Analysis of Case 1, Stage 1, Lesson 1, Episodes 2 &4

**1. Analysing the talk**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | Q | R | F | Remarks |
| 1.T | …lets start the discussion. lets see the physical properties of the substance in general but we are taking the iron as an example. What are the physical properties if in which a change happen, the substance still can be returned back to what it was before? What are the physical properties? S1 | I | L |  |  | …T closes a pupils' group discussion about the physical and chemical changes of the iron using an iron tweezers  \* L: CP of ‘Remember; identify’ |
| 2.S1 | The colour^ | R1 |  | L |  | ^ Affirmation tone  \* L: CP of ‘Remember; identify’ |
| 3.T | The colour, good. But we need to pay attention to something here. It’s right, colour is a physical property but also can be? Chemical property (). So I wouldn't take it now as a distinctive one, Ok? S2 | F |  |  | Ev | () some pupils iterate the answer with the teacher |
| 4.S2 | We can say melting | R2 |  | L |  | \* L: CP of ‘Remember; identify’ |
| 5.T | Instead of saying melting, I say melting degree. It's a physical property, why? Well done (B). I mean girls if the substance was melting and then went through a freezing phase. Can't be returned back to its first state? ()  Yeah it's possible, you get it? S3 | F  I , Rg  F | L | L | Ev  Ev | () T writes on board: melting degree  () some pupils iterate: Yes |
| 6.S3 | Geometry of the substance^ | R3 |  | H |  | ^ Affirmation tone  \* H: unusual articulation of grouping together different physical properties |
| 7.T | The geometry, we can see the geometrical dimensions (B), the geometry of the substance or we can see the outward shape.  With the melting degree, I can add something, what? | F  I | L |  | Ev | () T writes on board: substance's geometry  \* L: CP of ‘Remember; identify’ |
| 8.S4 | Freezing degree | R4.1 |  | L |  |  |
| 9.T | Melting degree is the same as freezing degree,  but there is another degree also considered to be a physical property | F  I | L |  | Ev |  |
| 10.S4 | Burning | R4.2 |  | L |  |  |
| 11.T | Burning? Is there a burning degree?! (). S5 | F |  |  | Ev | () Disapproving tone |
| 12.S5 | Density | R5 |  | H |  | \* H: unusual answer in terms of going to microscopic level |
| 13.T | The substance's density, good.  What else? S6 | F  I | L |  | Ev |  |
| 14.S6 | The volume of the substance | R6 |  | L |  |  |
| 15.T | The volume, shape are called the geometry, but we said the meting degree, what else can we say with it? S7 | F  I | L |  | Ev |  |
| 16.S7 | The pressure? | R7 |  | L |  |  |
| 17.T | What is this pressure?!  What can I say with the melting degree? () The boiling degree.  With melting, boiling degree is considered as a physical property. So boiling (B) in addition to the physical properties that you mentioned like density,  What else? Physical properties of the substance? ()  For example, this substance is solid, very hard (). If, for example, I exposed it to some fire, what will start to happen to it?... | F  I , RT | L |  | Ev | ?! Disagreeing tone  () No pupil answers, and so T answers herself  (B) T writes on board: Boiling degree  () Silence for seconds and no one raise hand  () T points to the iron tweezers  …I/A talk continues to be ended by a NI/A one |
| **Example 2 (episode 4)** | | | | | | |
| 1.T | …So someone defines for me the physical change What's the physical change? | I | L |  |  | …T continues an I/A talk at the beginning of episode 4  \* L: CP of ‘Remember; Recall’ |
| 2.S1 | It's an outward change of the substance | R1.1 |  | L |  | \* L: CP of ‘Remember; Recall’ |
| 3.T | Good, an outward change only of the substance | F |  |  | Ev |  |
| 4.S1 | It can be returned back to its original state | R1.2 |  | L |  |  |
| 5.T | And can be returned back to its original state (B), ok? Lets take some everyday examples of physical change, S2 | F  I | L |  | Ev | (B) T writes on board the repeated answer  \* L: CP of ‘Understand; Exemplify’ |
| 6.S2 | Burning of candles | R2 |  | L |  | \* L: CP of ‘Understand; Exemplify’ |
| 7.T | We don't say burning, we call it melting of candles. Yes | F |  |  | Ev |  |
| 8.S3 | The dissolving of salt in water | R3 |  | L |  |  |
| 9.T | That’s right. S4 | F |  |  | Ev |  |
| 10.S4 | Melting of butter () | R4 |  | L |  | () If literally translated, the girl used a word in Arabic that means dissolve, although she means melt. These two words are widely mixed up in Arabic |
| 11.T | Good S4. S5 | F |  |  | Ev |  |
| 12.S5 | Melting of ice | R5 |  | L |  |  |
| 13.T | Good S5. S6 | F |  |  | Ev |  |
| 14.S6 | The evaporation of water | R6.1 |  | L |  |  |
| 15.T | Evaporation of water ^ | F |  |  | Ev | ^ Affirmation tone |
| 16.S6 | And the freezing of water | R6.2 |  | L |  |  |
| 17.T | Freezing of water, excellent.  Melting, freezing, condensing, falling, all of these are changes, which kind? | F  I | L |  | Ev | \* L: CP of ‘Remember; recall’ |
| 18.Sg | Physical | Rg |  | L |  | L: CP of ‘Remember; recall’ |
| 19.T | ^ So, I might write in sum of all of this.  What do we call it? What it is? | F  I | L |  | Ev | ^ Affirmation tone  \* L: CP of ‘Remember; recall’ |
| 20.S7 | The cycle of water | R7 |  | L |  |  |
| 21.T | The cycle of water in nature, what kind of change? Physical ()  This is of course if there is no any kind of chemicals that dissolve in water when it rains. For example, the acidic rain happens when we have acidic substances dissolving in rain water, then we will have an acidic rain. This is a special event, but in the normal water cycle in nature is considered what? Physical change (). Here you said the dissolving of salt. The dissolving of substances. Dissolving of salts in general is considered…The forming of metals…the different kinds of forming that happens in the crust of the earth are considered as physical changes… | F |  |  | Ev | () Some pupils iterate with T: Physical  () Some pupils iterate: physical change  … Skip some sentences  … T continues the NI/A talk to proceed then an I/A talk about chemical change |

**2. Characterizing the talk**

|  |  |
| --- | --- |
| Class of the talk | Teacher-Pupil talk   * Example1, Turns: 1- 17: I/A * Example2, Turns: 1- 21: I/A * Turn 21, NI/A |
| Purpose of the talk | * Example1, I/A: Developing a scientific concept * Example2, I/A: Developing a scientific concept * NI/A: Explaining scientific ideas regarding the scientific concept in discussion |
| Content of the talk | * Example1: Scientific view of Theoretical Scientific subject matter * Example2: Scientific view of Theoretical Scientific/Everyday content |
| pattern of the talk | - Example1, I/A: I-R1-Ev-R2-Ev-R3-Ev,I-R4.1-Ev-I-R4.2-Ev-R5-Ev-I- R6-Ev-I-R7-Ev-I-RT-I…   * Example2, I/A: I-R1.1-Ev-R1.2-Ev-I-R2-Ev-R3-Ev-R4-Ev-R5-Ev-R6.1-Ev-R6.2- Ev-I-Rg-Ev-I-R7-Ev   NI/A: --- |

**3. Quantitative indicators**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | Co | El |
| Authoritative, 1 | 7 |  | 7 | 2 | 9 |  |  |
| Authoritative, 2 | 4 |  | 10 |  | 10 |  |  |

**4. Narrative account**

With these examples, we start characterizing the talk of the first videotaped lesson in Case 1. These first examples demonstrate a quite obvious authoritative attitude. In both examples, the teacher is trying to develop certain scientific concepts; physical properties in the first example and physical change in the second one. Besides, both examples have taken place following group discussions regarding these two issues.

After giving the group of pupils iron tweezers and asking them to discuss its physical and chemical properties, the teacher has initiated the talk in the first example starting with the physical ones. As it is clear in the analysis above, the teacher was giving an immediate evaluation for the pupils' contributions. Whether approving or disapproving the pupils' responses, she was doing this firmly, strongly and directly;

* R: The colour / F: The colour, good.
* R: Melting / F: Instead of melting, I say melting degree
* R: Geometry… / F: The Geometry
* R: Burning? / F: Burning?! Is there a burning degree?!
* R: The volume / F: The volume, shape are called the geometry
* R: The pressure / F: What is this pressure?!

She restricted the pupils' participation to uttering the mere physical property without asking them 'how' or 'why' questions. If there were anything to be explained regarding those uttered properties, she was the one to offer it as part of her evaluation (see, for example, the utterance in turns; 3, 5 and 7). What is more, she performed more intellectual control when she was trying to extract from the pupils the answer of 'Boiling degree'. She did this by using two strategies; asking directly and repeatedly about this property (see turns, 7, 9 and 15), and offering, herself, the answer to her query when pupils fail to provide it (see turn 17). This successive authoritative behaviour has resulted in a pattern of talk devoid of any comments or elaborative follow-ups (I-R1-Ev-R2-Ev-R3-Ev-I-R4.1-Ev-I-R4.2-Ev-R5-Ev-I-R6-Ev-I-R7-Ev-I…). This pattern can also be easily divided into repeated chunks of the conventional sequence of Authoritative talk, I-R-E, when assigning every response to the original initiation it answers.

Moreover, the authoritative attitude of the teacher had contributed to restricting the talk to be of a scientific view although it could be opened to the pupils' personal views as the main initiation relates basically to their everyday experiences. Still and in spite of characterizing the content of this example as scientific only, we can not really disregard the personal experiences that mixed-up with the pupils' attempts to provide answers that are scientifically correct. Similarly, it was difficult to judge the quality of some pupil's responses. Although, the responses of the 'Geometry' (turn 6) and the 'Density' (turn 12) have been classified of high quality due to their uniqueness in the context (see the remarks in turns 6 & 12), again we can not disregard different possibilities leading to judging them of low quality. With the absence of explanations from the pupils of; what they mean by, and why they chose such answers, the judgment is opened to be questioned.

This analysis of the first example stands also for the second one. Similar characteristics can be easily noticed;

* The dominance of the evaluative voice of the teacher;
* The movement towards what is considered a scientific view;
* The absence of the challenging voice in asking how and why question (see, for example, how the teacher discounted the debatable features in defining physical change like reversibility (turns 1-5;)
* The absence of comments and elaborative follow-ups (I-R1.1-Ev-R1.2-Ev-I-R2-Ev-R3-Ev-R4-Ev-R5-Ev-R6.1-Ev-R6.2- Ev-I-Rg-Ev-I-R7-Ev);
* The verbal and the intellectual control of the teacher over the explanation task ( see, for example, how the teacher raised, herself, controversial points regarding the cycle of water and dissolving processes in the NI/A turn of 21, and how she responded, herself, to these points).

The content in this example has been characterized as an everyday and scientific because the second initiation in turn 5 asks directly for everyday examples of physical change. The easiness of the question has resulted in responses from everyday experience that are scientifically correct, and that are of low quality though.

Analysis of Case 1, Stage 1, Lesson 3, Episode 1, 2

**1. Analysing the talk**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | I | R | F | Remarks |
| 1.T | Some of you might have noticed that after the filtration. The solid substance didn't split out of the liquid completely. What do you expect the errors are? Here, we have two results. Notice the one I have. Here we got a solution where the liquid is almost totally separated from the solid substance, and here the solid substance is still mixed with the liquid. What's the reason or what are the errors? | I | H |  |  | \* H: CP of ‘Create, hypothesize’, open Q |
| 2.S1 | May be the way we put the filter paper is wrong | R1 |  | H |  | H: CP of ‘Create, hypothesize’ |
| 3.T | Good, may be you didn't put the filter paper in the right way, S2 | F |  |  | Ev |  |
| 4.S2 | The filter paper hasn't been folded in a right way | R2 |  | H |  | H: CP of ‘Create, hypothesize’ |
| 5.T | Yeaah, folding the filter paper in the wrong way, what else? S3 | F , I | H |  | Ev |  |
| 6.S3 | May be the shaking of the solution? | R3 |  | L |  | \* L: reflects usual simple thought |
| 7.T | It does nothing with the shaking. Even after the shaking, the solution separates, ha?  During the spill of the solution, I mean when you spilled it, may be you did it quickly and some leaked out at the back of the filter paper and I said spill it slowly. So what do you do in this case? I will repeat the step of the filtration again… | F |  |  | Ev | … T gives instructions to repeat the step through a NI/A talk |
| **Example 2 (episode 1)** | | | | | | |
| 1.T | () What do you expect the solid substance that formed here in the clock glass to be? | I | L |  |  | () T is opening this discussion with the videotaped group  \* L: CP of ‘Understand, interpret’ |
| 2.Sg | Calcium Carbonate | Rg |  | L |  | \* L: CP of ‘Remember, identify’ |
| 3.T | Calcium Carbonate, how do you know it is Calcium Carbonate? | F, I | H |  | EL | \* H: CP of ‘Understand, justify’ |
| 4.S1 | Because it’s reacted. A reaction happened between Sodium Carbonate and Calcium Chloride | R1.1 |  | L |  | \* L: CP of ‘Remember, recall’ |
| 5.T | Ok, and then | F | H |  | EL | \* H: CP of ‘Understand, justify’ |
| 6.S1 | And got Calcium Carbonate which is the substance that form rocks, the … | R1.2 |  | L |  | …S1 repeats the same meaning |
| 7.T | Ok, how do you make sure it's calcium Carbonate? ()  Ok, this substance? () which dissolved in water | F  I | H  L |  | EL | () Silence and no answer from the group  () T points to the remaining substance in the glass after the heating  \* H: CP of ‘Understand, justify’  \* L: CP of ‘Remember, identify’ |
| 8.S1 | Sodium Chloride | R1.3 |  | L |  | \* L: CP of ‘Remember, identify’ |
| 9.T | Sodium Chloride, how can you assure it's Sodium Chloride? Ha? | F, I | H |  | EL | \* H: CP of ‘Understand, justify’ |
| 10.S2 | May be rough? | R2.1 |  | L |  | \* L: CP of ‘Remember, describe’ |
| 11.T | How was it basically? | F | L |  | EL | \* L: CP of ‘Remember, describe’ |
| 12.S1 | Initially, when the substance -- was I mean -- | R1.4 |  | L |  | -- hesitation |
| 13.S2 | Soft () | R2.2 |  | L |  | () S1 and S3 iterate with S2: Soft |
| 14.S3 | Soft and that rough () | R3 |  | L |  | () S1 mutters in a hesitated tone: No |
| 15.T | This is soft1 and this is rough2.  Another thing? Now, if I take some of this substance1 and try to dissolve it in water, dissolve it in water. Just a little. A small amount, dissolve it in water, see what will happen to it?... | F |  |  | C0 | \* The tone of the Follow-up is not affirmative. It's a non-evaluative comment  1: Substance in the clock glass CaCO3  2: Substance in the glass NaCl  … T gives instructions to the whole class to do the same |
| **Example 3 (episode 2)** | | | | | | |
| 1.T | Did the substance in the filter paper1 dissolve in water? | I | L |  |  | 1: the same substance in the clock glass CaCO3  \* L: CP of ‘Remember, describe’ |
| 2.Sg | No | Rg.1 |  | L |  | \* L: CP of ‘Remember, describe’ |
| 3.T | Look girls, when any substance dissolves, notice that the resulted colour is transparent like the colour of the salt when you dissolve it in water. Have you noticed that there is a white colour? | I | L |  |  | \* T here is just repeating the same query raised in turn 1, but from a different angle |
| 4.Sg | No | Rg.2 |  | L |  |  |
| 5.T | So, this substance didn't dissolve in water whereas the substance in the glass2, was how before? | F  I | L |  | Ev | 2: Substance in the glass NaCl  \* L: CP of ‘Remember, describe’ |
| 6.Sg | Dissolved | Rg.3 |  | L |  |  |
| 7.T | Dissolved in water^. Was how before? | F , I | L |  | Ev | ^ affirmation tone |
| 8.Sg | Dissolved () | Rg.4 , F |  | L | Ev | \* Affirmation gesture (nodding) from T |
| 9.T | See how it feels, rough or soft? | I | L |  |  | \* L: CP of ‘Remember, describe’ |
| 10.Sg | rough | Rg.5 |  | L |  |  |
| 11.T | It feels what? Rough.  At home, I want you to go and think about the resulted substance here1 and the resulted substance here2 and tell me, what's the reason? what's your evidence… | F |  |  | Ev | … T continues an instructive talk about things to be done as a homework |

**2. Characterizing the talk**

|  |  |
| --- | --- |
| Class of the talk | Pupil-Teacher talk   * Example 1, Turns 1- 7: I/A , Turn 7: NI/A * Example 2, Turns 1-15: I/D , Turn 15: NI/A * Example 3, Turns 1-11: I/A , Turn 11: NI/A |
| Purpose of the talk | * Example 1, I/A: Investigating a scientific Problem   NI/A: Suggesting/Explaining a scientific idea regarding the scientific problem in discussion   * Example 2, I/D: Exploring pupils' views of a scientific problem   NI/A: Suggesting/Explaining a scientific idea regarding the scientific problem in discussion   * Example 3, I/A: Reviewing scientific observations   NI/A: Introducing a homework task |
| Content of the talk | * Example 1: Personal/Scientific views of Theoretical/Empirical Scientific subject matter * Example 2, 3: Scientific view of Theoretical/Empirical Scientific subject matter |
| Pattern of the talk | * Example 1, I/A: I-R1-Ev-R2-Ev-I-R3-Ev   NI/A: --- (I)   * Example 2, I/D: I-Rg-EL,I-R1.1-EL-R1.2-EL…-I-R1.3- EL,I- R2.1- EL-R1.4-R2.2-R3-C0   NI/A: --- (I)   * Example 3, I/A: I-Rg.1-I-Rg.2-Ev-I-Rg.3-Ev-I-Rg.4-Ev -I-Rg.5-Ev * NI/A: --- (I) |

**3. Quantitative indicators**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | Co | El |
| Dialogic | 3 | 4 | 8 |  |  | 1 | 5 |
| Authoritative 1 |  | 2 | 1 | 2 | 3 |  |  |
| Authoritative 2 | 5 |  | 5 |  | 4 |  |  |

**4. Narrative account:**

These excerpts from lesson 3 are taken from two episodes; 1 and 2. They demonstrate 3 classes of talk according to the communicative approach; I/A, NI/A and I/D. Each example of the three we have here entails two parts; the Interactive part, whether Authoritative or Dialogic, and the Non-Interactive/ Authoritative one. Regardless of their class, the talk uttered in these examples is of a theoretical and empirical scientific content. The lesson from which these examples are taken was a mixture of practical activities and theoretical discussions prior and subsequent to these activities.

If we start with the two Interactive/Authoritative excerpts; the first and the third examples, then we can put them into two types according to their level of authority. The third is of a high-level authority and the first is of a mid-level authority, and let's start examining the third one. In this excerpt, the teacher is aiming to review with the pupils some of the experiment's observations that they went through. She started initiating the talk by asking about direct observation on one hand, and through the question of 'did it happen?' than 'what did happen?' on the other hand. She kept on this manner of questioning defined choices as it can be obviously noticed in turns 3, 5 and 9 in addition to turn 1;

* Have you noticed …a white colour? (Turn 3)
* This substance didn't dissolve…whereas (that) substance…was how before? (Turn 5)
* How it feels, rough or soft? (Turn 9)

These questions of low-quality, due to their low-cognitive levels, simplicity, directness and closeness have led naturally to short and rote responses of low quality. Such questions gave a apace only for 'Yes/No' and the 'One from two choices' answers;

* I: Did…(it) dissolve? / R: No
* I: Have you noticed…colour? / R: No
* I: This …didn't dissolve,…(that), was how before? / R: Dissolved
* I: …Rough or Soft? / R: Rough

This characterization of the questions and responses of this example is a main attribute in judging the class of the talk to be of highly-Authoritative. The nature of the initiated questions has drawn, in fact, the rest of the authoritative characteristics;

* They directed the talk not towards scientific views only, but towards very-defined ones
* They imposed a strong evaluative voice, not just through the dominance of the evaluative follow-ups and the absence of the elaborative ones, but also through their implementation as a strategy to affirm certain answers, by being repeated a second time (turn7) or being duplicated in different words (turn3)
* They led to replicate the sequence of the (I, R, E) different times throughout the whole pattern of the talk (I-Rg.1-I-Rg.2-Ev-I-Rg.3-Ev-I-Rg.4- Ev-I-Rg.5-Ev)
* They called for group answers and disallow individuals participations

So, if all these characteristics have led to judging the third example as to exhibit high authority, what is there in the first example to make it less Authoritative?

The lower level of authority in the first example has been driven by the main initiation; a question of a high cognitive level that requires the pupils to practice a synthesis skill in hypothesizing the errors. On the other hand, it is an open question in terms of the different possibilities than can answer it. Therefore, although the teacher might have had some sources of errors in her mind, the nature of the question has not allowed the talk to head for certain scientific view. Instead, there were different contributions from the pupils that the teacher might have not thought about. So then, does this make it a Dialogic talk?

Not at all, and this can be easily justified by examining how did the teacher deal with those contributions;

* Firstly, she was evaluating the pupils' contributions; approving the ones considered by her as scientifically correct (turns 3 & 5) and disapproving the wrong ones (turn 7).
* Secondly, she was not elaborating the pupils' responses, neither the right nor the wrong ones (I-R1-Ev-R2-Ev-R3-Ev). She has not tried to explore the pupil's thoughts about the sources they offered; why do they think about and how do they think these sources could affect the filtration process. Again as in the previous lesson, such performance has created a difficulty in categorizing the quality of the pupils' responses. Although the responses in turns 2 and 4 have been classified as of high quality due to the reasons explained above, we admit again that such classification can be easily argued about, as the justification behind these answers is simply not there.

These two points imply that the teacher was looking just for what is correct scientifically from her point of view. She asked for the pupils’ views, but she was looking only for the scientific one. Moreover, she had one specific error in her mind (see turn 7), that she has asked the groups to repeat the filtration process based on paying attention to that particular error and neglected the ones offered by the pupils. Accordingly, this example has been characterized as reflecting an Interactive/Authoritative class. The nature of its purpose and the question it answers, though, has contributed to lessen its authoritative facet. To differentiate such kinds from the highly Authoritative ones (Example 3 in this lesson and the examples of the previous lesson), I chose to describe it for now as a mid-Authoritative class of talk.

Now, let's move to the only Dialogic example in this lesson. The talk in this excerpt is not, actually, a part of a whole-class discussion. It has been exchanged between the teacher and the videotaped group only. Generally, the whole excerpt goes around the group's expectation regarding the resulted substances from the chemical reaction of the conducted experiment. This expectation, though, is defined with just two alternatives that are known by the pupils; CaCO3 and NaCL. This has contributed, consequently, to classifying the initiations in turns 1 and 7 as of low quality. However, when the teacher asks for justifications in turns 3 and 9, the initiations are classified as of high quality as they require the pupils to practice a high cognitive-level of analysis (see the remarks in turns 3 & 9). Though, the group could not offer the correct justifications for the choices they made in turns 2 and 8. They didn't show a high-level thinking in reasoning the raised queries, and so the excerpt has been short of high-quality responses.

Despite the incorrect answers of the pupils, the teacher has not disapproved them. Nor, did she approve the correct ones (turns 2 & 8). This can be understood in light of the purpose for which this talk has been initiated in the first place. The teacher opened this discussion with the group, just to explore their views of what was happening in the experiment, as she was doing with some other groups. So, she was listening to the pupils, asking for explanation, elaborating their answers and repeating their views without evaluating them (I-Rg-EL,I-R1.1-EL-R1.2-EL…-I-R1.3- EL,I- R2.1- EL-R1.4-R2.2-R3-C0). Moreover, the talk has progressed to be more like of informal conversation between the teacher and the group. Three pupils were responding to the teacher's elaborative question in turn 11. Indeed, they have been also responding to each other's contributions (see the remarks in turns 13 & 14). This has resulted in a distinctive sequence of moves (EL-R1.4-R2.2-R3-C0) that cannot be noticed in the Authoritative types of talk.

All the aforementioned behaviours of the teacher and the reactions of the pupils, reflect characteristics of Dialogic talk that has been driven basically by the teaching purpose of identifying the groups' expectations.

Nevertheless, the Non-Interactive/Authoritative part that follows this Dialogic excerpt shows the teacher practicing the authoritative manner she is used to, as the general analysis of her teaching in this stage shows. In this part, the teacher was directing the pupils towards the idea of the solubility to be the criteria for differentiating the two substances. She had not recited the idea directly, but did ask the pupils to conduct a practical activity to examine this property. Through such talk, she was imposing the scientific idea authoritatively; neglecting the responses of the pupils during her Dialogic talk to them. She did the same in the first example. Although she did approve two sources of errors suggested by pupils, she did not take them into account when asking the pupils to repeat the filtration process. As has been explained earlier, she had one error in her mind and acted very authoritatively when attributing the failure of the filtration to that one error, bearing in mind the fact that the process has been done by the pupils themselves.

Analysis of Case 1, Stage 1, Lesson 4, Episode 1,3, 4

**1. Analysing the talk**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | Q | R | F | Remarks |
| 1.T | …Step 3, what's the kind of change in step 3? | I | L |  |  | … T closes NI/A about Step2  \* L: CP of 'Understand, categorize' |
| 2.S1 | Dissolving thaa -- Calcium Chloride -- Sodium Carbonate with Calcium Chloride | R1.1 |  | L |  | -- hesitation  \* L: CP of 'Remember, recall' |
| 3.T | Dissolving?! How dissolving Carbonate # | F |  |  | Ev | ?! disapproving tone  # T got interrupted by S3  \* Evaluative F because T is disapproving the S's response through the wonder tone in her follow-up. |
| 4.S1 | Mixing | R1.2 |  | L |  | \* L: CP of 'Understand, clarify' |
| 5.T | Yeaah, **adding** the two solutions together, and when I have solutions, I don't say adding. I say **mixing**. So, the next step is mixing or adding the two solutions together, ok? (B)  the kind of change? S2 | F  I | L |  | Ev | - **Although** T is differentiating between two words in Arabic, both of them actually can be translated to one word in English; mix  (B) T writes on Board what's in the step  \* L: CP of 'Understand, categorize' |
| 6.S2 | Chemical change | R2.1 |  | L |  | \* L: CP of 'Understand, categorize' |
| 7.T | What's your proof that it's a chemical change? | F | L |  | EL | \* Although it seems a HQ as it asks for an explanation, T is only asking pupils to recall direct observations and interpret them |
| 8.S2 | Change in colour? | R2.2 |  | L |  | \* L: CP of 'Remember, recognize' |
| 9.T | Change in colour. What's it?  I want strong evidence | F  I | L |  | Ev | \* T is disapproving the evidence of colour and so the F move is evaluative |
| 10.S2 | If we heat it we won't find -- we won't notice the same -- it's the same | R2.3 |  | L |  | -- Hesitation |
| 11.T | If we heat it! But as an observation you noticed during the work, during the experiment. You noticed something, obvious as evidence # | F  I | L |  | Ev | ! Wonder tone implies a disapproving F  # T got interrupted by S2 |
| 12.S2 | Bubbles | R2.4 |  | L |  |  |
| 13.T | Bubbles?! S3 | F |  |  | Ev |  |
| 14.S3 | The formation of a precipitate during the work | R3 |  | L |  | \* L: CP of 'Understand, categorize' |
| 15.T | Yeah, that’s good. The formation of a precipitate or a white substance, was before, at the beginning, then what? what happen to it? | F  I | L |  | Ev | \* L: CP of 'Remember, recall' |
| 16.S4 | It goes down | R4 |  | L |  |  |
| 17.T | It goes down bit by bit. If you have left it for a period of what? Of time then a white precipitate formed (B). Four, the next step What's the procedure we've followed after that? S5 | F  I | L |  | Ev | (B) T writes on board about the precipitate as an evidence  \* L: CP of 'Remember, recall' |
| 18.S5 | We've done a filtration for the solution | R5 |  | L |  |  |
| 19.T | Filtering the solution. Very good. A filtration process.  What's the kind of change in this case? S6 | F  I | L |  | Ev | \* L: CP of 'Understand, categorize' |
| 20.S6 | Physical | R6.1 | L |  |  |  |
| 21.T | Physical, why? | F | H |  | EL | \* T is not confirming the answer  \* H: CP of 'Understand, explain' |
| 22.S6 | Because -- the substance, I mean it remained on the filter paper | R6.2 |  | L |  | \* L: CP of 'Remember, recall' |
| 23.T | A substance remained on the filter paper, and the liquid, where did it go? | F | L |  | EL | \* L: CP of 'Remember, recognise' |
| 24.S6 | In the glass | R6.3 |  | L |  |  |
| 25.T | In the glass^, but still you've not proved why it's physical change?  Yeah S7 | F  I | H |  | Ev | ^ affirmation tone  \* T repeats the HQ question in turn 21 |
| 26.S7 | Cause the precipitate in the filter paper can be returned back to the glass # | R7.1 |  | H |  | S7 got interrupted by T  \* H: CP of 'Understand, explain' |
| 27.T | Very good, cause I can reverse the step and I'll get the same previous result. So, it's a physical change, why? One of you say it again () | F  I | L |  | Ev |  |
| 28.S8 | cause the precipitate can be returned back to its original state | R8.1 |  | L |  | \* L: CP of 'Remember, recall' |
| 29.T | Good, getting the precipitate back to the solution to have the same previous result. You get it?  Step 5, the procedure… | F |  |  | Ev | … T continues the I/A talk to end it with a NI/A one and so on till discussing the whole steps of the experiment |
| **Example 2** | | | | | | |
| 1.T | …The question here, how did the reaction happen between the content of test tube (1) and the content of test tube (2)? (B) Yes S1 | I | L |  |  | … T continues an I/A talk about the reaction equation  (B) T writes on board the question  \* L: asks for already explained information |
| 2.S1 | By that Umm, mixing the test tube (1). I mean mixing (2) in (1) | R1.1 |  | L |  |  |
| 3.T | Can you tell me the two sides of the reaction equation? I mean what is in the reactant side? And what is in the resultant side? The reacted side | I | L |  |  | \* L: CP of 'Remember, recall' |
| 4.S1 | Sodium Carbonates | R1.2 |  | L |  |  |
| 5.T | We have Sodium Carbonates^ (B),  with what? | F  I | L |  | Ev | ^ (B) T affirms the answer & writes on board |
| 6.S1 | Calcium Chloride | R1.3 |  | L |  | \* L: CP of 'Remember, recall' |
| 7.T | With Calcium Chloride^ (B) ,  I got what? | F  I | L |  | Ev | (B) T writes on board |
| 8.S1 | That, that, Sodium Chloride | R1.4 |  | L |  | \* L: CP of 'Remember, recall' |
| 9.T | Sodium Chloride^ (B) | F |  |  | Ev | (B) T writes on board |
| 10.S1 | Plus Calcium Carbonates | R1.5 |  | L |  |  |
| 11.T | Plus Calcium Carbonates^ (B).  And which substance formed the precipitate? And which has dissolved? | F  I | L |  | Ev | \* L: CP of 'Remember, recognise' |
| 12.S1 | That a precipitate, It's Sodium Chloride | R1.6 |  | L |  |  |
| 13.T | Sodium Chloride is a precipitate?! | F |  |  | Ev | \*Evaluative as the question has a disapproving tone ?! |
| 14.S1 | Noo, the opposite #. Calcium Carbonates | R1.7 |  | L |  | # S1 got interrupted by T asking: Who? |
| 15.T | Calcium Carbonates. I indicate it with a downward arrow cause it precipitates. What about this substance? | F  I | L |  | Ev | \* L: CP of 'Remember, recall' |
| 16.S1 | Dissolved | R1.8 |  | L |  |  |
| 17.T | Dissolved. And these two substances which reacted together, were what, dissolved or precipitates? | F  I | L |  | Ev | \* L: CP of 'Remember, recall' |
| 18.Sg | Dissolved | Rg |  | L |  |  |
| 19.T | Dissolved together. I mean this is a solution of a dissolved substance, and here we have a solution of a dissolved substance. Sit down, thank you.  Look at the reaction we have. Sodium Carbonates with Calcium Chloride gave us Sodium Chloride and Calcium Carbonates. This reaction is called (…) reaction which we will study in grade 10. Why? Cause every element of these replaced the second element, you get it? Notice that the Sodium replaced the Calcium and so I had Sodium Chloride and… | F |  |  | Ev | …T continues the NI/A talk |
| **Example 3** | | | | | | |
| 1.T | …In the rocky area surrounding the cave, there are salts of what? Anyone knows? Based on all what we've said, salts of what? S1 | I | H |  |  | … this talk comes after a group discussion about a paper work activity regarding some drawings  \* H: CP of 'Apply, implement' |
| 2.S1 | Calcium Chloride | R1 |  | L |  | \* L: Expected incorrect answer |
| 3.T | Calcium Chloride? () | F |  |  | Ev | () T is nodding a disapproving gesture |
| 4.S2 | Sodium Chloride | R2 |  | L |  | \*L: Expected wrong answer |
| 5.T | Let me ask you if the salts of Calcium Chloride and Sodium Chloride, the continuous fall of rain upon these salts, will they remain in this area? | F  I | L |  | Ev | \* I consider it evaluation as T means, by the question to disapprove S2’s answer  Meanwhile, It's an initiation as it raises the point of solubility |
| 6.Sg | No..Noo | Rg.1 |  | L |  |  |
| 7.T | What happen to them? They dissolve and go down and the water will evaporate and they will remain as a precipitate below. Right or not?  Salts of what? S3 | F  I | L |  | Ev | \*Although T is repeating here the question in turn 1, it's not H here because T has put the dissolving cue in this turn to guide the pupils to the desired answer |
| 8.S3 | Calcium Carbonates | R3 |  | L |  | \* L because T raised the solubility point which implied indirectly this correct answer |
| 9.T | Calcium Carbonate, the insoluble, and write it, the insoluble in water. Clarify it… the acidic rain falls. The normal rain, the acidic normal upon these salts and it does what? | F  I | L |  | Ev | …Instructive talk |
| 10.S4 | Dissolving it | R4 |  | L |  |  |
| 11.T | Dissolving it. Good, and a substance forms. What is this substance called? Anyone know? Salts, acid, Calcium Carbonates with acid or the acidic rain, a substance will form. Anyone knows? This substance, is it soluble or insoluble? | F  I | L |  | Ev | \* The question characterized here as low is the second one about solubility and not the first one about the substance |
| 12.Sg | Soluble | Rg.2 |  | L |  |  |
| 13.T | Anyone knows the name of this substance? The one who will answer will take two points. The substance forming as a result of the dissolving of Calcium Carbonates. I mean as a result of the reaction of the Calcium Carbonates with the acid | I | H |  |  | \* H: CP of 'Apply, implement' (refer to turn 1) |
| 14.S5 | Potassium Chloride | R5 |  | L |  | \* L: incorrect unjustifiable answer |
| 15.T | We're saying Calcium and she is going to potassium Chloride. Of course no cause we're talking about something with Calcium. S6 | F |  |  | Ev |  |
| 16.S6 | Calcium Chloride | R6 |  | L |  | \* L: incorrect unjustifiable answer |
| 17.T | No | F |  |  | Ev |  |
| 18.S7 | Sodium Chloride | R7 |  | L |  | \* L: incorrect unjustifiable answer |
| 19.T | Why Sodium? () Did we mention anything about Sodium? Did we mention Potassium? | F |  |  | Ev | () No answer from S7  \* The questions here are meant to disapprove the answer |
| 21.S8 | Calcium Nitrates () | R8 , F |  | L | Ev | - T disapproves the answer by shaking her head and she points to S9 to answer |
| 22.S9 | Calcium Bicarbonates | R9 |  | H |  | \* It's characterized as H because it's the right one and it's difficult to be imagined as resulting from a guess, so It's more probable to be thought of as reflecting high cognitive thinking although the T's follow-up does not help to confirm this inference |
| 23.T | Calcium Bicarbonates. Excellent. Appraise her (). The substance forming here is Calcium Bicarbonates… | F |  |  | Ev | () Pupils are used to say certain words in Arabic to appraise distinctive answers  …T continues this I/A talk |

**2. Characterizing the talk**

|  |  |
| --- | --- |
| Class of the talk | Teacher-Pupil talk   * Example1, Turns 1-29 : I/A * Example2, Turns 1-19: I/A - Turn19: NI/A * Example1, Turns 1-23 : I/A |
| Purpose of the talk | * Example1: Developing scientific ideas * Example2, I/A: Developing a scientific idea * NI/A: Explaining the scientific idea in discussion * Example3: Explaining a scientific phenomenon to conclude the topic |
| Content of the talk | * Example1,2: Scientific views of Theoretical/Empirical Scientific subject matter * Example 3: Scientific views of Theoretical Scientific subject matter |
| Pattern of the talk | * Example1, I/A: I-R1.1-Ev-R1.2-Ev-I-R2.1-EL- R2.2-Ev-I-R2.3-Ev-I-R2.4-Ev-R3-Ev-I-R4-Ev-I-R5-Ev-I-R6.1-EL-R6.2-EL-R6.3-Ev-I-R7.1-Ev-I-R8.1-Ev * Example2, I/A: I-R1.1-I-R1.2-Ev-I-R1.3-Ev-I-R1.4-Ev- R1.5-Ev-I-R1.6-Ev-R1.7-Ev-I-R1.8-Ev-I-Rg-Ev   NI/A: ---   * Example3, I/A: I-R1-Ev-R2-Ev-I-Rg.1-Ev-R3-Ev-I-R4-Ev-I-Rg.2-I-R5-Ev-R6-Ev-R7-Ev-R8-Ev -R9-Ev |

**3. Quantitative indicators**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | C0 | EL |
| Authoritative , 1 | 11 | 2 | 12 | 1 | 11 |  | 3 |
| Authoritative , 2 | 7 |  | 9 |  | 8 |  |  |
| Authoritative , 3 | 4 | 2 | 10 | 1 | 10 |  |  |

**4. Narrative account**

Here we have three long examples of an Interactive/Authoritative type. The three reflect an Authoritative talk of a high level like some of the ones noticed in previous examples. The teacher's authority over the talk is extremely obvious through the following;

* The continuous recurrence of the evaluative follow-up (e.g. I-R1-Ev-R2-Ev-I-Rg.1-Ev-R3-Ev-I-R4-Ev-I-Rg.2-I-R5-Ev-R6-Ev-R7-Ev-R8-Ev -R9-Ev);
* The absence of comments and elaborative follow-ups- apart from few elaborative ones in example 1;
* The continuous replication of the I-R-Ev pattern of moves. What is striking here is that we are talking about three examples, and three long ones. And in spite of this, no other pattern of moves rather than the I-R-Ev can be noticed except the one of (I-R6.1-EL-R6.2-EL-R6.3-Ev) that took place in the first example (turns 19-25). This pattern still ends with an evaluative follow-up but the teacher practiced less authoritative voice by prompting R6's answers twice before evaluating them after the third answer;
* The teacher's verbal dominance over the talk. This can be easily spotted when comparing the long teacher's contributions (through the Initiation and Follow-up moves) compared to the short pupils contributions (through the Response moves).

Let's try now to examine each example for distinctive features. In the first example, it is good to see how the teacher was dealing with the pupils' answers. Certainly the talk in this example was continuously directed by the teacher towards what she thinks is the right scientific view. How was she doing this? When a pupil was offering the correct answer, she was instantly appraising the pupil, affirming the answer, rephrasing it and even repeating the question again to get another pupil to recite that same answer again (see turns 14-17 and 26-29).

So, what was happening when a pupil offer a wrong answer? To report on this, let's focus on the talk exchanged between turns 7 and 13. In these turns, the teacher was disapproving the answers of S2, by repeating her answers with a wonder intonation, and by repeating her query for S2 to provide evidence different from the uttered one. Look to the exchange in these turns:

S2: Change in colour

T: Change in colour. What's it? I want strong evidence

S2: If we heat it we won't find -- we won't notice the same -- it's the same

T: If we heat it! But as an observation you noticed during the work, during the experiment. You noticed something, obvious as evidence

S2: Bubbles

T: Bubbles?! S3

After S2 fails to give the teacher the answer she wants, she simply invites another pupil to provide that answer. In her first answer, S2 offered evidence based on an observation that her group has agreed upon. So, it is not a matter of the correctness of the change in colour as evidence or not. Rather, it should has been about the occurrence of that observation or not, and the same for bubbles. However, the teacher was confining her self with a certain observation to be the evidence, which has resulted, in turn, in such authoritative behaviour of ignoring not just the pupil’s thoughts, but even her existing observation. In fact, such behaviour in ignoring the S2’s first response as an observation, has driven S2 to offer one of the alternatives known to be evidences for chemical change, regardless of its occurrence in the experiment or not. It can be easily argued then, that such behaviour would not support the pupils’ learning. It can affect the pupils’ view to the role of the practical work in informing the theory in science. It can also reinforce the pupil’s conventional view to the discipline of science as an accumulation of constant factual knowledge that needs to be memorized. Generally, it can be argued that the authoritative attitude in this sense can influence negatively the pupils’ perceptions of the nature of science. Not to forget that such behaviour can affect the pupil’s attitude towards the teacher and the subject of science.

Between turns 20 to 25, we can see what it looks like a low level Authoritative exchange of talk as reflected by its pattern of moves (I-R6.1-EL-R6.2-EL-R6.3-Ev). Looking deeply into it, though, suggests a different story. The teacher was asking for a justification-an easy one in fact. The answer offered by S6 looked close to the right answer and so the teacher asked for more clarification. S6 has responded correctly to the teacher’s elaborative question in turn 24. But then, and just surprisingly, the teacher ignores S6’s contribution that could be easily prompted to the right view to shift the turn to another pupil to provide the desired answer. The authoritative attitude here might be of less effectiveness than the previous one, but certainly, such ignorance of the pupils’ contributions wouldn’t be expected to result in a positive attitude towards the subject.

In moving to example two, we see a very typical Authoritative talk in which a pupil is trying to recite the information that the teacher wants to hear. Throughout this example, the talk has been entirely exchanged between the teacher and just one pupil, S1 (apart from the group answer in turn 18). In most of the turns, S1 has provided the desired answers to the teacher, whom was following these answers by repeating them with such an affirming intonation and putting them into written form via the board;

S1: Sodium Carbonates , T: We have Sodium Carbonates^ (B)

S1: Calcium Chloride , T: With Calcium Chloride^ (B)

S1: Sodium Chloride , T: With Calcium Chloride^ (B)

S1: Plus Calcium Carbonates , T: Plus Calcium Carbonates^ (B)

When S1, however, provides incorrect answer, the teacher disapproved it by similarly repeating the answer, but this time with a wonder tone rather than the affirming one, and by holding her hand away from the board, indicating that this answer is not the one that should be documented in the board. This, consequently, gives S1 the signal to change her response to the opposite alternative;

S1: That a precipitate, It's Sodium Chloride , T: Sodium Chloride is a precipitate?!

S1: Noo, the opposite, Calcium Carbonates

In example three, the story is slightly different as the pupils were providing incorrect answers in most of the turns, and so the teacher had to disapprove more than to approve those responses. Actually, the quality of the question in the two examples is what has caused such a difference. In the previous example, the teacher was asking about pieces of information that have been already explained, and so the pupil was just recalling this information in her responses. But the question in this example is of a high quality level because it asks the pupils to implement what they have learned in a new situation. Did this high quality question affect the talk to be Dialogic?

No, it didn’t even contribute to make it of a low or mid authority. Again, the highly authoritative attitude of the teacher is what shapes the type of the talk here. After two incorrect guesses by pupils, the teacher posed the same question asked in turn 1, again in turn 7, but after giving a very obvious clue of the desired answer, which has been immediately provided in turn 8. This means that the high quality question has been diminished to a low one, which has resulted in the right response, but not the one that reflect a high cognitive level. Similarly, in the talk exchanged between turns (13-23), the teacher asked a question of a high cognitive level and had to disapprove many responses before getting the right one. When S9 offered that answer in turn 22, which is extremely difficult to be imagined as a guess, the teacher did not ask her for any kind of explanation that can reveal her thoughts about.

Lastly, regarding the purposes and the content of the three examples, not much really can be said. In these examples, the talk has progressed to develop certain scientific ideas within the theme of the lesson. Example 3 is actually part of a longer talk that has been planned by the teacher to summarize the main points of the overall topic by applying them in explaining an existing scientific phenomenon. Within this overall purpose, the talk in example 3 has progressed to achieve the purpose of the explanation. These purposes as well as the nature of the content (Scientific-Theoretical/Empirical) have not contributed to specifying the type of the talk or shifting it to a different direction. For example, we saw in some examples how a mixture of theoretical and empirical content could contribute to reducing the authoritative control, due to its relation to the pupils’ own observations. However, this was not the case in these examples as the highly authoritative attitude of the teacher did set aside any influences over the type of the talk that could be caused by the purposes or the content of the talk, or by the nature of the posed questions or the nature of the pupils’ responses.

Analysis of Case 1, Stage 1, Lesson 5, Episode 5,7,8

**1. Analysing the talk**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | I | R | F | Remarks |
| 1.T | …Other evidences? | I | L |  |  | …T continues a talk about evidences ofchemical change  \* L: CP of ‘Remember, list’ |
| 2.S1 | The rise of gases and bubbles | R1 |  | L |  | \* L: CP of ‘Remember, list’ |
| 3.T | Rise of gases and formation of bubbles. Good. An evidence that indicates chemical reactions | F |  |  | Ev |  |
| 4.S2 | Formation of precipitate | R2 |  | L |  | \* L: CP of ‘Remember, list’ |
| 5.T | Formation of a precipitate^ | F |  |  | Ev | ^ affirmation tone |
| 6.S3 | Change in colour | R3 |  | L |  | \* L: CP of ‘Remember, list’ |
| 7.T | Change in colour^. Good  Today, we're going to do a chemical reaction. We'll see in this reaction, is…and see if there is a chemical change or not. And we'll see the evidences… | F |  |  | Ev | ^ affirmation tone  …T continues a NI/A talk |
| Example 2 | | | | | | |
| 1.T | Step 2. We said focus on the temperature. Give me your observations. Which group recorded a rise in temperature?()  So, after you added Calcium Chloride, the temperature got higher? | I | L |  |  | () The videotaped group raise their hands  \* L: T is asking pupils to report on direct observation |
| 2.S1 | Not that much. Just a little | R1.1 |  | L |  | \* L: CP of ‘remember: describe’ |
| 3.T | So, It increased  How much it was? | F  I | L |  | C0 | \* L: CP of ‘remember: describe’ |
| 4.S2 | Was 23 # | R2.1 |  | L |  | # S2 got interrupted by some of her group mates |
| 5.Sg | And then increased | Rg |  | L |  |  |
| 6.T | How much? | I | L |  |  | \* L: CP of ‘remember: describe’ |
| 7.S3 | 24 | R3 |  | L |  | \* L: CP of ‘remember: describe’ |
| 8.Sg | 24.5 | Rg |  | L |  |  |
| 9.T | The group there | I | L |  |  |  |
| 10.S4 | It remained the same | R4 |  | L |  |  |
| 11.T | The rest of you? When you observed the temperature? So, why have you written, temperature decreased? () | I | L |  |  | () T is directing the talk to the videotaped group |
| 12.S1 | We haven't written this | R1.2 |  | L |  |  |
| 13.T | I saw it | F |  |  | C0 |  |
| 14.S1 | Before. Cause we didn't shake it well, the reaction didn't happen | R1.3 |  | L |  | \* L as she is just reporting on what happened in the group |
| 15.T | You didn't shake it well?! You mean you measured it again after a period of time since the reaction | I | L |  |  | \* L: CP of ‘remember: describe’ |
| 16.S2 | Yes | R2.2 |  | L |  |  |
| 17.T | You're supposed that after the reaction immediately, you measure what happens to the temperature ().  And you, what have you noticed? The group here? | F  I | L |  | Ev | () T stands besides the group when saying this, and goes then to the front of the lab when saying the I  \* L: CP of ‘remember: describe’ |
| 18.Sg | It decreased () | Rg |  | L |  | () The rest of the groups are responding |
| 19.T | It's supposed that the temperature will decrease slightly. You might notice this decrease and you might not and because of this we used the thermometer, why? To get a precise measure. It means that you, whether you weren't precise in your measure or may be the thermometer you used isn't precise enough. So, there is a decrease in temperature….  Another observation you noticed that indicated a chemical change? Is there any observation…? | F  I | L |  | Ev | …T continues a NI/A talk to start again an I/A talk about the same step  …T repeats the same question |
| 20.S5 | The rising of bubbles | R5 |  | L |  |  |
| 21.T | Bubbles rose?! | F |  |  | Ev | \* Evaluative F because of the wonder tone (?!) |
| 22.S6 | The change of colour | R6 |  | L |  |  |
| 23.T | The colour changed.  In how many groups the colour has changed in this step? ()  So, Is this an evidence of a chemical change or not? | F  I , Rg  I | L  L |  | C0 | () All the groups raise hands  \* L: CP of ‘remember: describe’ |
| 24.Sg | An evidence | Rg |  | L |  |  |
| 25.T | An evidence…So, we have here a change in colour and decrease in temperature (B). Ok? I said, it's not necessary that I see the all evidences. I might just see one evidence of chemical change, and might not see any evidence. You get it? And might see two evidences or more…we move now to the next step… | F |  |  | Ev | … T continues a NI/A talk about this step  …T starts an I/A talk about the next step |

**2. Characterizing the talk:**

|  |  |
| --- | --- |
| Class of the talk | Teacher-Pupil talk   * Example1, Turns 1-7 : I/A - Turn 7: NI/A * Example2: Turns 1-19: I/A - Turn 19: NI/A * Turns 19-25: I/A - Turn 25: NI/A |
| Purpose of the talk | * Example1: Introducing a scientific topic * Example2, I/A: Working on an issue (Investigating pupils' observations)   NI/A: Closing down the issue (Justifying/concluding the pupils' observations)  I/A: Working on an issue (Investigating pupils' observations)  NI/A: Closing down the issue (Explaining/concluding a scientific idea) |
| Content of the talk | * Example1: Scientific views of Theoretical Scientific subject matter * Example2, I/A,1 : Personal views of Empirical Scientific subject matter * Ni/A,1 : Scientific view of Theoretical/Empirical subject matter * I/A, NI/A,2 : Scientific views of Theoretical/Empirical Scientific subject matter |
| pattern of the talk | * Example1, I/A: : I-R1-Ev-R2-Ev- R3-Ev   NI/A: ---   * Example2, I/A: I-R1.1- C0 -I-R2.1-Rg-I- R3-Rg-I-R4-I- R1.2- C0 -R1.3-I-R2.2-Ev-I-Rg-Ev   NI/A: ---  I/A: I-R5- Ev-R6- C0-I-Rg-I-Rg-Ev  NI/A: --- |

**3. Quantitative indicators**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | C0 | EL |
| Authoritative, 1 | 1 |  | 3 |  | 3 |  |  |
| Authoritative, 2 | 7 |  | 10 |  | 2 | 2 |  |
| Authoritative, 3 | 3 |  | 3 |  | 2 | 1 |  |

**4. Narrative account**

Example one here retells the same scenario of the all the previous examples, especially example 2 in the previous lesson;

* A question of a low quality is posed and a number of low-level responses are uttered
* Pupils’ responses are evaluated positively by repeating them in an affirming tone
* The conventional pattern of the I-R-E repeats through the excerpt
* The final evaluative move is used by the teacher to practice more verbal control over the talk

The different thing about this excerpt is its purpose of introducing the scientific topic as it has taken place at the beginning of lesson 5. The experiment of this lesson has not been done yet and so the content is of a theoretical nature only. With this example, therefore, we had come over the three main types of purposes of opening up, working on and closing down a topic. Yet the same scenario of highly authoritative attitude repeats through these examples.

The second example from this lesson is distinctive compared to most of the examples of this case in this stage. It is much less Authoritative than the ones before. Although it has been categorized as Interactive/Non-Interactive Authoritative talk, the features that characterize the Authoritative talk generally are less persistent in this example especially in its first part. Through the turns (1-19), the teacher was trying to work on a certain issue regarding the conducted experiment, and she was doing this by investigating the pupils’ observations. In turns (19-25), the same purpose and teacher intervention repeat. The talk in the first part, though, exhibits two evaluative follow-ups within 19 moves, whereas the second part shows also two evaluative follow-ups but within only 7 moves. In the first part, the teacher awaits till the end of it to give an evaluation, while in the second part; she immediately provides an evaluation in its third turn. So, why did the teacher’s reactions differ between the two parts that have been initiated for the same purpose and shared a content of a same type?

We can find the answer to this question through the context of the two situations in relation to the subject matter. Though, the example of the first part needs to be deeply analysed before coming to the difference between the two parts.

In the first part, the teacher was investigating the temperature readings of the groups. She wasn’t sure of the results, so she chose to start asking about one of the alternatives; the rise in temperature. The videotaped group announced this rise, the teacher wanted to know more about it, and the whole group were participating in providing such information. Accordingly, the pattern of the talk took unusual sequence (e.g in turns 1-9; I-R1.1-C0-I-R2.1-Rg-I- R3-Rg). It is unusual for Authoritative talk because;

* more than one pupil was offering answers without directly being asked to do so, which means that the control over the talk was not entirely possessed by the teacher;
* the teacher was not evaluating the responses. She was just commenting on some of them;
* the teacher, in some incidents (e.g. after turn 8 & 11), has not provided any kind of follow-up to the pupils' responses, not even a comment;
* the teacher, in turns (11-17) was seeking clarifications from the videotaped group for something she is confused about. Although the teacher was asking and the group explains, the group was indeed the source of unknown information to the teacher.

Such characteristics, therefore, indicates a retreat of the evaluative voice of the teacher and a decline in the authoritative feature of the talk, which makes us judge the talk in this part as an Interactive/Authoritative of a low-level. But why this excerpt has been categorized as Authoritative in the first place?

Simply because the teacher was looking for what she thinks is the right view. When this view has been uttered by one of the groups, she instantly approved it and assumed certain errors with the groups that have not got this result. Though, the teacher's behaviour in this instance brings us back to our question when comparing such behaviour with what happened in the second part.

As I have referred to before, the subject matter of the content is what has driven, in fact, the difference between the two instances of the talk. In the first part, the teacher was aware that with this experiment, it is not very likely to get the actual result of a decrease in temperature (as we, as teachers, know from the experience of performing this experiment). This has resulted in the teacher showing more leniency towards the groups' responses-as I explained before when talking about her follow-up behaviour. So, it was something about the subject matter in its empirical form that has coloured the talk to be of such lower authority.

Quite the opposite, in the second part (turns 19-23), the empirical outcome regarding the change of colour was spotted by all the groups. So when the teacher asked for second evidence that has been observed in the experiment, the change of colour was the one in her mind as she was aware that all the groups have got it. What happened, however, that S5 uttered different evidence that the teacher was not aiming for. The teacher, consequently, reacted with an expected authoritative attitude based on her performance in all the previous lessons; disapproving instantly the undesired responses by repeating them with a wonder intonation, and approving the desired ones by repeating them with an affirming intonation:

S5: The rising of bubbles , T: Bubbles rose?!

S6: The change of colour , T: The colour changed ^