Chapter 2
Teaching intellectually disabled students practical skills in Dutch secondary schools

A previous version of this chapter was published as:
Abstract

In the Netherlands, education for intellectually disabled (ID) students of 12-18 year old is organized as a separate stream in secondary education. The stream is called ‘Practical Education’ (Dutch abbreviation = “PrO”). The main goal of Practical Education is to teach ID students to live independently and practice a profession. There are, however, doubts about the effectiveness of PrO and the teaching methods used (Blik & Harskamp, 2005).

Thirty-eight teachers in year two from 21 schools for PrO in the north of the Netherlands were given identical technical materials and assignments for their students. They were asked to use the assignments in a regular 100-minute lesson on technical skills. Two researchers observed the lessons and the activities performed by both teachers and students.

The observations showed that the majority of teachers (58%) handed out assignments and generally gave instructions on demand, mostly one-on-one (individual guidance). As a consequence, these teachers’ students asked many questions and waited for their teachers to help them. A smaller group of teachers (42%) used group instruction. These teachers instructed students before they went to work on their own. They explained a technical assignment and showed their students how to carry it out. They taught students to plan their activities before putting to work.

There were big differences between the individual guidance classes and the group instruction classes in active learning time and the number of questions of students that the teachers answered during task processing. There was also a difference between these classes in the amount of help given by the teacher. The quality of the assignments made by students was higher in classes with group instruction than in classes with individual guidance.
Abstract

In the Netherlands, education for intellectually disabled (ID) students of 12 -18 year old is organized as a separate stream in secondary education. The stream is called 'Practical Education' (Dutch abbreviation = "PrO"). The main goal of Practical Education is to teach ID students to live independently and practice a profession. There are, however, doubts about the effectiveness of PrO and the teaching methods used (Blik & Harskamp, 2005).

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The observations showed that the majority of teachers (58%) handed out assignments and generally gave instructions on demand, mostly one-on-one (individual guidance). As a consequence, these teachers' students asked many questions and waited for their teachers to help them. A smaller group of teachers (42%) used group instruction. These teachers instructed students before they went to work on their own. They explained a technical assignment and showed their students how to carry it out. They taught students to plan their activities before putting to work.

There were big differences between the individual guidance classes and the group instruction classes in active learning time and the number of questions of students that the teachers answered during task processing. There was also a difference between these classes in the amount of help given by the teacher. The quality of the assignments made by students was higher in classes with group instruction than in classes with individual guidance.

2.1 Introduction

Instruction for Intellectually Disabled students: state of research

In the Netherlands, education for intellectually disabled (ID) students of 12-18 year old is organized as a separate stream in secondary education. The Dutch Inspectorate of Education has ascertained that teachers working with students with learning disabilities tend to choose individual instruction over group instruction (Dutch Inspectorate of Education, 2009). Instruction aimed at individual students seems justifiable as one-on-one instruction to students with an intellectual disability seems to be more effective than group instruction (Pinnell, Lyons, Deford, Bryk, & Selzer, 1994; Wasik & Slavin, 1993, Slavin, Lake, Davis, & Madden, 2009) mainly because the interaction between student and teacher is more intensive. Individual instruction enables teachers to keep students focused and involved by addressing their individual learning needs.

However, individual instruction isn’t really feasible in groups of 12 to 15 students because the time teachers can spend on each individual students is very limited (Bosker & Doolaard, 2009). In 2005, Dutch researchers (Blik & Harskamp, 2005) observed and interviewed several teachers of ID students who were teaching practical subjects such as: care and welfare, retail, gardening and technical engineering. Part of the teachers used group instruction, followed the guidelines of the direct instruction model and explained the assignments before the students set to work. But, the majority of the teachers, used what one could describe as “one-on-one help” or “individual guidance”. These teachers put the students almost instantly to work. The teachers then went to each of the students and gave short instructions or demonstrations on how to handle (parts of) the assignment. Blik and Harskamp (2005) concluded that this approach leaves students dependent on their teachers.

In the USA and many other western countries ID students at high school are offered inclusive education together with ‘normal’ students. In an inclusive high school, students with ID are given individual study plans and special support of an assistant teacher (Spooner, Baker, Harris, Ahlgrim-Delzell, & Browder, 2007). Just like the Dutch teachers, the assistant is always close to the ID students and individual guidance is provided if a student can’t handle an assignment on his own. Assistant teachers are helping students by showing them
how to progress with their learning tasks. But it seems that this approach also leaves the students dependent on their teacher (Giangreco, Yuan, McKenzie, Cameron & Fialka, 2005).

The notion that individual guidance is the best way to teach ID students seems well grounded in teaching practice in the Netherlands and other countries. Research in the Netherlands by Blockhuis and Berlet (2006) shows that many teachers believe that ID students can only perform assignments independently if they have had individual guidance and much practice. This notion is also represented in practical exams for ID students in specific industries (cleaning, retail, catering). For their exams, students are only tested in the assignments they have trained. Probably, because one assumes that ID students can be trained in job routines but not in performing new tasks independently.

After literature study in ERIC, Google Scholar and other data bases we concluded that limited research has been done in the Netherlands and abroad into the ways of teaching ID students and its consequences (see also Turnbull, Turnbull & Wehmeyer, 2007).

The research in this chapter has been undertaken in the Netherlands and looks at the relationship between the forms of instruction (pre-task group instruction versus individual guidance) on the one hand and the independence of students and the quality of their work on the other.

2.2 Theoretical framework

The above suggests that many teachers choose individual guidance as their way to organize instruction and that they put students to work on assignments without instruction beforehand. Other teachers may actually instruct their students before they put them to work. However, it is not entirely clear how teachers actually teach and how this influences their students (Blik & Harskamp, 2005).

Swanson et al. (1998) have shown in a meta-analysis that both direct instruction (DI) and strategy instruction (SI) are likely to be effective instructional models for groups of ID students. Providing these instructional models are applied properly, students will be capable of performing assignments independently and with good results (Adams & Carnine, 2006).
The DI and SI models both consist of five stages:

- **Stage 1: Orientation stage**
- **Stage 2: Instruction stage** in which an example of an assignment is provided and the construction process is explained
- **Stage 3: Guided Practice stage** in which one or more students practice the assignment together with the teacher
- **Stage 4: Processing stage** in which the students work on an assignment on their own
- **Stage 5: Closing/Review stage** in which the assignment is reviewed

Teachers using SI will differ greatly in the degree of interaction with their students during these stages compared to teachers who apply DI. Table 2.1 shows the difference in approach between both models of instruction.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Direct Instruction</th>
<th>Strategy Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>The teacher explains what will be created in the lesson.</td>
<td>The teacher involves the students in the explanation (interaction).</td>
</tr>
<tr>
<td>Instruction</td>
<td>The teacher demonstrates how the assignment is made and asks questions.</td>
<td>The teacher asks the students to explain the assignment to him/her and discusses the suggestions of the students. Then, the teacher performs the steps and lets the students explain.</td>
</tr>
<tr>
<td>Guided Practice</td>
<td>Students work on a step of the assignment under the teacher’s guidance. The teacher immediately corrects the students if necessary.</td>
<td>Students work on a step of the assignment under the teacher’s guidance. To correct students, the teacher lets them verbalize their approach by asking questions.</td>
</tr>
<tr>
<td>Processing</td>
<td>The students work on the assignment following the steps demonstrated by the teacher. The teacher gives both solicited and unsolicited feedback and immediately corrects the student if necessary.</td>
<td>The students work on the assignment using the step-by-step plan they discussed. The students have to verbalize their approach if they do not know how to progress with their assignment.</td>
</tr>
<tr>
<td>Closing/Review</td>
<td>The teacher reviews the assignment.</td>
<td>The teacher and the students review the process and the assignment.</td>
</tr>
</tbody>
</table>
**Direct Instruction** is aimed at teaching students to understand and carry out similar assignments as shown during instruction. Several studies have shown the effect of DI for students with learning disabilities. Ryder, Burton and Silberg (2006) studied the progress of students during reading education. Teachers were trained to give DI. The class was then observed to determine the extent to which students were able to work independently by looking at whether and how much help they received from the teacher and the extent to which they were able to continue working without help. In a recent study, Jackson (2010) demonstrated the effect of DI on the language capabilities of students with learning difficulties. The study revealed that instruction in the form of examples and explicit explanation is an effective way of expanding the language capabilities of students with learning difficulties. Similar results were also found in earlier studies (Lyon, 2004; Kinder & Carnine, 1991). Research by Hughes, Copeland, Wehmeyer, Agran, Rodi & Presley (2002) showed that DI improved the students’ practical and social communication skills.

**Strategy Instruction**, at the other hand, is aimed at teaching students how to acquire effective strategies for complex assignments (Joyce & Chase, 1990; Swanson, 1999; Alexander, 2006). Instruction is given in the form of questions and answers during which a strategy is devised together with the students. The strategy that is devised can be mapped onto a step-by-step plan students can use independently (Graham & Bellert, 2004). The students practice with the teacher as their coach, by verbalizing how to execute the strategy and finish an assignment. If the students ask for help during individual processing, the teacher first refers to the step-by-step plan and the discussion at the beginning of the lesson.

Research by Klingner, Vaughn, & Boardman, (2007) showed that students with learning disabilities in comprehensive reading are able to effectively apply a strategy that is devised together with their teacher and are more capable of performing assignments independently and reflecting on their own actions. Montague (2008) and Montague & Dietz (2009) indicate that SI improved the capability of students with learning disabilities to perform mathematics assignments independently as well as their test performance compared with the usual way of teaching. Montague & Dietz showed that the students’
verbalization of a strategy (explaining to another person) is an important aspect of SI: it enables the students to structure an assignment better.

### 2.3 Research questions

Our exploration of the theory shows that there are several ways in which teachers can teach. We suspect that many teachers do not give instruction beforehand but let their students immediately get to work and provide one-on-one help (individual guidance). Other teachers probably give group instruction before students start at a task. The first research question is aimed to establish the state of the art in teaching ID students.

1. **Which form of instruction do teachers use to help their students with performing assignments?**

   If teachers give pre-task instruction to their group of students, it would be interesting to know whether this form of instruction would improve the level of independence in performing assignments. If group instruction (DI or SI) could be compared to individual guidance one might expect that students in group instruction are more independent and therefore will finish more of their assignments successfully compared to students who receive individual guidance. The second and third research questions are aimed at investigating these expectations:

2. **To what extent are ID students, in different forms of instruction, capable of performing assignments independently?**

3. **What is the relationship between the form of instruction, the extent to which the assignment is performed independently, and the quality of the completed assignment?**
2.4 Method

The research was aimed at teachers of woodworking and metalworking in schools for practical education (PrO). Of the 177 Dutch schools for PrO, 43 are in the north of the Netherlands. For practical reasons (travel distance), 27 school boards (five provinces) were approached. Once the school boards had consented, teachers were invited to participate in the research. In total, 21 schools and 38 teachers participated. The selected schools were compared to the entire northern population (43) on school size and urbanization. It showed that the selected schools where representative as far as school size is concerned. In the sample, the average school size was 158 students ($SD = 59$). In the population the average was 147 students ($SD = 64$). Schools in the sample contained as many rural schools as urban schools.

The students, were indicated at the age of 12 by a regional referral committee and met the following criteria that also apply to all other Dutch ID students: IQ between 55 and 80, and learning disadvantage of at least three years in two or more educational domains.

Procedure

The lessons of 19 woodworking teachers and 19 metalworking teachers were observed. The teachers were given construction materials and an assignment card for the students several weeks before the observations started. The teachers used the materials and assignment card to teach a lesson to year-two students in the way the teacher and the students were used to (daily practice). The maximum duration of the lesson was 100 minutes ($2 \times 50$ minutes).

The teachers could decide to make a prototype of the completed assignment for show to the students and to alter the assignment card in a format the students were used to. Teachers were asked to teach the lesson with the assignment during regular classes. The researchers used an observational checklist to record both the teacher’s instructional behavior in different stages of the lesson as well as the behavior of students throughout the lesson.
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*Figure: 2.1a. Assignment card for woodworking class*
Observational instrument

An observation form was developed based on the form of Deinum (2000). The form enables both individual guidance as well as group instruction to be observed and to distinguish between DI and SI.

The observation was divided into blocks of five minutes. The first four minutes consisted of observing the teacher’s teaching behavior and the number of times the teacher helped individual students. Student activity was monitored in the fifth minute (Table 2.2). During the observation of teaching behavior (4 out of 5 minutes) four topics were checked every minute:

- Which minute of the lesson are we in?
- In which setting is the lesson organized: group instruction or individual guidance?
- What stage of the lesson (five stages) are we in and which model of instruction is used (DI or SI)?
- How often does the teacher offer unsolicited help to a student or answers questions of a student during task processing?

Table 2.2  
Observation block of 5 minutes

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>First minute: teaching behavior</td>
<td></td>
</tr>
<tr>
<td>Second minute: teaching behavior</td>
<td></td>
</tr>
<tr>
<td>Third minute: teaching behavior</td>
<td></td>
</tr>
<tr>
<td>Fourth minute: teaching behavior</td>
<td></td>
</tr>
<tr>
<td>Fifth minute: student behavior</td>
<td></td>
</tr>
</tbody>
</table>

During the student observations (every fifth minute) one question was answered:
- How many students are inactive in this minute?

From the observations three main characteristics (A, B and C) were determined.

A. Setting of the lesson

During the lesson observations, decision rules made it possible to determine in which setting the lesson was organized. The settings were divided into four groups:
- Individual guidance (Group 1): No group activities were undertaken. During help to the individual students the teacher might use the stages: Orientation/Instruction, Guided Practice/Processing and Closing.
- Combination instruction (Group 2): If teachers used aspects of the DI as well as the SI model in the stages: Orientation/Instruction, Guided Practice/Processing and Closing/Review.
- DI (Group 3): If teachers used at least the stages: Orientation/Instruction, Guided Practice/Processing and Closing/Review according to the DI model.
- SI (Group 4): If teachers used at least the stages: Orientation/Instruction, Guided Practice/Processing and Closing/Review according to the SI model.

B. Time spent on lesson stages

The stage the teacher was in has been recorded throughout the observation. The stage the lesson was in was easy to determine when a teacher gave group instruction.
Lesson stages were more difficult to distinguish when a teacher gave individual guidance, but it was possible to distinguish between the main stages: 1) Orientation and Instruction (a collective start in which the assignment card was presented and the materials and tools were discussed), 2) Processing stage (students working on their own, sometimes with help from the teacher), 3) Closing/Review stage (ending the lesson and possible evaluation of the assignment).

In order to be able to compare individual guidance lessons and group instruction lessons, the five lesson stages were combined into three main stages:

The observation data were used to determine how much time a teacher spent on these distinct lesson stages.

C. Independency of assignment performance

Three indicators were used to measure independent assignment performance:
- Questions of the students answered by the teacher (Teachers Answers): The number of questions asked during task processing that were answered by the teacher.
- Unsolicited help given by the teacher: The number of times help was offered (instructions were given) during class by the teacher without a student having solicited it.
- Student inactivity: This was determined by the average number of inactive students during every fifth minute of observation.

Points 1 and 2 were observed in periods of four minutes in a five-minute block. The total amount of solicited and unsolicited help given during these four minutes was calculated for each lesson. Student inactivity was observed during the last minute of the five-minute block.

The lessons were observed by two researchers. The inter-rater reliability was established with the help of three test observations of lessons prior to the research. The researchers each observed the three lessons and the scores of the researchers were compared through calculation of Pearson product moment correlations. This produced high reliability indices. The researchers means scores per lesson for the instruction model the
teachers used the correlation coefficient was $r = 0.91$; for the number of minutes in a lesson spent on each of the five stages the correlation coefficient was $r = 0.95$. In order to compare the researchers’ scores for students’ independence during the processing stage of the lessons three indicators were used: the mean number of inactive students, the total number of questions answered by the teacher and the total amount of help during processing. The agreement between the two researchers was high; the correlation was $r = 0.95$.

During the course of the project the two researchers regularly discussed the manner of scoring in the observations, in particular for unforeseen events in class.

Assessing the assignment

The researchers determined the quality of the assignments after the observation.

Table 2.3
Processing steps in the four stages of readiness (woodwork)

<table>
<thead>
<tr>
<th>Process steps</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notepad/pen holder</td>
<td></td>
</tr>
<tr>
<td>partial activities in work sequence</td>
<td></td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
</tr>
<tr>
<td>1 Measure and draw back and sides</td>
<td>1</td>
</tr>
<tr>
<td>2 Saw to length</td>
<td></td>
</tr>
<tr>
<td>3 Use cutting mold to mark curves</td>
<td></td>
</tr>
<tr>
<td>4 Saw curves</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
</tr>
<tr>
<td>5 Draw cutouts</td>
<td>2</td>
</tr>
<tr>
<td>6 Make cutouts</td>
<td></td>
</tr>
<tr>
<td>7 Sand back and sides</td>
<td></td>
</tr>
<tr>
<td>8 Glue back and sides together</td>
<td></td>
</tr>
<tr>
<td>9 Measure bottom plate</td>
<td></td>
</tr>
<tr>
<td>10 Drill holes</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td></td>
</tr>
<tr>
<td>11 Glue border design on bottom plate</td>
<td>3</td>
</tr>
<tr>
<td>12 Measure and saw pen holders</td>
<td></td>
</tr>
<tr>
<td>13 Measure and saw pens</td>
<td></td>
</tr>
<tr>
<td>14 Glue pens and pen holders to bottom plate</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong></td>
<td></td>
</tr>
<tr>
<td>15 Drill hole in pen holder</td>
<td>4</td>
</tr>
<tr>
<td>Finish neatly (sand and remove excess glue)</td>
<td></td>
</tr>
<tr>
<td>If there are more than three flaws in sub-activities 1 to 16, students are given three points.</td>
<td></td>
</tr>
</tbody>
</table>
Both the woodworking and the metalworking assignment were divided into four work stages each with process steps (Table 2.3). The four work stages were scored (1 - 4) on the basis of the process steps. Table 2.3 shows the stages of readiness of the woodworking assignment. The interobserver reliability between the two researchers was tested using the assignments of three groups of students (36 assignments). The Pearson correlation between the scores the two researchers gave for these assignments was 0.84.

Considering the similarity of the two researchers’ ratings, and for reasons of efficiency, it was decided to assign one researcher to the lesson observations and assignment reviews for each lesson. In the event of doubt, a photograph was taken for later consultation.

Analysis of Data

We used descriptive statistics to answer the first research question about the form of instruction the teachers used (DI, SI or individual guidance). DI and SI were taken into one category and called Group Instruction. With t-tests for independent cross-sections we compared the time teachers in group instruction versus teachers in individual guidance spent on the lesson stages Orientation, Instruction, Guided Practice, Processing and Closing/Review.

The second research question was about the degree students worked independently and the possible differences between students who received group instruction versus students who received individual guidance. We used three indicators for student independency during processing of an assignment: a) the number of questions answered by the teachers, b) the amount of unsolicited help the teacher gave and c) the number of inactive students during processing. The analyses were done with t-tests for independent cross-sections on all three indicators.

The third research question deals with the relationship between the form of instruction, and the independency of classes of students (three indicators). We tested the strength of the correlations between these variables. We also investigated the relationship between the form of instruction and the task performance of students. The task performance of students would be influenced by the teacher’s instruction and help during
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2.5 Results

Form of instruction

To answer the first research question, the teachers were grouped into three categories based on the form of instruction they gave: DI, SI, or individual guidance. Figure 2.2 shows that 58% of teachers gave individual guidance. After a brief opening of the lesson, they put their students to work and helped the students individually. Teachers walked around the classroom and gave instructions and demonstrations to the students.

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Sometimes the quality of the work was briefly discussed at the end of the lesson, but there was generally no review in an individual guidance setting.

However, 42% of teachers gave group instruction. They used lesson stages from the DI instruction model. Only one of the observed teachers used stages of the SI model. None of the teachers gave a combination of DI and SI. The teacher who gave SI (2.6 %) and the teachers who gave DI (39.5 %) were joined into one category: group instruction (42 %).

**Individual guidance:**

The teachers started by handing out the assignment and the materials. The students were put to work almost immediately with the materials and the assignment card. The teachers generally had a prototype of the assignment in the classroom to show what the assignment should look like. There was no group instruction on the steps in the assignment nor on the problems that could be encountered. The teachers went from student to student giving short instructions and direct help. An average of nine students per four minutes asked for help. The request for help usually went unanswered if it meant that the teachers had to deviate from his fixed route in the classroom. The students were asked to be patient. On the other hand, the teachers gave unsolicited help (short instructions the student had not explicitly asked for). Students progressed bit by bit with their assignment. Because the teachers could only help one student at a time, they indicated that classmates could be called upon for help. But, many students copied incorrect working methods from their peers. There were always inactive students throughout the lesson.

**Group instruction:**

The teachers gave at least a 10-minute explanation to the group of students of how the assignment could be made. They used the assignment card to discuss the steps the students could take and the problems they could encounter. One of the teachers asked students to come up with solutions themselves (strategy instruction). This was his way of preparing students for the assignment.

Most teachers had prepared their lessons and made a prototype of the assignment. They explained step-by-step how the assignment could be made and gave examples of how the tools and techniques could be used. A phase of independent processing followed the explanation. Relatively few students called on their teacher for help and teachers offered little unsolicited help. In these lessons, most students actively worked on their assignments.

Figure 2.3. Characterization of individual guidance and group instruction

<table>
<thead>
<tr>
<th>Stage</th>
<th>Total (n=38)</th>
<th>Individual (n=22)</th>
<th>Group (n=16)</th>
<th>Cohen's d</th>
<th>t-value</th>
<th>p-value</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation/Instruction</td>
<td>8.89 (5.11)</td>
<td>5.18 (1.74)</td>
<td>14.00 (3.50)</td>
<td>3.19</td>
<td>10.24</td>
<td>&lt;.001</td>
<td>[-10.57; -7.07]</td>
</tr>
<tr>
<td>Guided Practice/Processing</td>
<td>68.55 (11.59)</td>
<td>73.27 (12.48)</td>
<td>62.06 (5.98)</td>
<td>1.15</td>
<td>3.32</td>
<td>&lt;.001</td>
<td>[18.06; 17.43]</td>
</tr>
<tr>
<td>Closing/Review</td>
<td>3.89 (3.83)</td>
<td>3.00 (3.02)</td>
<td>5.13 (4.53)</td>
<td>0.55</td>
<td>-1.74</td>
<td>.091</td>
<td>[-4.61; 0.36]</td>
</tr>
</tbody>
</table>

The difference in the length of the instruction stage (t(36) = -10.24; p < .001; Cohen’s d = 3.19) and the difference in the length of the task processing stage (t(36) = 3.32; p < .001; Cohen’s d = 1.15) are clearly present. As could be expected, the teachers who applied group instruction spent far more time at group instruction and less time at task processing. No significant difference was found between both teacher groups in the length of the closing stage (t(24) = -1.74; p = .091; Cohen’s d = 0.55).

As opposed to the other teachers, teachers giving individual guidance hardly spent any time on instruction prior to task processing. They spent some time on orientation and then went straight to the processing stage. In most cases, in both groups of teachers,
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Figure 2.3. Characterization of individual guidance and group instruction

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Group instruction:
The teachers gave at least a 10-minute explanation to the group of students of how the assignment could be made. They used the assignment card to discuss the steps the students could take and the problems they could encounter. One of the teachers asked students to come up with solutions themselves (strategy instruction). This was his way of preparing students for the assignment.

Most teachers had prepared their lessons and made a prototype of the assignment. They explained step-by-step how the assignment could be made and gave examples of how the tools and techniques could be used. A phase of independent processing followed the explanation. Relatively few students called on their teacher for help and teachers offered little unsolicited help. In these lessons, most students actively worked on their assignments.

In Figure 2.3 there is a characterization of the lessons by teachers who gave individual guidance versus teachers who gave group instruction.

Time spent on lesson stages

All of the teachers, whether they gave individual guidance or group instruction, skipped lesson stages. Because stages were skipped, the five lesson stages were reduced to three in order to represent the data: 1. Orientation/Instruction; 2. Guided Practice/Processing; 3. Closing/Review (see Section 2.5).

Table 2.4 shows, as expected, a clear difference between the factual time spent on the lesson stages of teachers who gave group instruction and teachers who gave individual guidance. To verify this an independent samples t-test was conducted.

Table 2.4
Observed mean time spent in minutes (standard deviations between parentheses) of teachers who gave group instruction versus teachers who predominantly gave individual guidance

<table>
<thead>
<tr>
<th>Stage</th>
<th>Total (n=38)</th>
<th>Individual (n=22)</th>
<th>Group (n=16)</th>
<th>Cohen’s d</th>
<th>t-value difference</th>
<th>p</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation/Instruction</td>
<td>8.89 (5.11)</td>
<td>5.18 (1.74)</td>
<td>14.00 (3.50)</td>
<td>3.19</td>
<td>t(36) = 10.24</td>
<td>&lt;.001</td>
<td>[-10.57; -7.07]</td>
</tr>
<tr>
<td>Guided Practice/Processing</td>
<td>68.55 (11.59)</td>
<td>73.27 (12.48)</td>
<td>62.06 (5.98)</td>
<td>1.15</td>
<td>t(36) = 3.32</td>
<td>&lt;.001</td>
<td>[18.06; 17.43]</td>
</tr>
<tr>
<td>Closing/Review</td>
<td>3.89 (3.83)</td>
<td>3.00 (3.02)</td>
<td>5.13 (4.53)</td>
<td>0.55</td>
<td>t(36) = -1.74</td>
<td>.091</td>
<td>[-4.61; 0.36]</td>
</tr>
</tbody>
</table>

The difference in the length of the instruction stage (t(36) = -10.24; p < .001; Cohen’s d = 3.19) and the difference in the length of the task processing stage (t(36) = 3.32; p < .001; Cohen’s d = 1.15) are clearly present. As could be expected, the teachers who applied group instruction spent far more time at group instruction and less time at task processing. No significant difference was found between both teacher groups in the length of the closing stage (t(24) = -1.74; p = .091; Cohen’s d = 0.55).

As opposed to the other teachers, teachers giving individual guidance hardly spent any time on instruction prior to task processing. They spent some time on orientation and then went straight to the processing stage. In most cases, in both groups of teachers, the
researchers noticed that neither the work process nor the students’ assignments were systematically reviewed.

**Independence in assignment performance**

The use of an instruction model (DI or SI) versus individual guidance probably has an impact on the extent to which students have the opportunity to carry out an assignment independently (see par. 2.2 and research question 2). For each form of instruction Table 2.5 shows the outcome on three indicators of students’ independent work during the processing stage. The first indicator is the number of questions answered by teachers, the second the number of unsolicited help from the teacher and the third the number of inactive students.

<table>
<thead>
<tr>
<th>Table 2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean number of questions the teacher answered (standard deviations between parentheses), amount of unsolicited help given, and number of inactive students per lesson</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Form of instruction (group versus individual)</th>
<th>Length of instruction stage</th>
<th>Unsolicited help</th>
<th>Teacher’s answers</th>
<th>Inactive students during lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual (n=22 classes)</td>
<td>Group (n=16 classes)</td>
<td>Cohen’s d</td>
<td>t-value difference</td>
<td>p</td>
</tr>
<tr>
<td>Questions answered during task processing</td>
<td>9.05 (3.11)</td>
<td>3.00 (1.86)</td>
<td>2.36</td>
<td>t(36) = 6.91</td>
</tr>
<tr>
<td>Unsolicited help given during task processing</td>
<td>8.05 (5.76)</td>
<td>2.00 (1.63)</td>
<td>1.43</td>
<td>t(36) = 4.07</td>
</tr>
<tr>
<td>Inactive students during lesson</td>
<td>2.02 (1.15)</td>
<td>0.50 (0.73)</td>
<td>1.58</td>
<td>t(36) = 4.64</td>
</tr>
</tbody>
</table>

To compare the differences between both forms of instruction, an independent samples t-test was conducted. Teachers who gave group instruction answered fewer questions (t(36) = 6.91; p < .001; Cohen’s d = 2.36) during processing and gave less unsolicited help (t(36) = 4.07; p < .001; Cohen’s d = 1.43) than teachers who gave individual guidance to their students. The students in group instruction were less inactive than their peers who received individual guidance (t(36) = 4.64; p < .001; Cohen’s d = 1.58).
The relationship between teaching behavior and the students’ outcomes

Table 2.6 explores the relationship between teaching behavior, the independence of the groups of students and their success at performing the assignment (third research question). The correlations in Table 2.6 confirm the analysis in Table 2.4 and 2.5 that teachers who gave group instruction had longer Instruction stages and gave fewer unsolicited help. They answered less often questions and their students were less inactive (more active).

Table 2.6
Correlations between length of instruction stage, number of questions answered by the teacher during processing, unsolicited help given, and inactive students

<table>
<thead>
<tr>
<th>Form of instruction (group versus individual)</th>
<th>Length of instruction stage</th>
<th>Unsolicited help</th>
<th>Teacher’s answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length Instruction stage</td>
<td>0.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsolicited help</td>
<td>-0.56</td>
<td>-0.50</td>
<td></td>
</tr>
<tr>
<td>Teacher’s answers</td>
<td>-0.76</td>
<td>-0.69</td>
<td>0.66</td>
</tr>
<tr>
<td>Inactive students</td>
<td>-0.61</td>
<td>-0.44</td>
<td>0.22</td>
</tr>
</tbody>
</table>

There is a clear negative correlation between the length of the Instruction stage and the number of questions the teacher answered ($r = -0.69$) and the number of unsolicited help ($r = -0.50$). When teachers gave instruction a longer time, their students apparently asked fewer questions during processing and the teachers gave students less often help. The students’ were less inactive when instruction time was longer ($r = -0.44$).

Extended time for instruction seemed to have a positive influence on the independency of the students during task processing. As the instruction time was longer for students in group instruction, they profited more from instruction.
Relationship between the form of instruction and the students’ performance

All students worked at the same assignments for woodworking or metalworking during the lesson that was observed. After the lesson the researcher graded the assignments with a score (1 – 4) according to a detailed rating scale (see Table 2.3).

Table 2.7 shows the results of the students from the group instruction or individual guidance condition. 22 Classes received individual guidance and 16 classes group instruction. The difference between the scores of the students in the two conditions is significant \( t(36) = -3.49, p < .001; \) Cohen’s \( d = -1.17 \). This is a large effect. Students who received group instruction were able to finish the assignments with a higher quality. Despite the large degree of one-on-one help in classes with individual guidance, the quality of the assignments is lower than in classes with group instruction.

<table>
<thead>
<tr>
<th>Evaluation of assignments</th>
<th>Individual Guidance ((n = 22))</th>
<th>Group Instruction ((n = 16))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.54 (0.78)</td>
<td>3.48 (0.88)</td>
</tr>
</tbody>
</table>

2.6 Conclusions and discussion

The purpose of the research was to analyze the relationship between the forms of instruction and the degree of independence in which a class of students performs an assignment. Thirty-eight teachers were observed during woodworking or metalworking classes. We concluded that 42 percent of the teachers gave group instruction and 58 percent of the teachers offered individual guidance to their students.

In *group instruction* the teachers interacted with their students by asking questions about the assignment they instructed and they gave the students opportunity to understand the assignment and to learn how to work on their assignment independently.
The teachers answered on average 3 questions during task processing and gave unsolicited help on average only 2 times.

Teachers who gave *individual guidance* did not offer instruction in advance. In individual guidance, a class of students asked their teachers during task processing on average 9 times questions and the teachers gave their class unsolicited help on average 8 times. This is in sharp contrast to the way the teachers in group instruction acted. Hence, during group instruction, more students actively worked on their assignments than in individual guidance.

Our conclusion is that the teachers offering group instruction prepared their students better for assignment completion than the teachers who gave individual guidance. The research indicates that teachers who constantly give individual guidance deprive their students of the opportunity to become independent learners. (Wehmeyer, Shogren, Palmer, Williams-Diehm, Little & Boulton, 2012; Warnez, 2002).

The research shows that group instruction prior to an assignment has a positive impact on the degree of independent work (teachers have to answer fewer questions, have to help students less often and students spend their learning time more actively). Our research seems to indicate that instruction on task processing before the task begins has more impact on students’ achievements than individual help during task processing (Wehmeyer & Palmer, 2003).

The research we did has limitations. The target population for this research consisted of the 43 schools for Practical Education in the five northern provinces of the Netherlands. Twenty-seven were randomly selected and approached and 21 were interested in cooperating. This means that approximately half of the teachers in the technical domain for ID students in the north of the Netherlands were included in the sample. That seems a large enough sample. However, the proportion of rural schools versus urban schools and the proportion of immigrant students in the less densely populated north are different from schools in the central and western parts of the Netherlands. It is hard to generalize our findings to schools and teachers with these groups of students. However, ID students in schools in all parts of the Netherlands have a similar range of intelligence scores and similar
age and gender composition. This gives rise to the expectation that our results can be
generalized to a larger population.

Secondly, we did not perform an experiment, so we do not know whether students,
if randomly grouped in two conditions (group instruction versus individual guidance), would
progress just as we found in our results with intact classes and conditions. It is possible that
teachers in our research mainly gave individual guidance to classes of students who were
genuinely unable to work independently. However, given the similar mean intelligence
scores of the students in both research groups and the similarities in age or gender
composition, this assumption is rather improbable.

Thirdly, the research results do not distinguish between the metalworking and the
woodworking classes. Such a distinction seems unnecessary as the construction processes
of the assignment in this research did not differ between woodworking and metalworking.
In our results we found no differences in use of the instruction methods or indicators of
students’ independence between woodworking and metalworking classes.

2.7 Recommendations

We know that teachers in special primary schools often have little knowledge of other forms
of instruction than individual guidance. Most teachers help their students individually by
giving short instructions or, taking over certain parts of the assignment (Fuchs, et al., 2002;
McLeskey & Billingsley, 2008). After our research, we can conclude that this also applies to
the teachers in Dutch Practical Education we studied. Training teachers in instructing their
students before the students start to work on their assignment, seems required. DI or SI are
the most obvious instruction models for teachers to use. The two models have proven their
effectiveness in special education (see among others Ryder, Burton, Silberg, and Swanson,
2001). The models assume a stage where instruction is given in combination with guided
practice, after which the students start to process the assignment on their own.

We recommend setting up a training experiment in which teachers of ID-students
can learn to teach using a model for group instruction (DI or SI). This training should address
both the benefits and possibilities of group instruction as well as the limitations and
possibilities of individual guidance. The effect of the training could be measured by comparing the classes with teachers trained to improve their instruction in a group setting with those who are trained to introduce instruction in an individual setting. We expect that if teachers in a group or an individual setting will be able to apply interactive instruction and make their students understand the assignment at hand, then students will become more capable in executing the assignment on their own and make good-quality assignments.
Interactive Group Instruction