0.50
3-factor solution		
Score on factor 1	-0.06	0.38
Score on factor 2	.17	0.18
Score on factor 3	.02	0.46

Conclusion and Discussion

In the section below the main findings of this study are described. Also the limitations of this research will be discussed, as well as suggestions for further research. Finally, some practical implications for this study will be explained.

The aim for this study was to find an answer to the research question: *To what extent do observations of contingency of support (using the contingent shift framework) and students' perceptions of contingency of support correspond?*

The study does not show a significant relationship between the observations of contingency in a 1-on-1 teacher-student interaction and the students' perception of the received support. This outcome does not confirm the study of Shuell (1996) in which students' perception affects the effectiveness of support given in a 1-on-1 student teacher interaction. No nameable correlations between the students' perception and the observed interactions were found in this study.

Because of the not significant results and the unconvincing correlations it is forced to neglect the hypothesis that there is a positive relationship between the students' perception and the contingency of the 1-on-1 interactions. When the correlations were $r_s \geq .30$ they would have been significant. All correlations were smaller than .30. That is why there is no relationship or correspondence between the student's perception about, and contingency of support. This means that in contrast to the study conducted by Shuell (1996) students' perception does not affect in any way the contingency of the support in 1-on-1 interactions and vice versa.

When conducting the factor-analysis, it appeared that the construct of contingency consisted of several variables. That wasn't expected, because in this study contingency was approached as a whole construct. Also in other studies contingency was explained as one

construct (Van de Pol & Elbers, 2013). It appeared after conducting the reliability analysis that the items which belong to *contingent and giving the student more challenge* (i.e. C-MC) and the items that belong to *not contingent giving the student too much support* (i.e. NC+) had to be deleted the construct. There is searched for a theoretical explanation, but none of the items were very different to the others. However, each of the items for NC+ and C-MU suggested that the competence of the student in that part was very high or even excellent. For example, *I understand it all, but the teacher is still helping me* (NC+) or *If I understand something really well, the teacher gives me a task with more challenge* (C-MC). To be confident that you are doing really well as a first grade pre-vocational student, it asks insight in own educational capabilities. It is possible that the students interpreted those questions different from each other, because of the very positive statements on their capabilities in the classroom. According to Cole, Martin, Peeke, Seroczynski and Fier (1999) the underestimation of academic success changes overtime. In their study (Cole et al., 1999) they found that the feeling of academic success tended to increase with grade level. Also the degree of confidence about students' academic ability is dependent on gender differences. Boys are feeling more confident about their academic success then girls (Cole et al., 1999). However, in this study the amount of boys (N=17) and girls (N=15) is almost the same. Thus, students may not score very high on the 5-point likert scale on those items because they did not think they are that successful. So, it is possible those items were affected by other variables, for instance insight in own academic capabilities.

Also a surprisingly high Cronbach's alpha was shown, this means that the internal consistence of the questionnaire was very high (Field, 2009). However, in this study the Cronbach's alpha of the questionnaire was .924 before deleting items. After deleting the items with a low value on the item-total correlation the questionnaire showed a Cronbachs alpha of .975. According to Tavakol and Dennick (2011) a very high Cronbach's alpha means that the

items have an extraordinary internal consistence. It may suggest that items with a higher *alpha* than .90 are the asking the same but in a different guise. It is important to review the questionnaire before using in future research.

Another potential explanation for the unconvincing results is the fact that the questionnaire was not linked to an individual interaction. The questionnaires were conducting somewhere during the week in which the video-observations at the specific school took place. In some of the situations the students have filled in the questionnaire before the selected interaction took place. Also, the items in the questionnaire were about the teacher's support in general and not about the specific selected interaction. However, it is likely that the interactions between the paired teacher and student are almost always similar in quality. Also, three interactions per teacher-student duo were analysed so it would be exceptional if all three of the interactions were different to the usual support in 1-on-1 interactions.

The correlation showed us a not significant result in the relationship between students' perception about the support, and the support in the 1-on-1 interactions itself. It is possible that a significant result did appear when a bigger sample size in this study was used (Field, 2009). In this study, 33 couples were used to see if there is any relationship between the students' perception and the support in 1-on-1 interactions. But from all those 33 couples, only three teachers were selected and each paired to eleven students. In future research, it would be recommended that more teachers were assigned. However, a bigger sample size gives no assurance for a significant result, it only would exclude that a not significant result is due to the sample size.

In this study, the observations and questionnaires of Van de Pol (2013) were used. Van de Pol is still executing her research and analysis at this point. This research will contribute to the validity of the instruments that were used. It is important for new instruments that the construct validity is correct (Cronbach & Meehl, 1955). Also in the context of

validity, when conducting research on students' perception it is important to take construct-irrelevant variances into account (Messick, 1995). This may explain the different factors in the factor-analysis. The reliability of students' perception depends on different aspects of construct validity, which need to be taken into account. Also the generalizability of students' perception is important, because every student, class and teacher is different from each other. To understand why the reliability analysis and the factor-analysis showed these results in this study, more research must be conducted. Another solution for a better construct validity, is using more different schools and teachers, and then the construct validity of the instruments is likely to be better.

For further research it is recommended that the questionnaire should be adjusted in order to get a better Cronbach's alpha and one factor in the factor-analysis. This can be done by changing the items and making sure they are not asking the same, but in different appearances. Also as stated above, more research on the construct-validity of the questionnaire must be excecuted.

References

Carolan, J. & Guinn, A. (2007). Differentiation: Lessons from master teachers. *Educational Leadership*, *64*, 44-47.

Cole, D. A., Martin, J. M., Peeke, L. A., Seroczynski, A. D., & Fier. J. (1999). Children's over- and underestimation of academic competence: A longitudinal study of gender differences, depression and anxiety. *Child Development, 70*(2), 459-473. Doi: 10.1111/1456-8624.00033

Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin, 52*, 281-302.

Davis, E. A., & Miyake, N. (2004). Explorations of scaffolding in complex classroom systems. *Journal of the Learning Sciences, 13*(3), 265-272.

Fauth, B., Decristan, J., Rieser, S., Klieme, E., & Büttner, G. (2013). Student ratings of teaching quality in primary school: Dimensions and prediction of student outcomes. *Learning and Instruction, 29*, 1-9. doi:10.1016/j.learninginstruc.2013.07.001.

Field, A. (2009). *Discovering statistics using SPSS*. London: SAGE publications. Third edition.

Gates Foundation (2012). *Gathering feedback for teaching.* Seattle: Gates Foundation.

Goodenow, C. (1993). Classroom belonging among early adolescent students: Relationships to motivation and achievement. *Journal of Early Adolescence, 13*, 21-43.

Inspectie van het Onderwijs (2013). *De staat van het onderwijs. Onderwijsverslag 2011/2012*. Utrecht: Inspectie

Ministerie van het Onderwijs, Cultuur en Wetenschappen (2005). *Notitie vernieuwing van de zorgstructuur in het funderend onderwijs.* Zoetermeer. www.passendonderwijs.nl

Ministerie van het Onderwijs, Cultuur en Wetenschappen (2009). *Voortgang Passend Onderwijs. Brief aan de Tweede Kamer* (S. Dijksma, 5 juni).

Pianta, R. C. (1999). *Enhancing relationships between children and teachers.* In: Reddy, Rhodes & Mulhall (Eds). The influence of teacher support on student adjustment in the middle school years: A latent growth curve study. *Development and Pyschopathology, 15*, 119-138. doi:10.1017.S09545794030000075

Pianta, R. C., Steinberg, M. S., & Rollins, K. B. (1995). The first two years of school: Teacher-child relationships and deflections in children's classroom adjustment. *Development and Psychopathology, 7*, 295-312.

Prast, E., Van de Weijer- Bergsma, E., Kroesbergen, E., & Van Luit, H. (in preparation). *What constitutes good differentiation in primary mathematics education? Results of an expert consensus procedure.* Unpublished manuscript, Department of Social and Behavioural Sciences, University of Utrecht, the Netherlands.

Reddy, R., Rhodes, J. E., & Mulhall, P. (2003). The influence of teacher support on student adjustment in the middle school years: A latent growth curve study. *Development and Pyschopathology, 15*, 119-138. doi:10.1017.S09545794030000075

Reezigt, G. (2012). De kwaliteit van het basisonderwijs: ontwikkelingen in het laatste decennium. In: Dijkstra, A.B., Janssens, F.J.G., (red). *Om de kwaliteit van het onderwijs. Kwaliteitsbepaling en kwaliteitsbevordering*. Utrecht: Inspectie van het Onderwijs.

Robson, C. (2002). *Real World Research*. Oxford UK: Blackwell, second edition.

Ruiz-Primo, M., & Furtak, E. (2007). Exploring teachers' informal formative assessment practices and students' understanding in the context of scientific inquiry. *Journal of Research in Science Teaching, 44*(1), 57-84. doi:10.1002/tea.20163

Shuell, T. J. (1996). Teaching and learning in a classroom context. In P. J. Brok, T. den Bergen, R. J. Stahl, & M. Brekelmans, (2004). Students' perceptions of teacher control behaviours. *Learning and Instruction, 14*, 425-443. doi:10.1016/j.learninstruc.2004.01.004.

Stone, C. A. (1993). What is missing in the metaphor of scaffolding? In E. A. Forman, N. M. Minick, & C.A. Stone (Eds.), *Contexts for learning. Socialcultural dynamics in children's development* (p. 169-183) New York: Oxford University Press.

Stone, C. A. (1998). The metaphor of scaffolding: Its utility for the field of learning disabilities. *Journal of Learning Disabilities. 31*, 344-364.

Tavakol, M., & Dennick, R. (2011). Making sense of cronbach's alpha. *International Journal of Medical Education, 2*, 53-55. Doi: 10.5116/ijme.4dfb.8dfd

Tomlinson, C. A., Birghton, C., Hertberg, H., Callahan, C.M., Moon, T.R., Brimijoin, K., …Reynolds, T. (2003). Differentiating instruction in response to students readiness, interest and learning profile in academically diverse classrooms: A review of the literature. *Journal for de Education of the Gifted, 27*, 119-145.

Van de Pol. J. (2013). [Questionnaire and observations on contingency]. Unpublished raw data. University of Utrecht.

Van de Pol. J., & Elbers, E. (2013). Scaffolding student learning: A micro-analysis of teacher-student interaction. *Learning, Culture and Social Interaction. (in press).* http://dx.doi.org/10.1016/j.lcsi.2012.12.001.

Van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher-student interaction: a decade of research. *Educational Psychology Review, 22*, 271-297. http://dx.doi.org/10.1007/s10648-010-9127-6.

Van de Pol, J., Volman, M., Elbers, E., & Beishuizen, J. (2012). Measuring scaffolding in teacher- small-group interactions. In R. Gillies (Ed.), *Pedagogy: New Developments in the Learning Sciences*. Hauppage: Nova Science Publishers.

Van Meersbergen, E., & De Vries, P. (2013). *Handelingsgericht werken in Passend Onderwijs*. Utrecht: Perspectief uitgevers

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry, 17*, 89-100. Doi:10.1111/j.1469-7610.1976.tb00381.x