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

**1. Analysing the talk:**

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| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | Q | R | F | Remarks |
| 1.T | What do we know about the dynamic electricity? And what's the difference between this kind and the first one? Yes current intensity () | I | H |  |  | \* In terms of the CP, the categorization is open to the two probabilities of L & H. However, the complexity and openness of the Q and what is obvious from successive turns, suggests the categorization to be: H  () each girl in the class has been given a name related to the electricity topic. S1’s name is ‘current intensity’ |
| 2.S1 | The dynamic electricity moves in conducting materials but static electricity doesn't move in conductors, it is in insulators | R1.1 |  | L |  | \* L: it's usual, expected answer |
| 3.T | So, it has to be an insulating material () | F | H |  | EL | () T chose to focus on the second part of the answer about static electricity  \* H: CP of 'Understand; explain' |
| 4.S1 | Cause it doesn't move freely | R1.2 |  | L |  | \* L: reflects expected misconception |
| 5.T | Doesn't move freely. Beautiful. Doesn't move freely.  You've said, who is this? Which electricity?...  And dynamic electricity? | F  F…  F | L  L |  | C0  EL  EL | () S1 is nodding yes  …Skip some turns in which T was trying to make S1's view obvious to all the class |
| 6.S1 | Moves freely in conducting materials | R1.3 |  | L |  | \* L: Expected, usual answer |
| 7.T | So the static electricity…(B).  Do you agree with S1? All of you agree with her? ()  Yes alternating current | F  I | H |  | C0 | …(B) T repeats/write on board  () S2 is saying no  \* H: CP of 'Evaluate; judge' |
| 8.S2 | Static electricity exists in every material | R2.1 |  | H |  | \*H: Unusual answer |
| 9.T | Exists in all materials, how? | F | H |  | EL | \* H: CP of 'Understand; explain' |
| 10.S2 | Cause we know that any matter is neutral having protons and electrons. There're atoms and because a matter consists of atoms, then it has negative electrons and positive protons | R2.2 |  | H |  | \* H: CP of 'Analysis; organize' |
| 11.T | It has charges, so every matter generally # | F |  |  | C0 | # T is distracted and shut the door, S2 continues talk |
| 12.S2 | and also it doesn't move, means static electricity | R2.3 |  | H |  |  |
| 13.T | Ok, but electrons don't move (whiz?) around the nucleus? | F | H |  | EL | \* H: CP of 'Analysis, differentiate' |
| 14.S2 | Yeah, they go around but - I mean - they don't move in the whole material… | R2.4 |  | H |  | - pause  …skip some turns  \* H: CP of 'Analysis, organize; |
| 15.T | …what we call it electricity or moving charges, does it move inside the atom itself or move from one atom to another? | F | H |  | EL | …talk about the structure of the matter  \* H: CP of Analysis, differentiate' |
| 16.S2 | Moves from an atom to another | R2.5 |  | H |  | \* H: CP of Analysis, differentiate' |
| 17.T | This is S2's opinion. Good S2. She said that static electricity exists in conducting materials because the conductor is a matter and we got to know before that any matter consists of….  But If I ask you, is there an evidence, an experiment or something in which we saw static charges but in a conductor? Yes heat | F  I | H |  | C0 | …repetition  \* H: CP of 'Apply, implement' |
| 18.S3 | A conductor () | R3 |  | L |  | () T is distracted by something out the class, she shuts the door, and seems not to hear the answer so she repeats the question |
| 19.T | We've generated static charges in its place but it was in a conductor ()  Didn't we ever generated static charges but in a conductor? Didn't we? Yes heat | I | L |  |  | () No response from S3  \* L this time cause she is trying to remind the class with something has been done |
| 20.S4 | Van De Graaff generator | R4 |  | L |  | \* L: CP of 'Understand, exemplify' |
| 21.T | Excellent, Van De Graaff generator. A conductor, you remember when we talked about its parts. This is a matter (), we've said what its kind is? | F  I | L |  | Ev | () T lifts up the metal ball (sphere) of the generator which was there already in the lab |
| 22.Sg | A metal – A conductor | Rg |  | - |  | - some say: matter, some say: conductor  -not categorised: group answer |
| 23.T | What's its kind? | I | L |  |  | \* L: CP of 'Understand, classify' |
| 24.Sg | Conductor | Rg |  | - |  | -not categorised: group answer |
| 25.T | Conductor^.  Didn't the charges accumulated in its surface? | F  I | L |  | Ev | ^ Affirmation tone  \* L: CP of 'Remember, recall' |
| 26.Sg | Yeah | Rg |  | - |  | -not categorised: group answer |
| 27.T | Didn't I consider it in this case or didn't I consider it as charges that stand still on the surface of this matter? It's right that the electrons moved (), but at the end they are there on the surface of this conductor. They stand still on its surface. So they are not just on the surfaces on insulators, but they're also on the surfaces of which matters? The conductors.  When do they move from the surface of this conductor? When do they move? | F  I | L |  | Ev | () T means when electrons carried by the belt  \*L: CP of 'Remember, recall' |
| 28.S5 | When been touched by another matter,… | R5 |  | L |  | … S5 talks about ways to get the charges from this electrical machine |
| 29.T | Excellent. So, when it's been touched…  Ok, in this case, Is it right to say that the static electricity are just there in the insulators? () | F  I | L |  | Ev | …T repeats the previous answer and adds more  () T directs the question to S1 who said at the beginning of this episode that static electricity is only in insulators |
| 30.S1 | No. No they're there | R1.4 |  | L |  | \*L: CP of 'Remember, recall' |
| 31.T | Where? | F | L |  | EL | \*L: CP of 'Remember, recall' |
| 32.S1 | In all the matters | R1.5 |  | L |  | \*L: CP of 'Remember, recall' |
| 33.T | In all the matters. Conductors and insulators. Good.  Dynamic electricity. Does everyone agree with S1 that they exist only in conductors? | F  I | H |  | Ev | \*H: CP of 'Evaluate, judge'  () Group of pupils answer: Yeah |
| 34.Sg | Yeah | Rg |  | - |  | -not categorised: group answer |
| 35.T | Do any one agree…? ()  Why they're just there in conductors? Why we restricted them to conductors?... | I | H |  |  | … T repeats the question, () G of P: yeah  \* H: CP of 'Understand, Explain'  … T continues the I/A talk regarding this point |
| **Example 2** | | | | | | |
| 1.T | Give me examples of electric circuits? Think about the class here? A circuit, and tell me about its components if you can? Yes electric circuit () | I | H |  |  | () each girl in the class has been given a name related to the electricity topic  \*H: CP of 'Apply, execute' |
| 2.S1 | The laptop () | R1.1 |  | H |  | () S1 points to the laptop in the teacher's table  \* H: unusual |
| 3.T | The laptop# | F |  |  | C0 |  |
| 4.S1 | It's firstly, (…?) the electric charges come from the plug and they move through the wire that connects the laptop with the source, which is the plug | R1.2 |  | H |  | (…?) the exact words cannot be recognized  \* H: CP of 'Analysis, recognize' |
| 5.T | The laptop, so now is this a circuit? | F | H |  | EL | \* H: CP of 'understand, Explain' |
| 6.S1 | Not a circuit -- | R1.3 |  | L |  | -- hesitation |
| 7.T | You've said now that the plug is the source and we connect it to the laptop (B). Is this a circuit? Why did you say it's not a circuit? | F | H |  | EL | \* H: CP of 'understand, Explain'  (B) T draws on board |
| 8.S1 | Because it's just between two, the circuit must (…?) | R1.4 |  | H |  | (…?) inaudible  \* H: CP of 'Analyse, recognize' |
| 9.T | Between two things - means the current doesn’t go around in a circuit. If it's doesn't go around, how does it move? | F | H |  | EL | \* H: CP of 'Create, hypothesize' |
| 10.S1 | It goes back and forth | R1.5 |  | H |  | \* H: CP of 'Analysis, recognize' |
| 11.T | It goes back. So this is S1's opinion that current goes back and forth. This is an opinion that I want you to write in your notebook… and write your opinion. S1 explained to us the example of the laptop. Any laptop we see will be connected to a power source like that (). Is this considered a circuit? And if it's a circuit, then where is this circuit exactly? Remember this point cause we want to come back to it later to find out if it's a circuit, and if so, where is it? | F |  |  | C0 | … T reminds them with the notebook  () T points to the drawing on board |

**2. Characterizing the talk:**

|  |  |
| --- | --- |
| Class of the talk | Teacher-Pupil talk   * Example 1; Turns 1-17: I/D - Turn 17: NI/D * Turns 17-27: I/A - Turn 27: NI/A - Turns 27-35: I/A * Example 2; Turn 1-11: I/D - Turn 11: NI/D |
| Purpose of the talk | * Example 1: I/D: Exploring & Explaining pupils' views (Opening up the topic)   NI/D: Reviewing pupils' ideas  Authoritative1: Working on a pupil's scientific idea  Authoritative2: Developing a scientific idea   * Example 2, I/D: Explaining a pupil's view   NI/D: Reviewing / Questioning a pupil's view |
| Content of the talk | * Example 1: Scientific - Theoretical * Example 2: Scientific/Everyday - Theoretical |
| pattern of the talk | * Example 1; I/D: I-R1.1-EL-R1.2-C0,EL…-EL-R1.3-C0-I-R2.1-EL-R2.2-C0-R2.3-EL-R2.4-EL-R2.5-C0 , NI/D:--- * I/A: I-R3-I-R4-EV-I-Rg-EV-I-Rg-EV , NI/A:--- * I/A: I-R5-EV-I-R1.4-EL-R1.5-EV / (I-Rg-I-…)      * Example2; I/D: I-R1.1-C0-R1.2-EL-R1.3-EL-R1.4-EL-R1.5-C0 , NI/D: --- |

**3. Quantitative indicators**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | Co | El |
| Ex 1, Dialogic | 2 | 6 | 3 | 5 |  | 4 | 6 |
| Ex 1, Authoritative 1 | 4 | 1 | 2 |  | 3 |  | 0 |
| Ex 1, Authoritative 2 | 3 | 2 | 3 |  | 2 |  | 1 |
| Ex 2, Dialogic |  | 4 | 1 | 4 |  | 2 | 3 |

**4. Narrative account**

This is the first lesson to be videotaped after the training intervention, and how amazing is it to see a smooth shift between the four classes of talk from the first episode of this lesson. I chose hence part of this episode that manifests this shift. In addition, we have here a second example that is slightly short compared to the first one. If we start with the first example, we can see a shift in the communicative approach for five times, as follows; I/D-N/D-I/A-NI/A-I/A. The Dialogic part in this excerpt starts with the teacher asking for the difference between dynamic and static electricity. S1 provided, in response, an answer that shows an expected misconception regarding the confining of static electricity to insulators only. S1 also talked about dynamic electricity in conductors only. It's right scientifically, but then it is an expected thought to relate dynamic charges to conductors. The teacher, therefore, chose to pay a little more attention to discuss the view of static electricity. After taking a justification from S1 and making her answers obvious to the class through a number of turns, she opened the discussion to other opinions. It is then when another pupil; S2, declares her objection to S1's partial answer regarding static electricity. She follows her objection by offering the other sensible possibility that static electricity exists in insulators and conductors as well. Furthermore, the teacher asks for a justification, S2 offer a precise scientific view, the teacher challenges it by trying to confuse S2 in relation to the movement of charges, but S2 responds to this challenge by providing a brilliant analysis in differentiating between the movements of electrons inside the atom itself or that from one atom to another. So, what makes this part of talk Dialogic? And, on the other hand, what did this dialogic flavour add to the talk?

Let's answer the first question; why it is Dialogic? Because;

* It is opened to different points of view. And although the teacher listened only to two opinions, but these opinions represent, in fact, the only sensible views that pupils are likely to assign to the question about static electricity.
* Till the end of this part, it can't be noticed that the teacher did try to lead the discussion to a certain scientific view. Quite the opposite, she was trying to confuse the pupil who offered the right view. It is just in the Authoritative part following this Dialogic one when she tried to develop S2's correct view towards that scientific one.
* The talk here is devoid of any evaluative moves. Instead, comments and elaboration from the side of the teacher are flowing through the talk (I-R1.1-EL-R1.2-C0,EL…-EL-R1.3-C0-I-R2.1-EL-R2.2-C0-R2.3-EL-R2.4-EL-R2.5-C0). The teacher was commenting on the pupils' contributions by repeating or rephrasing their answers. She was also extending those contributions by asking for explanations and challenging their justifications.

So then, what did this dialogic manner add to the talk?

* Through the talk here, a misconception related to static charges, and its scientific modified view, both have been offered. This can be also imagined to happen through an Authoritative talk. However, without any positive or negative evaluation from the teacher through this dialogic manner, the misconception and its opposite scientific correction were opened to other pupils self-thought and self-argument. This supports, I would argue, the chance for other pupils' to be intellectually engaged with the discussed issue; the thing that is less likely to happen if the opinions have been closed down by approving or disapproving them.
* This talk starts with a complex question in the sense that it asks about two queries, and it is an open question also as the teacher does not specify a certain direction for the pupils in answering these queries as it appears in the question wording; what do you know?, What's the difference?. In terms of the cognitive process, however, I found it difficult to infer the cognitive level that the teacher is asking the pupils to implement in answering this question. Her successive dialogic manner, though, is what made it clear that she was asking a question of a high cognitive level. Although the first pupil's answers and some of the teacher's elaboration of these answers reflect low cognitive processes, the questions and responses that follow, show the opposite. Because of the dialogic attitude of the teachers in asking for; a judgment for the first pupil' opinion, a justification for that judgment and a challenging explanation for that justification, the posed questions and their received answers have been all of high quality as they showed high cognitive processes. This means that the dialogic manner has support the chance for high quality responses and successive high quality questions to manifest through the exchanged talk.

What has also supported the appearance of high quality questions and responses is the nature of the content. The scientific content of this Dialogic part has affected the purpose of the talk not to be of just exploring the pupils' ideas, but went on to explain the scientific background behind these ideas. Providing such scientific background is more likely to invite for high questions to be posed and high responses to be offered, through the explanations and justifications that need to be asked about.

If we move now to the Non-Interactive part of this Dialogic talk, we can see then the most common purpose of Non-Interactive Dialogic type; reviewing pupils ideas. Here we hear two ideas, but the NI/D part reviews the details of the second pupil's idea only. The first pupil's idea has been reviewed and made clear to the class through the talk happened in turn 5 and the skipped turns through (see remarks in turn5). Such an observation regarding the review of pupils' ideas through Interactive parts has been actually noticed in several episodes. It can be considered as part of the teacher's role in orchestrating the classroom talk.

The discussion of this issue continues in this episode, but it shifts to the Authoritative type. Instead of approving the second correct view of S2 directly, the teacher chose to do it slowly and indirectly, so they can conclude themselves that this a right idea. She did this by;

* opening an Interactive Authoritative discussion about evidence that shows practically that static electricity exists in conductors (i.e. Van de Graaff generator);
* providing a summary for how this evidence support the aforementioned point through a Non-Interactive Authoritative talk;
* Shifting the turn again to the first pupil who has showed the misconception about static electricity, and controls the talk intellectually, in the way that led S1 to correct herself the misconception she early showed.

If we try therefore, to summarize the 5-step shifts in this example, it would be useful to follow the purposes, the content, and the kinds, quality and patterns of moves of the Authoritative part in regard to the Dialogic part:

* Purpose of the talk: We have seen through the Dialogic part how the teacher did implement the dialogic manner in identifying, explaining and reviewing major pupil's ideas. In this Authoritative part, she picked up the right opinion, worked on it by relating it to old scientific information through a certain scientific example, and finally developing the desired scientific idea;
* Content of the talk: A theoretical scientific content has been the focus through the Dialogic part of exploring the pupils' opinions. Naturally, in the Authoritative part, the teacher needed to keep this kind of content as she was trying to develop those opinions towards the precise scientific view;
* Kinds, quality and pattern of moves: As evaluative moves were absent from the Dialogic part, they just dominate the follow-up move through this part (I-R3-I-R4-EV-I-Rg-EV-I-Rg-EV / I-R5-EV-I-R1.4-EL-R1.5-EV ). In terms of the quality, we have seen how the dialogic manner opens the chance for high quality question to be posed by the teacher, and high quality answers to be offered by S2. The Authoritative part, though, has been short of high quality moves because, simply, the talk here has taken place to just develop S2's opinion that has been already justified and explained through moves of high quality in the part before. Though, we need really to focus here on an observation that I has come through in another example of Authoritative talk with the second teacher through the first stage. The Authoritative part here did actually start with a question of high cognitive level (I in turn 17). The teacher, however, was aiming at this stage, to support S2's right opinion. So, when she gets the vague response of 'Conductors' (turn 18), she immediately, in turn 19, repeated the same query of turn 17, but this time with a low cognitive level; How is this so? To answer this, we need to compare between the two questions in turns 17 & 19. In turn 17, the teacher was asking for unidentified, unclear and may be an abstract evidence or example to support a scientific hypothesis, which gives the question its high quality. In turn 19, though, she gave a hint about a specific example that the pupils have went through once, and which was there in the lab. The hint worked and S4, immediately, offered the teacher the answer she was looking to which she was directing the pupils. What I want to say here, that the authoritative attitude did influence the quality of the question and consequently, the quality of the response because it stimulated the teacher to lessen the high level of the first posed question to a lower level, that can increase the chance of pupils providing her with answer she is aiming for.

This example, therefore, is distinguished with the harmony in shifting the types of the talk; the shift that entailed a gradual growth of the purposes, starting with pupils' opinions regarding certain scientific content and ending with the scientific precise view. It entailed a managed control from the teacher between confining her follow-up moves to just commenting or extending pupils' contributions, or practicing her intellectual control in evaluating such pupils' contributions

The second example exhibits a short Dialogic type of talk entailing both Interactive and Non-Interactive parts. Although the excerpt here starts with a question that looks of a scientific content as it asks for examples of electric circuits, it invites, in fact, the pupils to engage their personal experience in giving these examples. Basically, the teacher has not explained at this stage yet the details concerning electric circuits; its components, essentials, functions…etc (see the examples in lesson 2). In asking this question, she was, actually, relying on the pupil's previous experience with electric circuits, whether from everyday life or from school experience, the thing that contributes to assigning high quality to this question. Meanwhile, it seems that the teacher was aiming to identify pupil's knowledge or preconceptions of electric circuits through their explaining of the examples they give.

When the teacher asked for examples from the class, an expected answer would have been a battery connected to a bulb as these components were there in the front bench of the lab. S1 did pick something from the teacher's bench, but wasn't the simple circuit of the battery/bulb. She picked the example of the laptop which surprised the teacher initially. The teacher then was repeating the answer with a face expression that indicates that she was thinking about it. S1 interrupted the teacher's comment to provide an explanation of how the electric current moves to reach the laptop. The teacher provided then an elaboration question to examine S1's view. S1 herself, without any negative evaluation from the teacher, changed her mind by stating that this is not a circuit. The truth is that her attempt to explain the route of the current from and to the laptop has confused her. So, she was not actually negating the idea of the laptop as a circuit when she said, hesitantly; 'Not a circuit (turn 6). She was, in fact, thinking loudly, about it. With a dialogic attitude, the teacher kept probing S1's ideas, by asking her to apply, explain and generate hypothesis. S1, in response, was trying to analyse; to recognize how the elements behind the example of the laptop work together in relation to what she knows about electric circuit.

Then again, if we asked ourselves, what did the dialogic manner in this example add to the talk? The obvious answer would be the high quality of the questions and responses. Yes, the excerpt here started with a question of a high level that might justify the continuity of high quality through this excerpt, but so did the Authoritative part in the previous example. We saw, however, how the teacher has changed the level of the question in the Authoritative example in order to get to the desired response. In this example, though, the teacher kept asking high level questions in her elaboration of S1's answers that stimulate S1 to try to think deeply about those questions, to result eventually in responses that indicate high cognitive processes going inside S1's mind.

In relation to this Interactive part of this Dialogic example, lastly, we can refer to the different elements that for and by which the talk took its dialogic essence;

* The purpose of the talk for not exploring, but explaining in details one pupil's ideas
* The content of the talk that invited for the pupil's personal experience of electric devices to interact with the scientific account of electric circuits
* The pattern of the moves in which the elaborative follow-ups kept revealing S1's thoughts and the neutral comments kept the teacher away from approving or disapproving those thoughts (I-R1.1-C0-R1.2-EL-R1.3-EL-R1.4-EL-R1.5-C0).

Lastly, it would be interesting to highlight the purpose of the Non-Interactive Dialogic part that followed the Interactive one. It is a distinguished purpose in the sense that the teacher was not just reviewing S1's thoughts, but she was addressing also her confusion by speaking it out through several questions that have been left open for a number of lessons.

Analysis of Case 2, Stage 2, Lesson 2, Episode 2,5 & 6

**1. Analysing the talk:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | I | R | F | Remarks |
| 1.T | …Let's listen to the group of electric potential, what's your view? The first activity, Is it necessary to have wires in the circuit? The answer of the Voltmeter group was no. It can be without the wires themselves, but may be a piece of iron in the circuit that represents what? A conductor and so we can have an electric circuit. Other opinions. The group of electric potential. Do you wanna add anything to their answer? | F  I | H |  | C0 | … T continues the talk that started in the previous lesson in which she gave them some written activities to discuss regarding what is necessary to form an electric circuit  \* H: CP of 'Create; hypothesize' |
| 2. S1 | It needs wires | R1.1 |  | L |  | \* L: usual |
| 3.T | So in general the wires. So, it can't be a piece of iron? | F | H |  | EL | \* H: CP of 'Analysis, differentiate' |
| 4. S1 | It can be. But the wires are made of iron. Means a conducting matter | R1.2 |  | H |  | H: CP of 'Analysis, recognize' |
| 5.T | It has to be a metal, a conductor. Ok, this is an opinion.  Ammeter group, do you have other opinions? | F  F | H |  | C0  EL | \* H: CP of 'Create; hypothesize' |
| 6.S2 | It doesn't have to be wires. It's necessary to be a conductor, but doesn't have to be wires or the matter itself is solid. That matter can be a liquid or I mean | R2.1 |  | H |  | \* H: CP of 'Create; hypothesize' |
| 7.T | Liquid like what? | F | H |  | EL | \* H: CP of 'Understand; explain' |
| 8.S2 | like water | R2.2 |  | H |  | \* H: based on the explanation in turn 10 |
| 9.T | Water! | F |  |  | C0 |  |
| 10.S2 | Water if being added to substances that help on conducting electricity, it will be a good conductor | R2.3 |  | H |  | \*H: CP of ' Create; generate' |
| 11.T | Excellent your group.  Ammeter group did mention indeed - Ammeter group has said that it's necessary to be, yes a conductor matter, but it's not a basic condition that the matter is a solid or wires. It's not necessary. We've talked about the existence of a liquid.  We've had an electric circuit that contains a liquid. It was a circuit and it worked. In the chemistry chapter we did a practical activity in which we used a liquid, Yes S3 | F  F  I | L |  | Ev  C0 | * pause   \* L: CP of 'Remember, recall' |
| 12.S3 | In separating water into Hydrogen and Oxygen | R3 |  | L |  | \* L: CP of 'Remember, recall' |
| 13.T | Excellent, Indeed, in separating-which is, the electrolysis of water.  What's the substance we've used? Yes S4 | F  I | L |  | Ev | \* L: CP of 'Remember; recognize' |
| 14.S4 | Calcium Chloride | R4 |  | L |  |  |
| 15.T | Not chloride. We used it in the electrolysis of water… | F , I | L |  | Ev | …I/A talk continues till T reaches the answer of 'Sulphuric Acid, H2SO4', and then summarizes the main points in the electrolysis of water through the I/A talk |
| 16.T | This is what S2 has talked about, that this is an electric circuit which works, but I have not put a wire between these two ()…this solution is not a solid matter.  So, is it essential that the electric circuit contains wires? | F  I | L |  | Ev | () T refers to the two bars in a simple drawing of the process done by her in board and continues the NI/A talk |
| 17.Sg | Noo … | Rg |  | - |  | …T opens an I/A talk in successive turns to review with the class the final saying about the importance of wires in the electric circuit and its alternatives |
| Example 2 | | | | | | |
| 1.T | .. Based on your discussions, what's the role of the battery in your opinion? Yes | I | H |  |  | \* H: CP of 'Create, hypothesize' , open-ended |
| 2.S1 | The battery just pushes the electrons, then the electrons- It just give orders to the electrons to move | R1 |  | H |  | - pause  \* H: Unusual, CP of Create |
| 3.T | A good probability. Good. Her opinion is that the battery only gives orders to move. Let's hear other views, yes | F  I | H |  | C0 | \* H: CP of 'Create; generate hypothesis' |
| 4. S2 | The battery moves the charges, the electrons | R2 |  | H |  |  |
| 5.T | So, the battery gives^ electric charges? | I | H |  |  | \* H; CO of ‘Understand, explain’ |
| 6.Sg | No | Rg |  | - |  | -not categorized; group answer |
| 7.T | Does the battery produce^ charges? | I | L |  |  | \* L: repetition of the question in turn 5 |
| 8.S3 | No | R3.1 |  | H |  | \* H: based on the explanation in turn 10 |
| 9.T | So, what's its role? | F | H |  | EL | \* H: CP of 'Understand, explain' |
| 10.S3 | Move the charges | R3.2 |  | H |  | \* H: CP of 'Analysis, differentiate' |
| 11.T | Move the charges, helps in moving the charges. Ok, beautiful.  Are there other opinions? | F  I | H |  | C0 |  |
| 12.S4 | I say it produces charges | R4 |  | L |  | \* L: usual, expected |
| 13.T | Produces charges. So her opinion that it produces charges, beautiful. This is a second opinion. Let’s see other opinions, yes resistance, what do you think? | F  I | H |  | C0 | \* H: CP of 'Create; generate hypothesis' |
| 14.S5 | It gives charges cause it has positive and negative charges | R5 |  | L |  | \* L: Usual, expected |
| 15.T  16.T | And the battery produces these charges and provides it to the current. Beautiful opinions. Now, we'll try to work on two activities to see if the battery produces the electric charges or basically it just move them?  If I told you that I want a simple experiment using the following apparatus:…. How I do design two experiments to test whether the battery is a producer or a mover of the charges?... | F  I | - |  | C0 | …T continues instructive NI/A talk after which the class starts group work & discussion |
| Example 3 | | | | | | |
| 1.T | …Let's listen to your designs. The Voltmeter group | I | H |  |  | …This excerpt follows the groups’ work that took place after the excerpt of the previous example |
| 2. S1 | In the first experiment …we connect one wire to the Galvanometer... | R1 |  | L |  | …Account on the design  \* L: the design reflects low CP |
| 3.T | Beautiful. Here they used two experiments, one with a battery and one without. Yes, your group | F |  |  | C0 | \* H: CP of 'Create; generate hypothesis' |
| 4. S2 | The first experiment, we connect… | R2 |  | L |  | \* L: the design reflects low CP |
| 5.T | Good, your group | F |  |  | C0 |  |
| 6.S3 | We have a galvanometer with a battery and wires, long wires #, and we use the second time the same but short wires and see if - if - and we use a bulb and see which one- I mean lights faster, lights first | R3.1 |  | H |  | # T iterates: beautiful  - Pause  \* H: Unexpected |
| 7.T | So, if it lights first, what does this indicate? Based on your assumptions, if it's faster. If in one circuit lights faster than the other one, what does this mean? | F | H |  | EL | \* H: CP of 'Analysis, recognize' |
| 8.S3 | thaaaat - I mean - moving | R3.2 |  | L |  | - Pause |
| 9.T | Mover of charges? | F | L |  | EL |  |
| 10.S3 | Yeah, and the second producer of charges, So, it's the one who produce, the resource | R3.3 |  | L |  | \* L: CP can't be judged here, but the justification is insensible |
| 11.T | Ok. Let me give you a design for a circuit with long wires in a way and two galvanometers… | F , I | L |  | C0 | … T continues NI/A talk |

**2. Characterizing the talk**

|  |  |
| --- | --- |
| Class of the talk | Teacher-Pupil talk   * Example 1; Turn 1: NI/D - Turns 1-11: I/D - Turn 11: NI/D   Turns 11-…16: I/A - Turn16: NI/A - Turns 16-…: I/A     * Example 2; Turns 1-15: I/D - Turn 15: NI/D - Turn 16: NI/A * Example 3; Turns 1-11: I/D - Turn 11, NI/A |
| Purpose of the talk | * Example 1, NI/D1: Reviewing pupil's view , I/D : Exploring more pupils' ideas   NI/D: Highlighting certain pupils' ideas  I/A : Relating these ideas to the scientific view , NI/A: Putting together pupils/scientific ideas  I/A: Confirming the right scientific account     * Example 2, I/D: Exploring pupil's views , NI/D: Reviewing pupils' views   NI/A: Introducing a teaching task     * Example 3, I/D: Explaining pupil's suggestions , NI/A: Introducing a teaching task |
| Content of the talk | * Example 1, D: Everyday - Theoretical , I/A, 1: Everyday/Scientific Theoretical/Empirical   NI/A: Everyday/Scientific – Theoretical , I/A, 1: Scientific – Theoretical   * Example 2, D: Everyday – Theoretical   NI/A: Scientific – Theoretical/ Empirical   * Example 3, D: Everyday/Scientific – Theoretical/Empirical   NI/A: Scientific – Theoretical/ Empirical |
| pattern of the talk | * Example 1; NI/D:--- (C0) , I/D: I-R1.1-EL-R1.2-C0,EL-R2.1-EL-R2.2-C0-R2.3-Ev,C0   I/A: I-R3- Ev-I-R4-EV-I-Rg-EV-I-…-EV , NI/A:--- (Ev) , I/A: I-Rg…     * Example 2, I/D: I-R1-C0-I-R2-I-Rg-I-R3.1-EL-R3.2-C0-I-R4-C0-I-R5-C0  , NI/D, A:--- * Example 3; I/D: I-R1-...C0-R2-...C0-R3.1-EL-R3.2-EL-R3.3-C0-I… , NI/A: --- |

**3. Quantitative indicators**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | Co | El |
| Dialogic, 1 |  | 4 | 1 | 4 | 1 | 3 | 3 |
| Dialogic, 2 | 1 | 6 | 2 | 4 |  | 4 | 1 |
| Dialogic, 3 | 2 | 2 | 4 | 1 |  | 3 | 2 |
| Authoritative | 3 |  | 2 |  | 3 |  |  |

**4. Narrative account:**

From this lesson, the second to be videotaped after the training intervention, we have again very interesting examples in terms of different dimensions that I try to highlight through this qualitative account. We have here three examples, all of which contain the alternating binary of I/D-NI/D, but meanwhile, each of which demonstrate distinctive features in their characterization.

The first example offers another illustration of a 6-step shift between the four classes of the talk. This example is very similar to the first example in the previous lesson. They are similar not just in terms of the shift between the different classes, but most importantly in terms of the nature of the change of the teacher's manner from Dialogic to Authoritative. Before jumping to explaining this change, we need to first analyse the Dialogic part with which this example commence.

The initial distinctive thing about this excerpt is that it starts with a follow-up move through a NI/D talk. What is the teacher exactly following-up? At the last stage of the lesson before (Lesson 1), the teacher started listening to the pupils' thoughts about the essential elements for an electric circuit to work. She then picked up the element of wires and instructed the groups to have a small discussion about it. She listened to the first group comment regarding the discussed issue before the lesson ends. Through the first episode of this lesson, the teacher revised the overall elements though the succession of I/D and NI/A talk. After finishing with the general account about the circuit's elements, she allocated the talk to the element of wires, and here where this example starts (episode 2). So, she started reviewing the first group's view that has been already explained in the previous lesson. This means that she was following-up the group's contribution through a NI/D manner.

She then pursues listening to other groups' views. Going through the excerpt starting with the high quality question in turn 1 till S2's contribution in turn 10, shows unquestionable Dialogic talk. Turn 11, however, stimulates a considerable doubt about this judgment. In a first glance, the word excellent, in turn 11, suggests that the teacher was waiting for this answer and once she got it she approved it instantly; an act characterising usually Authoritative type of talk. So why have I categorized it as Dialogic? Based on deeper thinking about the broad context of this excerpt, I would say;

1. The act itself of listening to the groups' views about this particular point has started from the lesson before. Through a dialogic behaviour, the teacher did listen to three groups' views, and the three were going around the same thought which reflects, meanwhile, the scientific point of view. In spite of this, the teacher did not provide any kind of evaluation.

2. It is just in turn 11 when she spoke out the word 'Excellent'. Giving the context in which this word has been uttered, listening to the teacher's intonation and watching her expression, draws a picture of an excited teacher with unexpected response from a pupil; an excitement that appeared naturally in her reaction. So, she wasn't really planning to evaluate the group's contribution yet.

3. But then, she did, and the discussion has ended up with an evaluative move. I'm arguing, however, that this move cannot set aside the dialogic behaviour of all the long talk started from the lesson before. This judgment can be also supported by the teacher's subsequent reaction in turn 11. She held back after uttering the 'Excellent' comment, and did not keep on the evaluative move. Instead, we hear a neutral utterance of;

''Ammeter group did mention indeed – Ammeter group has said that it's necessary to be, yes a conductor matter, but it's not a basic condition that the matter is a solid or wires. It's not necessary. We've talked about the existence of a liquid''

In this short neutral move, the teacher was reviewing actually the pupil's view not as part of her organization of the talk (as in turn 5, for example), but rather for closing the open discussion and starting to direct it to certain end. This is, in turn, what makes it a Non-Interactive Dialogic type of talk. The authoritative attitude dominates then the rest of this episode through a chain of I/A, NI/A and I/A talk. Generally, If we go back to the first example from the previous lesson, we can see just the same scenario in shifting from Dialogic to authoritative mode of guiding the talk, except for the word 'Excellent'. It's the same scenario of ; the teacher listening to a number of ideas; eventually, a pupil initiates a remarkable point; the teacher get excited about it; she picked it up, review the pupil's account of it and it's then when she shifts to the authoritative direction to explore that point and tries to make it clear to the whole class.

Let's now discuss the whole episode in terms of the usual aspects of;

* Purpose of the talk: the significance of the shift between the four classes of talk in this episode can be obviously captured through the sequence of the purposes; Reviewing previous-mentioned pupil's views, exploring more of pupil' ideas, highlighting certain pupils' ideas, relating these ideas to the scientific view, putting together the pupils' and scientific views and finally confirming the right scientific account.
* Content of the talk: It seems a bit confusing trying to differentiate between everyday/scientific content as the pupil's views in this example are compatible with the scientific one. But then, it might be helpful to rely on pupils' views per se as an indicator of everyday content. It would be also interesting to examine the shift of the types of talk through the content lens. Through the whole Dialogic part with its three divisions (NI/D, I/D, NI/D), the content remained within the 'everyday/theoretical' categories. Although the stimulated everyday views were scientifically correct, they were not regarded as scientific at the time of the talk, and so we consider them as everyday. When the teacher, however, was trying to relate them to the scientific account through the first two divisions of the Authoritative part (I/A, NI/A), then the content developed to be both everyday and scientific. In the meantime, the teacher tried to support the theoretical everyday/scientific view with empirical evidence. Through her explanation of this evidence in the first I/A excerpt, the content took the categorization of both theoretical and empirical. In the last excerpt of the Authoritative part (second I/A), the teacher guided the talk to be of theoretical scientific content only, as she needed to confirm the scientific point of view through that final excerpt. The nature of the content has developed with the development of the purposes from; everyday-theoretical, everyday/scientific-theoretical/empirical, everyday/scientific-theoretical to scientific-theoretical at the last of the episode.
* Kinds, quality and patterns of moves: A very definite comparison can be drawn between the Dialogic and Authoritative parts in terms of the three elements;
* Kinds; The Dialogic is restricted with one initiation, but full of multiple responses and follow-ups that have been built over that one initiation. The Authoritative, though, has progressed with I/R ratio of approximate 1: 1. Secondly, the Dialogic is dominated by comments/elaborative follow-ups, where the Authoritative one has been devoid of any of which. Quite the opposite, the Authoritative has been dominated by the evaluative move, where the Dialogic one was short of it, except for the exceptional one at its end.
* Pattern; the pattern of I-R-F-R-F has specified in general the Dialogic part, where in the Authoritative one, the simple, conventional pattern of I-R-F took over. The pattern of the Dialogic got even more complicated with; a start of F instead of usual start of I and existence of two types of follow-up moves within the same turn (see turns 5 and 11).
* Quality: Again the Dialogic talk is distinguished with its high-level questions and responses, whereas moves of low-cognitive processes go over the Authoritative part. The teacher has called for the high cognitive processes of understand, analyse and create through her imitation and elaborative follow-ups for the pupils in the Dialogic excerpt, and so were the pupils' responses. In the Authoritative two excerpts, though, the teacher was asking for low cognitive processes of recalling, recognising by repeating or confirming scientific information, and the pupils were just doing so. So, 'Higher-level questions begot Higher-level responses'

Second example: here we have an Interactive/Dialogic talk with the purpose of exploring the pupil's views regarding the role of the battery. After repeatedly raising two main opinions by pupils, the teacher takes the verbal authority over the talk to; firstly; restate these opinions dialogically (NI/D) and secondly; introduce a teaching task (NI/A) that pupils are required to perform in relation to investigating those two opinions. Through the Dialogic excerpt, we see two pupils providing remarkable opinions that are compatible with the right scientific view. Though, such views have been initiated as pupils' personal thoughts and have not been evaluated, the thing that didn't give a space for the scientific view to be clear. The content of the Dialogic part, therefore, is of personal views regarding theoretical scientific content.

This excerpt starts with a question of a high cognitive level that motivated the pupils to generate hypothesis about the role of the battery. The responses reflect both; low cognitive processes manifested through usual, expected thinking of the battery as a producer and high cognitive processes manifested through unusual, unexpected thinking of the battery as a pusher. Quantifying the quality of the responses, though, shows a ratio of 5-2 high to low. Why was the excerpt dominated by high quality when the two views of low and high level have both been raised? In fact, when the teacher posed the high level question about speculating the role of the battery, the immediate response she got was going around the battery as a pusher; an idea that is considered unusual in its context. The teacher asks for another opinion, and again another pupil insists on this scientific view that reflects remarkable thinking about the battery. It seems that the teacher wanted to make sure that the pupils mean really what they say; that the battery is a pusher. So she asks the questions in turns 5 and 7 in which she stresses the words; gives & produce, and again she got the same answer from a larger group of pupils. The Dialogic talk, therefore, could not just stimulate high quality responses, but reveals also the existed views of the pupils that can specify for the teacher their starting point that can be useful for in planning her teaching

Lastly for this example, there is another distinctive feature regarding the pattern of moves. In Dialogic talk usually, we see a small ratio of initiations to responses. Here, however, we have the ratio of 1:1 as there is the same number of questions and answers (I-R1-C0-I-R2-I-Rg-I-R3.1-EL-R3.2-C0-I-R4-C0-I-R5-C0). This is, however, is an exceptional Dialogic excerpt, and the ratio here can actually be justified with the aforementioned explanation regarding the remarkable views offered by the pupils that motivated the teacher to keep on asking to make sure from what has been said. This can explain, in turn, why she has not provided any kind of follow-up for a number of turns (I-R2-I-Rg-I-R3.1).

As mentioned above this I/D excerpt has been followed by a NI/D talk to state the two major opinions that the teacher has expected to be raised by the pupils. The context indicates that the teacher planned the teaching, expecting the pupils to provide these two opinions, to give the pupils the chance to speak their thoughts out by asking them to offer their opinions. Her planning continues to designing activities to test the two views. So, in the last turn, after reviewing the opinions, she directed the attention to the progressive step of testing the presented views through an instructive Non-Interactive talk. Although this talk has been categorized as NI/A, it is strange that it is still built around the two pupils' opinions.

The third example looks like a short excerpt. The truth is that it is quite a long exchange of talk as its purpose was not of just exploring pupil's ideas, but to give them the chance to explain these ideas. This might be also influenced by the nature of the high level question firstly initiated, that asks pupils for ideas on designing an experiment to test two opposing ideas. The teacher listened to a number of groups’ designs. In explaining their designs, the pupils have higher verbal dominance over the talk. In the displayed excerpt, however, I skipped lots of the pupils' talk that was reflecting simple attempts with expected thinking that did not provide any meaningful design. The excerpt displays, though, the whole account of the third group design (starting from turn 6), in which S2 offers an outstanding idea reflecting her group's design. She talked about the idea of the big circuit that I have introduced to the teachers though the training intervention (see the account on the training intervention). It's amazing how the group came up with such good idea within few minutes of discussion. Needless to say, that the dialogic nature of the initiated task has created the chance for such idea to be aroused. So, when this brilliant idea has been stimulated, how did the teacher react to it? The excerpt shows the teacher elaborating the pupil' idea, and the exchange between the two lasts for several turns before the teacher ends it (6-11). However, looking at the teacher's first follow-up to S2's response reveals a mistaken resolution of the design. The pupil wasn't talking about two circuits, but she was talking about one circuit to be observed twice under one different condition (the length of the wires). In response to the strange, mistaken uptake of the teacher, S2 got confused and provide a vague answer. The exchange continues with contributions that I cannot really understand the point behind or what thoughts they exactly reflect. Following this excerpt instantly, the teacher introduced an experiment; already planned by her, and the teaching continues around this experiment. So, the question will be here, why did the teacher ask the groups for their opinions, when she has not used them in any way in spite the remarkable precise design proposed by S2? Why did she act in such a neglectful behaviour towards a brilliant idea, and instead of helping the group to refining it, she (with her as a reference in the pupils' eyes) directed the idea towards a total mistaken formation? Therefore, although this excerpt is Dialogic per se, the teacher reactions to the stimulated ideas in successive excerpts show a high authoritative manner. This example can be used to show that one Dialogic excerpt doesn't show in itself a dialogic attitude or reflect dialogic teaching. It is how this excerpt fit with pre- or post- excerpts that can tell about dialogic teaching.

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

**1. Analysing the talk:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | I | R | F | Remarks |
| 1. S1 | … How do they move at the same time? | IS.1 | H |  |  | … S1 is asking about an experiment suggested by the teacher to investigate if the battery is a producer or pusher. T explained that if battery is mover then the pointers of two galvanometers in the circuit will deflect at the same time, but S1 can't relate this expectation to the assumption of the battery as a mover. As she demanding for a detailed and convincing explanation, It's therefore H\* |
| 2.T | They will move at the same time. This is if the electrons start moving at the same moment | RT.1 |  | L |  | \* L because T repeats what she have said before without adding more explanation |
| 3. S1 | It can’t be at the same time | FS.1 | H |  | EL | \* H: following the categorization in Turn 1 |
| 4.T | We’ll see. We’ll see. Is it right, because if it (battery) produces, the first works then the second, Ok? ()  If they moved at the same time, this means the two got electrons at the same moment, right? Again # | RT.2 |  | L |  | \* L: because T is repeating what she have provided as an explanation before and which didn't convince S1 |
| 5. S1 | How? In one side, the electrons go | FS.2 | L |  | EL | \* L: reflects a usual misconception |
| 6.T | This is what we wanna see. Do the electrons really move from one side to reach the other one, or they're just there in the circuit? All what happen to them is a pull act^ ()-nothing more than this. You get it?  This is what we'll examine. Is it clear? Is it like this? The electrons are basically there in their places ready to go. You just give them the signal and they start moving at the same time like a lane, you know the chairs game…at a moment, there will be a voice ordering them to start moving, they all start going around at the same time? Right? You know this game? | RT.3 |  | H |  | \* H: CP of 'Analysis, deconstruct'  ^ Affirming tone  () T is acting the pull using her hand  … T talks about the game |
| 7. S1 | So, it's the same there | FS.3 |  |  | C0 | Based on the her tone: S1 is not asking here, It’s just like she is thinking loudly |
| 8.T | This will be happening in the circuit if the battery is a mover, if the battery is who give the order and make them all move at the same time | FT.1 |  |  | C0 | () different answers can be heard by pupils |
| 9. S1 | It can't be Miss at the same time cause from the same direction they go. I mean one before | IS.2 | H |  |  | \* H: Following Turn 1 |
| 10.T | Oh S1, this is what I'm saying. We have two ideas, whether the electrons start, start ^ from the battery and this means it produces. Or it wasn't, as a movement, starting from the battery (). They're not coming from a certain side of the battery, all work at the same time, you see? () This will indicate it's just a mover, you got the idea?() Ok girls? Anyone has any objection or have another idea? yes | RT.4  IT | H | H |  | ^ Affirmation tone  () S1: Ahaaaa  () S1: Yeaah  () S1 is nodding approvingly  \* H: CP of 'Create, generate hypothesis’ |
| 11.S2 | You mean the electrons-You mean they're there? | IS2 |  | L |  |  |
| 12.T | I don't know… | RT |  |  |  | …T continues another I/D, NI/D piece of talk |
| Example 2 | | | | | | |
| 1. S1 | … Miss, I don’t see that the battery is a producer | IS. | H |  |  | … This talk comes after the I/D, NI/D piece mentioned in the last remarks of the previous example. |
| 2.T | We’ll see. You know, we’ve said, Is the battery essential to have a current? # | RT |  | L |  | # T is interrupted by S1. By interrupted, T didn't have the chance to complete her response still around the argument of the battery; producer or mover. By asking the Q, she wasn't looking for an answer. It's just her habit in articulating words as interrogative statement sometimes |
| 3. S1 | Noo | R1.1 |  | L |  | - thinking that T is asking her a question, she provided this response which surprise T |
| 4.T | Not essential. So you’ve noticed that it works without a battery? | F | L |  | EL |  |
| 5. S1 | Yeah. I mean it didn’t work, but we can design an experiment without a switch. without a battery as a source of electricity, current | R1.2 |  | H |  | - based on the tone of this sentence, S1 just made a mistake in saying switch |
| 6.T | Yeah, but what can you use? Example | F | H |  | EL | \* H: CP of ‘Understand, explain’ |
| 7. S1 | We can use substances that give, I mean electrons | R1.3 |  | H |  | \* H: CP of 'Analysis, deconstruct' |
| 8.T | Like? | F | H |  | EL | \* H: CP of ‘Understand, explain’ |
| 9. S1 | An example, of course there is no example, cause this needs # | R1.4 |  | - |  | # S1 is interrupted by T, and so R is not complete to be judged |
| 10.T | No, there is. There is example. I give you a simple example, which is the electrolytic solution that you’ve offered before (). Right? The solution of Sodium Chloride. It can work as a battery cause it split into something # yeah # lemon. In this case you need…  It’s about the word battery. What its’ role? The battery can be different types…that what do in the circuit, and without its existence there, what will happen to the circuit? Without it is there, will the circuit work? S1 is still convinced that the circuit works | F  I | L |  | Ev | () She is the one who mentioned that a liquid can do the work of wires in the circuit  # While talking, T got interrupted different times by suggestions different alternatives to the known battery, and T was commenting on some of these suggestion but keep the control over the talk to herself |
| 11.S1 | Yeah, the circuit works | R1.5 |  | L |  |  |
| 12.T | So the bulb lights? | F | L |  | EL |  |
| 13.S1 | Yeah, I mean the batteries with their different kinds. If we didn’t put them, the bulb lights | R1.6 |  | L |  |  |
| 14.T | The bulb lights without the battery?! | F | L |  | EL |  |
| 15.S1 | I mean other substances apart from the battery | R1.7 |  | L |  |  |
| 16.T | Ok, other substances. Like what? | F | L |  | EL | \*L: CP of ‘Understand, exemplify’ |
| 17.S1 | Like the natural substances | R1.8 |  | L |  | \*L: CP of ‘Understand, exemplify’ |
| 18.T | Like the lemon, the lemon is a battery | F |  |  | Ev |  |
| 19.S1 | Yeah, this is what I mean | R1.9 |  | L |  |  |
| 20.T | This means you still put a battery even if it’s natural #. Battery is a battery at the end () | F |  |  | Ev | # T is interrupted by S1 saying: Noo  () continues arguing about it suggesting that rays can be directed to the circuit to stimulate electrons to move. At the end of this excerpt the teacher just ends it to do the practical activity to test if the battery; producer or mover |

**2. Characterizing the talk:**

|  |  |
| --- | --- |
| Class of the talk | Pupil-Teacher talk   * Example1, Turns 1-6 : I/D - Turn 6: NI/D - Turns 6-10 : I/D - Turn 10: NI/D * Example2: Turns 1-10: I/D   Teacher-Pupil talk   * Example2: Turn10: NI/A - Turns 10-20: I/A |
| Purpose of the talk | Pupil-Teacher talk   * Example1, I/D, 1,2: Responding to a pupil negotiating a proposed idea based on pupils' contributions   NI/D: Justifying the proposed idea   * Example2, I/D: Responding to a pupil challenging a scientific idea   Teacher-Pupil talk   * Example2, NI/A: Explaining a scientific idea   I/A: Challenging the pupil's view in favour of the scientific idea |
| Content of the talk | * Example1: Personal/Scientific views of Theoretical Scientific content * Example 2; I/D: Personal view of Theoretical Scientific content   NI/A: Scientific view of Theoretical Scientific Content  I/A: Personal/Scientific views of Theoretical Scientific content |
| Pattern of the talk | * Example1, I/D: IS-RT.1-FS (EL)-RT.2-FS (EL)-RT.3 - NI/D: --- (RT.3)   I/D: RT.3-FS (C0)-FT (C0)-IS-RT.4-(IT-IS2-RT…) - NI/D: --- (RT.4)   * Example2, I/D: IS.1-RT-R1.1-EL-R1.2-EL-R1.3-EL-R1.4-Ev - NI/A: --- (EV)   I/A: I-R1.5-EL-R1.6-EL-R1.7-EL-R1.8-EL-R1.9-Ev |

**3. Quantitative indicators**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | C0 | EL |
| Ex1, Dialogic 1 | 1 | 1 | 1 | 2 |  |  | 2 |
| Ex1, Dialogic 2 |  | 1 |  | 1 |  | 2 |  |
| Ex2, Dialogic | 1 | 3 | 2 | 2 | 1 |  | 3 |
| Ex2, Authoritative | 4 |  | 5 |  | 2 |  | 3 |

**4. Narrative account**

The examples here are different from the ones before as the talk is initially initiated by pupils. The two have been initiated by pupils strongly negotiating some of the views presented by the teacher. The categorization of such excerpts of pupil-teacher talk is quite tricky, not just in terms of the class of the talk, but also in terms of the other aspects included in the first part of the framework.

In doing the categorization of the class of the talk in such excerpts, we need always to remember that this is not a talk initiated by the teacher in relation to a certain purpose. We need to remember that as the basic question is coming from a pupil, the teacher has to respond to the pupil's inquiry. So, it has to be directed to a certain ending; the thing that when happen in teacher-pupil talk, constitutes a main indicator of authoritative manner and certainly this cannot be the case in pupil-teacher talk. Additionally, in categorizing the teacher-pupil talk, the practicing of the evaluative move is another main indicator, but this type of follow-up do not exist in pupil-teacher talk unless the control over asking questions goes back to the teacher. So then, what will be the criteria to judge the type of the talk whether Authoritative or Dialogic?

To answer this question, I focus on two main aspects. Before doing this, though, I would like to direct the attention to one point in regard to pupil-teacher excerpts that I referred to previously when talking about the difficulty in deciding about the Authoritative/Dialogic dimension. It happens that for a definite pupil's question, the teacher provides an immediate answer, and the interaction ends at this point, but this is not what we're talking about here. What we refer to actually are the long exchanges of talk (usually more than 4 turns). It happens sometimes, that in regard to a clarification question for example, the pupil needs to exchange a number of turn with the teacher in order to understand what s/he has asked about. Sometimes, a miscommunication happen between the teacher and the pupil who initiated the question, as the teacher cannot really see the difficulty faced by the pupil, and so on.

Let's move now to the aspects that I argue about in relation to this question;

1. In themselves, pupil-teacher excerpts are presumably, indicating a dialogic attitude. Most likely, this type of talk means that the teacher is encouraging the pupils to participate; to spoke out their thoughts as it can also indicate that the pupils feel that their contributions are welcomed and valued by their teacher.
2. We cannot specify definite criteria for judging the Authoritative/dialogic dimension of this type of talk. May be this is because the pupil's kinds of questions and their reaction to the teacher's responses to their queries, cannot be really imagined to follow expected routes. What we might have instead is a set of considerations that we need to bear in mind when discussing the categorization of excerpts from pupil-teacher talk;

* The type of the question or what the pupil is actually asking about: Procedural and clarification questions are most likely to invite for authoritative reaction from the teacher. For such definite questions which are most likely to be of low level, pupils usually seek direct and clear answers. So, once the teacher understands what they're asking about and provide them with the answer, the exchange ends. In contrast, high level questions are most likely to stimulate Dialogic talk. In such questions, the pupils might ask for new information or explanations that might not be in the teacher' mind at the time of the question. They might also be trying to challenge and negotiate certain presented information. In both cases, the teacher will be trying not just to exchange longer talk with them, but also to exchange thoughts as s/he needs to convince them by an acceptable scientific answer. This, however, cannot be always the scenario for high level questions. Any judgment here, in fact, will be highly determined by the teacher's reaction to the pupil's question.
* The reaction of the teacher to the initiated question: As explained, as a pupil asks, it is expected that the teacher will try to offer what s/he thinks a correct possible answer to that question. In some cases, though, s/he might leave the question open and postpone it to a later time to be discussed. How the teacher has closed the question or left it open, is what determines the kind of the excerpt whether Authoritative or Dialogic. In making a judgment for a certain excerpt we need to examine the 'how' though questioning different contextual aspects such as; did the teacher try to understand the pupil's view or difficulty? Did she allow the pupil to extend, explain or negotiate his/her view? Was she really listening and taking into consideration the voice of the pupil? Did she take other pupil's opinions regarding the initiated question? Such or similar questions are highly related to the question itself and the context in which this question has been raised and answered. However, as the answer to those questions is most likely to be 'Yes', as the excerpt is most probable to be Dialogic, and the opposite is right. In general, for any analysed excerpt of pupil-teacher talk, it would be always useful to ask ourselves; how should have the teacher acted to reflect a Dialogic (or Authoritative) manner if s/he didn't act in the way s/he did?

Based on such consideration, came our judgment of the examples from this lesson. In the first example, the pupil has asked about a point that has been mentioned by the teacher. She was not convinced with the justification the teacher has provided. So, she initiated the talk to negotiate the teacher about that specific point. For this pupil's intention (as can be easily concluded from the flow of the talk) of negotiation, the initiated questions has been classified as of high-quality. The teacher responded to that question by providing a justification (turn2), the pupil asks again (turn3), the teacher offers a more detailed answer (turn4), the pupil keeps negotiating (turn5) and the teacher provides a very detailed explanation in which she tries to use an analogy from everyday experience (turn6). In this turn, in fact, the teacher kept controlling the talk verbally for a relatively long time, the thing that make me categorizing it as NI/D. Listening to the teacher controlling the talk and directing it towards a certain view suggests that this is a NI/A. However, we need to remember, as I have said, that the teacher is responding here to the pupil's initiation and not following-up a pupil's response. Additionally, for the whole example (turns 1-10), the teacher was responding to S1's negotiation by listening to her, trying to understand her difficulty and looking for the explanation that could convince her. The exchange as a whole, therefore, is of a Dialogic type, but comes through the two turns of 6 & 10, in which the teacher dominates the talk verbally, and this is why we categorize it as NI/D.

Most of the S1's questions through the Initiation' and 'Follow-up' moves have been categorized of a high quality because S1 kept challenging the teacher's responses and she was actually doing this by approaching her main question from different angles each time she asks, depending on the teacher response to her. On the other hand, the teacher's responses have varied between high and low quality. In fact, the teacher's responses were developing in their content and quality level. Such development can be seen, for example, in the first three responses in turns 2, 4 and 6; a general low answer in turn 2, a detailed comparative of still low quality in turn 4 and a very detailed answer of a high quality containing an analogy in turn 6. S1's persistent questions have stimulated the different responses, and the dialogic manner of the teacher has influenced the development of her responses as it has basically, encouraged S1 to keep asking. Such dialogic manner has actually encouraged another pupil; S2 to speak out her confusion in turn 11, to start then another exchange of Dialogic pupil-teacher talk.

Following S2, a third pupil felt encouraged to start another strong negotiation with the teacher, and from here starts our second excerpt. This excerpt starts with S3 expressing her view very strongly stating that; ''I don't see that…''. The teacher thought that S3 was just providing a late response for the previously discussed point of whether the pupils consider the battery as a producer or a pusher. So, she was starting to response to S3's initiation by reviewing what have been said. It's a cultural feature that Omani teachers tend to recite information by putting them into an interrogative form without meaning them as questions. The teacher here was starting to do this review when saying; ''Is the battery essential…?'' and she was determined to continue when S3 interrupted her to deny the necessity of the battery for producing current in the first place. This surprised the teacher and resulted in the teacher taking the control over directing questions. So, in its pattern of discourse, this excerpt starts with a pattern of pupil-teacher talk (IS.1-RT).Starting in turn 3 and reinforced in turn 4, the pattern shifts to express a teacher-pupil talk. However, in its essence, this excerpt remains a talk being initiated and going on by S3's challenging view. In her reaction to this, the teacher has not disapproved S3's view, nor did she approve it. She kept elaborating that view in a dialogic manner till the talk reached the point of the example, for which the teacher chose to hold the control over the talk to explain authoritatively this point (turn10). Following the teacher explanation, the Non-verbal reaction of S3 showed that she was not yet convinced. And although she agrees with the explained examples, she still insists on her view that the battery is not essential. As the teacher couldn't see any justification behind this view based on the Dialogic talk she kept with S3, she chose to act in an authoritative manner this time (turns10-20).

I think it would be useful to approach the aspects of the purpose, content and the kinds/pattern of moves in light of the shift of the types of talk, as this can give a picture of how the teacher has reacted as a whole to S3's negotiation;

- Purpose: The talk started in its first type with the purpose of responding to S3's challenge to the scientific idea of the necessity of the battery in the electric circuit. The teacher didn't deny S3's view and kept elaborating it to know S3's thoughts about it through I/D talk. When the Dialogic talk developed to a certain point (the example), the teacher hold the control over the talk with the purpose of explaining a scientific sub-idea that she thought she would correct S3's view and clarify the right scientific view (NI/A). S3's insistence on her view, though, has stimulated the teacher to exchange an I/A talk with her with the purpose of challenging her view in order to reinforce the scientific one.

- Content: In the three types of talk, a theoretical scientific content was discussed. However, the content of the I/D part was specified with the personal view of S3, whereas the content in the next I/A contained the scientific view. In the last part that entailed argument between S3 and the teacher, the content was composed of both; the personal view of S3 and the scientific view presented by the teacher.

- Kinds, quality and Pattern of moves: what is different about this example is that we see an evaluative move in the Dialogic part. However, this can be expected at the end as this is a talk initiated by a pupil. The other thing is that the pattern of moves in general doesn't reflect a pupil-teacher talk as the control over questioning has moved to the teacher. In terms of the quality, we can see that the Dialogic part was mostly dominated by high questions and responses, where the Authoritative part was devoid of any questions or responses of high cognitive level.

Analysis of Case 2, Stage 2, Lesson 4, Episode 1,3 & 4

**1. Analysing the talk:** Example 1,2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | I | R | F | Remarks |
| 1.T | let's start with what we've learned from last lesson. We've started knowing about the electric circuit. We've got to know about… A simple definition of it (electric circuit) based on the group of activities we've done. Yes S1 | I | L |  |  | … Skip some of the talk  \* L: CP of 'Understand, interpret' |
| 2.S1 | It's - it's Aaaa. It's like I mean moves, the movement of charges through Aaa through the circuit. I mean it's formed of wires and # | R1.1 |  | L |  | - pause  # S1 is interrupted by T |
| 3.T | Wires, we've said it has to be wires? | F | L |  | EL |  |
| 4.S1 | No No. I mean conductors # | R1.2( |  | L |  | # interrupted by T |
| 5.T | Of Conductors ^ | F |  |  | Ev | ^ Affirmation tone |
| 6.S1 | Conductors through which the charges move | R1.2) |  | L |  |  |
| 7.T | Movement of charges.  And what's the role of the battery? | F  I | L |  | Ev |  |
| 8. S1 | Moves. Which is moving the charges and not producing them | R1.3 |  | L |  |  |
| 9.T  10.T | Moving the electrons and not producing them…  …Today we wanna know; so what's the role of the battery apart from it's being a mover. It's inside, what did it do? What did it do to stimulate the movement? For example, in the game we've talked about, the game of chairs. I want the players to move. They all standing in a circle, and I say the word? Start, and they start moving around, right? What does the battery do? Does it also say start and then electrons start to move? This is what we wanna know today. I'm gonna give you a small activity before we discuss what the battery does to make electrons move. I'm giving every group pins and a magnet. Ok?... | F…  I | H |  | Ev | …I/A continues till the next turn  \* H: CP of 'create, generate hypothesis'  … T talks about the activity, pupils do it and Authoritative/Dialogic Interactive talk progresses around this activity |
| Example 2 | | | | | | |
| 1. T | …Now imagine, you see the electrons moving. Who made them move? We've agreed last time that the battery move them. What did the battery do to make them move? Yes S1 | I | H |  |  | …This excerpt after discussing the previous activity  \* H: CP of 'Create; generate hypothesis' |
| 2.S1 | It attracted them | R1.1 |  | H |  | \* H: CP of 'Analysis, attribute' |
| 3.T | Ok. Good. Attracted them.  Any other opinion? Yeas electric energy | F  I | H |  | C0 | \* H: CP of 'Create, generate hypothesis' |
| 4.S2 | It pushed them | R2.1 |  | H |  | \* H: CP of 'Analysis, attribute' |
| 5.T | Pushed them. May be it pushed them from one side.  From one side? | F  F | H |  | C0  EL |  |
| 6.S2 | Yeah | R2.2 |  | H |  |  |
| 7.T | It attracted them. You mean from how many sides? Regarding your answer S1, from one side or two? | F | H |  | EL | \*H: CP of ‘Understand, explain’ |
| 8.S1 | From one side | R1.2 |  | H |  |  |
| 9. T | From one side also.  Say what you think. Yes electricity. Let me repeat, S2 said it pushed. S1 said it attracted from one side. yes | F  I | H |  | C0 |  |
| 10.S3 | It's – I mean there is a battery, and there, there is a negative and positive carbon and the charges move. So, one get empty of them, when they move # | R3.1 |  | L |  | \* L: reflects usual thinking about the battery; a misconception persist to exist in pupils' minds although they've agreed that the battery doesn't produce electrons |
| 11.T | Get empty, deflate of. You mean there will be no charges at all | F | H |  | EL | \* H: CP of 'Analysis, organize' |
| 12.S3 | One. Just one. The second will run out and positive and comes to the positive. And the positive, I mean it's – and they move, move | R3.2 |  | L |  |  |
| 13.T | You're confusing us | F | - |  | EL | -It seems like a comment, but the message from T here: Explain your opinion |
| 14.S3 | I mean one takes and the second till- one was empty and the second was Aaa | R3.3 |  | L |  | - Pause |
| 15.T | Full of charges? | F | - |  | EL |  |
| 16.S3 | Yeah, and the negative… | R3.4 |  | L |  | - Skip some turns in which T tries to understand S3's opinion |
| 17.T | The movement of the electrons stop. Ok. Is there another opinion. Yes alternating current | F  I | H |  | C0 |  |
| 18.S4 | In my view, the negative pole will, Umm – like stopping the negative – which is the negative electrons. There will be a repel force, so they'll go to the positive. The positive will attract them | R4.1 |  | H |  | \* H: CP of 'Analysis, organize' |
| 19.T | So, from two sides. Good.  Another idea? Yes electron… | F  I… | H |  | C0 | …skip some turns in which T take the idea of another pupil |
| 20.T | Ok. These are your ideas about what the battery do in the circuit does. Lets' discuss your opinions.. I might draw two circuits based on two general opinions that were greatly highlighted by you, the first says that it attracts or pushes… | F |  |  | C0 | …T continues a NI/D talk and progress then through I/A one |
| Example 3 | | | | | | |
| 1. T | My question again; what's the kind of energy transform in the electric bulb? Yes S1 | I | L |  |  | \*L: CP of ‘Remember, recognize’ |
| 2.S1 | Light | R1.1 |  | L |  |  |
| 3.T | Light. Where did the light come from? I'm asking about the energy transform, the word transform, always mean by it from ^ to ^ | F | L |  | EL | L: CP of ‘Remember, recognize’  ^ Affirmation tone |
| 4.S1 | From kinetic | R1.2 |  | L |  |  |
| 5.T | From kinetic. The energy transfers in it from kinetic into what? | F | L |  | EL |  |
| 6.S1 | From gravitational potential to kinetic | R1.3 |  | L |  |  |
| 7.T | The energy changed from gravitational potential into kinetic. This is S1's opinion | F |  |  | C0 |  |
| 8.S1 | No, may be from electric into kinetic | R1.4 |  | L |  |  |
| 9. T | Another opinion, from electric into kinetic. It's ok I write both of them (B). Yes S2 | F |  |  | C0 | (B) T writes on board uttered opinions |
| 10.S2 | From Kinetic into electric | R2 |  | L |  |  |
| 11.T | S2 is saying this time from Kinetic into electric.  In the bulb. I'm asking about the bulb (). Yes direct current | F  I | L |  | C0 | () T is smiling and the expression of astonishment is obvious in her face |
| 12.S3 | From gravitational potential into light | R3 |  | L |  |  |
| 13.T | From gravitational potential which refers to a fall () into light! Yes | F |  |  | C0 | () T is acting the fall with her hand with a surprise smile & expression in her face |
| 14.S4 | From electric into light | R4 |  | L |  | L: CP of ‘Remember, recall’ |
| 15.T | From electric into light. Excellent (). Let's see on which of these opinion (written on board) you agree upon; the first one …the second…the forth ()  So what's the secret behind all these opinions? Did the gravity caused the fall of the bulb and so it glow?! Did…. So the energy will transfer from #  Yes S5 | F |  |  | Ev | () T is showing an approving Expression  …()group of pupils iterate: No for all the first opinions and shout: yeah, this is right when comes to the last opinion  …T continues NI/A talk till the next turn  # T is interrupted before repeating again the kinds of energy |
| 16.S5 | We might also say from a kinetic energy into thermal into electric and light | IS5 | H |  |  | - Considered as I because the teacher already uttered what she considered the right view. So, it's like: why don't we say...? |
| 17.T | A kinetic energy? | FT | H |  | EL |  |
| 18.S5 | Yes, from a kinetic energy (T: from a kinetic energy (B))  Into a thermal energy (T: Into a thermal energy (B))  Into electric (T: electric (B)), into light (T: into light (B)) | R5.1 |  | H |  | # interrupted by T  \* H cause it's complex answer. When S5 explains the details in coming turns, the judgment relies on CP. |
| 19.T | May be. Kinetic. What do you mean by kinetic? | F | H |  | EL |  |
| 20.S5 | The movement of charges | R5.2 |  | H |  |  |
| 21.T | Thermal? | F | H |  | EL |  |
| 22.S5 | The movement produces heat | R5.3 |  | H |  | \* H: CP of 'Apply, implement' |
| 23.T | Movement produces heat. So, first the all movement is transferred into heat? | F | H |  | EL |  |
| 24.S5 | I mean it produced heat | R5.4 |  | L |  | \* L as it reflects the pupil's lack of precise understanding of the transform of energy |
| 25.T | Produced means transferred. Energy transferred into, that’s it. It transferred into heat | F |  |  | C0 |  |
| 26.S5 | Miss, I mean it moves and gives heat. | R5.5 |  | H |  |  |
| 27.T | Beautiful. So you mean the kinetic, at the same time, it produces electric, heat and then light # | F |  |  | C0 | # S5 interrupts T, and the two voices actually interfere together |
| 28.S5 | Then the heat produces electric and then light | R5.6 |  | L |  | \* L as the sequence is mistaken |
| 29.T | So, the heat produces electric and then at the end light (). We'll see. Good S5. Yes S6 | F |  |  | C0 | () S5 is nodding: yeah |
| 30.S6 | I disagree with S5. It's first electric then kinetic then heat and light | R6.1 |  | H |  | \* H because it's a complex answer |
| 31.T | From electric into kinetic… | F |  |  | C0 | …T continues the I/D talk about the energy transform with this pupil and then with another pupil who talks about the same forms but again in different sequence (electric-kinetic-light-heat) |

**2. Characterizing the talk:**

|  |  |
| --- | --- |
| Class of the talk | Teacher-Pupil talk   * Example1, Turns 1-9… : I/A - Turn 10: NI/A * Example2, Turns 1-20: I/D - Turn 20: NI/D * Example3, Turns 1-15: I/D - Turn15: NI/A - Turns 16-31…: I/D |
| Purpose of the talk | * Example1, I/A: Reviewing scientific ideas - NI/A: Introducing a scientific topic * Example2: I/D: Exploring pupil's views - NI/D: Reviewing / Generalising pupils' views * Example3: I/D: Collecting pupils' opinions -   NI/A: Evaluating the pupils' opinions (reciting the scientific view)  I/D: Responding to pupil's contributions |
| Content of the talk | * Example1: Scientific view of Theoretical Scientific content * Example2: Personal views of Theoretical Scientific content * Example3, I/D 1,2 : Personal views of Theoretical Scientific content * NI/A: Scientific view of Theoretical Scientific content |
| pattern of the talk | * Example1, I/A: I-R1.1-EL-R1.2(-Ev-R1.2)-Ev-I-R1.3-Ev   NI/A: --- (I)   * Example2, I/D: I-R1.1-C0-I-R2.1-C0,EL-R2.2-EL-R1.2-C0- I-R3.1-EL-R3.2-EL-R3.3-EL-R3.4-C0-I-R4.1-C0-I…C0 NI/D: --- (C0) * Example3, I/D: I-R1.1-EL-R1.2-EL-R1.3-C0-R1.4-C0-R2-C0-R3-C0-R4-Ev   NIA: --- (EV)  I/D: IS5-IT-R5.1-EL-R5.2-EL-R5.3-EL-R5.4-C0-R5.5-C0-R5.6-C0-R6.1-C0 |

**3. Quantitative indicators**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | C0 | EL |
| Ex1, Authoritative | 3 |  | 4 |  | 3 |  | 1 |
| Ex 2, Dialogic 1 |  | 8 | 4 | 5 |  | 6 | 5 |
| Ex 3, Dialogic 1 | 4 |  | 7 |  | 1 | 4 | 2 |
| Ex 3, Dialogic 2 |  | 5 | 2 | 5 |  | 4 | 4 |

**4. Narrative account**

Three examples have been chosen from this lesson. All the three represent a teacher-pupil talk and shows the four classes of talk. In the first one, we have an excerpt of Interactive/Non-Interactive Authoritative talk where the second one is an Interactive/Non-Interactive Dialogic talk. The third example contains both, Authoritative and Dialogic types of talk.

The first excerpt is a bit distinguished in its purposes as the teacher used the Interactive Authoritative manner to review a scientific idea and Non-Interactive Authoritative one to introduce a new relevant scientific issue to be discussed. It is distinguished in the sense that the opposite usually happens; Non-Interactive for reviewing and Interactive for introducing. This indicates that the types of talk within the dimension of 'Interactive/Non-Interactive' cannot be assigned to certain purposes, which means that the aspect of the purposes of the talk cannot really be a determining criteria in characterising the classes of talk.

However, the purpose in this example can be seen as a determining factor in relation to the 'Authoritative/Dialogic' dimension. As the purpose of the talk was to review a scientific idea, this, can be argued, has influenced the teacher attitude to handle the discussion in this extract to be Authoritative. Meanwhile, we can also argue that the wording/quality of the first initiation has influenced the talk to take the authoritative route. Quite the opposite, we can also argue that with such purpose, the talk could still take the dialogic route and it's the teacher's intention to act authoritatively is what has driven it to be Authoritative, and which has also defined the wording and the quality of the first initiation. In conclusion, I believe that the relation of the class of the talk to the other aspects is best to be described as a mutual relation, as each aspect can be seen as to affect and being affected by the class of the talk. The second important thing that worth to be mentioned here, that there is overlap between the Authoritative/dialogic manner of the teacher, the purpose, the articulation of the first initiation and its content as all come within the intention and the attitude of the teacher.

For the Non-Interactive part, it is worth mentioning that this extract was part of a teacher's initiation in introducing a new scientific point to be opened and discussed. It is another cultural feature that this teacher tends to express a certain point by repeating the meaning more than once using the same or different wording. The other thing here that the purpose of the Non-Interactive Authoritative talk is strongly assigned to the kind of move that this kind is expressed through. In this excerpt, for example, the NI/A talk have been uttered through the 'Initiation' move, and the purpose was of introducing a new issue. When the IN/A talk is expressed through an evaluative move, then it's more likely for its purpose to be of reviewing the scientific point of view. When it is part of 'comment' follow-up, then the purpose is more likely to be of reviewing personal views and so on.

The second example is built over the high level question expressed by the teacher in the last move of the previous example (i.e. Initiation in turn 10). After opening the pupil's awareness of a second role of the battery in addition to its first role as a pusher in that initiation, the teacher instructed the class to perform a certain activity that she thinks is working as an analogy to the battery' role. After performing the activity and discussing it, comes the second example.

In this example, the teacher has initiated the talk to examine the pupils' thoughts of the role of the battery in pushing the electrons. After getting different opinions from the class through I/D talk, she reviewed these opinions by trying to classify them within two main views through a NI/D talk. It is good to highlight here the learning outcomes in relation to the class of the talk through its kinds, quality and pattern of moves. The kinds/pattern of moves characterize the Authoritative/Dialogic types of talk, as they are actually a constituent of its A/D nature. In regard to the learning, it is also worth mentioning the influence of this excerpt’s content on the pupil's learning;

* Content in relation to learning: The content of this excerpt went around the pupil's thoughts of a theoretical scientific issue. Such content means that the pupils are asked to think deeply about scientific information. In this excerpt, it was about the pupils being asked to generate hypothesis about how do they think the battery accomplish exactly its role of pushing the charges in the circuit. This resulted in the pupils offering views different in their quality of cognitive level, but mostly of high one. In fact, three of four opinions showed high cognitive processes. The forth didn't reflect a low cognitive process only, but showed how misconceptions can be resistant to change. In the lessons before (as you can see from some of the previous examples), the teacher tried through different activities and long discussions, to confirm the role of the battery as a pusher and not a producer. Although the pupils had agreed with this piece of information per se, the misconception persist to impose itself in their thinking when it comes to relating this piece of information to other elements in explaining a whole system (see turns 10-16)
* Kinds, quality and pattern of moves in relation to the pupils' learning: If we divide the Interactive part of this excerpt into chunks of turns according to every pupil's contribution, then we can see the same general pattern of ; (I-R-C0) repeats with each pupil. This is very obvious when we take the whole pattern and mark it for each pupil, as follows; (I-R1.1-C0) – (I-R2.1-C0,EL-R2.2-EL-R1.2-C0) – (I-R3.1-EL-R3.2-EL-R3.3-EL-R3.4-C0) - (I-R4.1-C0) - (I…C0). Moreover, we can see that through the exchange with S2 and S3, elaborative moves repeat as the teacher continues extending the pupil' answers, but still within the general one that starts with 'Initiation' from the teacher, an answer from the pupil and ends with a comment from the teacher without any evaluation. Such kinds of follow-up moves and such pattern reflects positive indicator of learning not just in terms of the pupils' participation, as anyone having an idea can spoke it out, but also in terms of the pupil's engagement. In her elaboration of the pupils' answers, the teacher was engaging these pupils to think more deeply about their ideas and stimulate the rest of the class to engage also in that thinking.

In example 3, the talk starts in its first part with the teacher asking about what she thought of as a simple question regarding the transform of energy in electric bulb. The teacher might not have intended to initiate a Dialogic type of talk with the purpose of collecting pupil's opinions, as can be concluded from the context and from her comment in turn 15. When she initiated the question in turn1, S1 offered half of the desired answer, and the teacher elaborated S1's first response to develop it to the desired one. However, S1 surprised the teacher with two new views that are incorrect and strange in their context, the thing that motivated the teacher to guide the talk into a dialogic route and to allow other opinions to be spoken out. She asked the class for their opinions, and what did she get? More strange answers with which she couldn't really hide her astonishment that appeared in her smile, wondering facial expression & tone, and some indicators of indirect negative evaluation like the ones in turn 11( In the bulb. I'm asking about the bulb) and turn 13 (From …which refers to a fall). When the right answer has been offered lastly, the teacher could not control her excitement with the right answer when she spoke out the word 'Excellent' in turn 15.

The scenario here is similar to the one in the first example of lesson 2, which in spite of its ending with evaluation the excerpt is still characterized as Dialogic. Although each example has its own distinctive context, the two gather under the same general context. It's the same in the sense that we're talking about the same teacher; a teacher trying to promote more Dialogic talk in her teaching as a result of a training intervention, and the two examples are part of her attempt. In both, she guides a Dialogic talk in which she listens to different opinions and comments on without evaluating them. For a reason specific to the context of each example, she can't hide her excitement with the right answer for which she provides an immediate approving response 'Excellent'. But then, she holds back and gives a space for reviewing these opinions by stating them or asking the whole class about the opinion they support. Without that approving word, the excerpt is undoubtedly Dialogic, but with it, confusion happens. A context-based justification has specified the judgment of the example in lesson 2, and so does here. Given the simplicity of the question, the weirdness of the opinions and the low cognitive level they reflect, the class reaction to these opinions and the later reaction of the teacher to very detailed opinions of high cognitive level regarding the same question, in addition to all what I have explained about how did the teacher react through this extract; all of these supports the judgment of a Dialogic rather than Authoritative talk.

After the whole class raised their hands in support of the right scientific view (from electric into light), and the teacher's confirmed it through the NI/A extract in turn 15, another pupil initiated another opinion regarding the same question. It is a strong indication of the pupils' engagement in the ongoing discussion; it is a strong indicator of the pupils' control not just over their learning but even over the process of the teaching itself. This in turn, is a strong indication of the dialogic attitude of the teacher, that the pupils still offer their opinions after the teacher approve a certain answer as scientifically correct.

How did the teacher react to this new opinion offered by S5? She listened to S5, elaborated her answer into its very details, appraising S5's thinking about it without evaluating it. And then, another two pupils; S6 and S7 participated in the discussion by disagreeing with some of the details of S5's answer, and again the teacher listens to them, elaborates their opinions and comments on their contributions without evaluating them. And again, another Dialogic talk about the same question takes place even after a Non-Interactive Authoritative one has been practiced to confirm the right scientific view. The Dialogic excerpt this time, though, is of higher level that the first one because of different attributes;

* It is initiated by pupils negotiating what has been confirmed by the teacher as scientifically correct;
* It shows responses of high quality that reflect high cognitive processes in thinking about the transform of energy in electric circuit. This is in contrast to the first Dialogic excerpt that is dominated by low questions and answers and lacks any high-quality moves;
* It shows three pupils taking account of each other's contribution and criticizing each other's answer by approving part of it and disapproving another part. It can be argued, that such attitude and such skill would be less likely to take place within a talk highly controlled by the teacher and bounded only to one possible view. So then, we can talk about an indicator of learning in terms of the attitude to practicing argumentation;
* It takes the sequence of moves defined only by one initiation and it is a pupil's initiation and goes through a long exchange with just one pupil; S5 (I haven't included the rest of the talk with S6 & S7 as it reflects similar characteristics); IS5-EL-R5.1-EL-R5.2-EL-R5.3-EL-R5.4-C0-R5.5-C0-R5.6-C0-R6.1-C0. Although S5 has initiated the first question, the teacher didn't provide a response. Instead she followed up S5's initiation by asking her to explain what she means by part of her opinion (turn17). The talk then followed the normal sequence of a teacher asking and a pupil answers. Those questions were through elaborative follow-ups moves. Then the talk got more interesting with S5 clarifying her opinion and the teacher comments on it by stating what she understands from S5'answers. S5, though, doesn't agree with the teacher and insists on confirming her view by restating it in different turns (turns 24, 26 & 28). So, the pattern really goes around just (R-F) whether it is (R-EL) or (R-C0). However, this pattern doesn't mean that the teacher was asking questions that she knows their answers and trying to get the pupil to speak out those answers. It was the opposite indeed; the teacher was asking the pupil questions for which she does not the answers and waiting for the pupil to explain to her those answers. So, the intellectual control over the talk was, in fact, in the pupil's hand, where the verbal control was shared by both of them. This is, therefore, is an important attribute in giving this excerpting its high level as Dialogic talk.

Analysis of Case 2, Stage 2, Lesson 5, Episode 1,2 & 3

**1. Analysing the talk:** Example 1,2

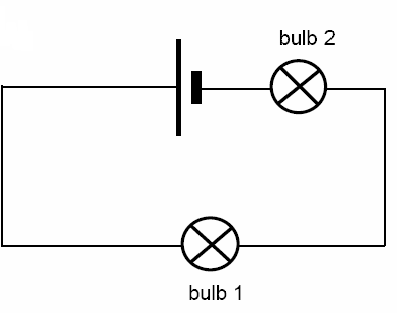
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S | Utterance | Move | I | R | F | Remarks |
| 1. S1 | Miss, is it possible for the bulb to glow? () cause the charges moved -- | IS | H |  |  | () S1 referrers to a bulb in a circuit contains one battery and two bulbs which is open from one side near to the second bulb; the mentioned bulb (first) is connected on both its sides, so S1is thinking that it might glow  -- Hesitation  \*H because although it is incorrect, it shows a pupil going to microscopic level in thinking |
| 2.T | The charges moved and it works. Let's see. Will this bulb work while the circuit is opened or not? What do you think? She is saying that the bulb will work because it's closed on both of its sides, will it work in your opinion? And remember one point from last lesson; we've mentioned the role of the battery. Yes electricity | FT  IT | H |  | C0 | \* H: CP of 'Create, generate hypothesis' |
| 3.S2 | It doesn't light, cause it's supposed - now it's not closed even from one bulb that she said it works it doesn't work cause it didn't find a closed path cause there is something missing even that bulb (…?) still it's not closed. So, there is no closed path that the charges can move through cause charges start from all the directions, means equal | R2.1 |  | H |  | - Pause  \* H CP of 'Explain, construct a model'  (…?) inaudible |
| 4.T | Let me direct the question in a different way. Good S2. What you've said is scientifically correct, but let me direct the question in a different way; for the bulb to work, what does it need? | F  I | L |  | C0 | - It seems like T is evaluating the answer, but she meant to provide any comment to move the talk to another direction  \*L: CP of 'Remember, recognize' |
| 5.S2 | Closed path | R2.2 |  | L |  | \*L: CP of 'Remember, recall' |
| 6.T | Why closed path? | F | H |  | EL | \* H: CP of 'Understand, explain' |
| 7. S2 | Miss, the charges move, I mean all of them from and to the battery | R2.3 |  | L |  | \* It seems that the misconception about the battery as a producer still persists, but knowing this pupil, make me conclude that this is just a misuse of words |
| 8.T | From and to the battery.  So, for the bulb to work, it needs moving charges or static ones in general? | F  I | L |  | C0 | - Again T neglects the utterance From/to battery because it wouldn't help in her planning to answer S1's initiation |
| 9.S2 | Moving | R2.4 |  | L |  | \*L: CP of 'Remember, recognize' |
| 10.T | Moving. It needs moving charges.  You, who have asked the question, tell me; now for this bulb to work- Does, if I brought you a bulb and connected it to two wires from both its ends, and asked you, will it work? | F  I | L |  | C0 | \*L: CP of 'Remember, recognize' |
| 11.S1 | No | R1.2 |  | L |  |  |
| 12.T | It wouldn't work. Why? | F | L |  | EL | \*L: CP of 'Remember, recognize' |
| 13.S1 | First of all, there is no battery | R1.3 |  | L |  |  |
| 14.T | No problem, I put a battery, other reason? | F | H |  | EL | \* H: CP of 'Understand, explain' |
| 15.S1 | It might work Miss | R1.4 |  | L |  |  |
| 16 T | It works? | F | H |  | EL | \* H: CP of 'Understand, explain' |
| 17.S1 | Cause basically the charges are there | R1.5 |  | L |  | \*L: CP of 'Remember, recognize' |
| 18.T | How did the existed charges move? … | F | H |  | EL | \* H: CP of 'Analysis, organize'  …repeating the question in different wording |
| 19.S1 | We've said that the battery make the charges move | R1.6 |  | L |  | \*L: CP of 'Remember, recall' |
| 20.T  21.T | Beautiful, the charges moved.  Come and show me how did the charges move? ()…  Still a second question that S3 didn't answer. Regarding this route (the first open circuit), why there will be no current? What's the reason for the absence of a current? A movement, a flow, a continuity of the electrons movement? | F  I…F  I | H  …  H |  | C0  …  Ev | \* H: CP of 'Apply, implement'  () T open an I/A talk in which she asks S3 to explain visually& verbally how the charges move around the circuit. Talk continues till S3 is convinced that the bulb wouldn't glow. Then another episode starts from turn 21 |
| 22.S3 | Cause we've said last lesson that the battery has two positive and negative poles. And the connecting wires have negative charges. The positive pole attract the negative charges, and the second pole from the battery, a repel will happen between them, which is between the negative of the battery and the charges. So, from this side, the battery attracts the charges and from that side. It repels so the battery pushes the charges # | R3.1 |  | H |  | \* H: CP of 'Understand, summarize'  # interrupted by T |
| 23.T | Repel. Good^, and the path should be what? | F , I | L |  | Ev | \* L: simple, close-ended question |
| 24.S3 | Closed | R3.2 |  | L |  |  |
| 25.T | Closed. Good S3. Well done. The point we've mentioned last lesson that there are two poles in the battery, a positive one that … | F |  |  | Ev | …T continues a NI/A talk |
| Example 2 | | | | | | |
| 1. T | Let's go back to the question you have (). Yes alternating current | I | L |  |  | () This question is attached below |
| 2.S1 | How do you expect the brightness of the two bulbs? | R1.1 |  | L |  | - She is responding to T by reciting the mentioned question |
| 3.T | Ok. So, what's your group's answer? | I | H |  |  | \* The question in the activity is of H level |
| 4.S1 | Both bulbs have the same brightness | R1.2 |  | H |  | \* H: it's the right answer and supported by the explanation that follows |
| 5.T | Why? | F | H |  | EL | \* H: CP of 'Understand, explain' |
| 6.S1 | Cause we know that the charges move at the same time. The electrons move at the same time, and they go around in a closed circuit. So, it will be the same brightness cause they're passed by the same charges | R1.3 |  | H |  |  |
| 7.T | Ok, cause the same charges will pass by them. Good. So, the two bulbs will glow with same brightness. First, because they will be passed by the same moving electrons. It means, the moving electrons from this end are the same that will pass through the two. This is one thing.  The other thing, we've said that these electrons; where do they get the energy they carry from? | F  I | L |  | Ev | \* L: CP of 'Remember, recall' |
| 8.S2 | The battery | R2 |  | L |  | \*L: CP of 'Remember, recall' |
| 9. T  10.T | The battery which is formed of… It has a chemical energy that transfers to electric energy that make the electrons move…If the two bulbs are identical, then what will happen when the electrons pass by? Will it give one bulb more energy than the other? Or will it…. I, for, example, I'm carrying a group of pencils and I want to distribute among the class ()…the electrons, while carrying the energy, they distribute this energy to the two bulbs…this is what happens in the electric circuit…the electrons take energy from the battery…but the battery does not produce them, does not produce electrons. The electrons are basically there in the conducting materials…the moving electrons as a number will not be affected, but what happen? The energy is distributed… is it clear?  Ok, regarding the justification, the reason (), how do you explain that the two bulbs have the same (brightness). May be it's simple now, S3 | F  I | L |  | Ev | … skip some turns  () a short I/A talk takes place here about the example of pencils, but skip it in this analysis and regard this whole turn as NI/A  although in the quantitative analysis, it is: NI/A-I/A-NI/A  () T is referring to part (b) of the question  \*L: CP of 'Remember, recall' |
| 11.S3 | Both bulbs used up. I mean the battery when moving the charges. I mean the two bulbs use up the same electric current () | R3.1 |  | L |  | () S3 is mixing more than one answer from the given alternatives |
| 12.T | Use up the same electric current. What's the number of this answer? Use up the current. Do you know the meaning of use up? | F  I | L |  | C0 |  |
| 13.S3 | Means it takes | R3.2 |  | L |  |  |
| 14.T | Use up means finish or consume () | F |  |  | Ev | () Surely it's not a literal translation, but I tried to focus on the meaning of 'use till it finishes' that T wanted to highlight |
| 15.S3 | Yeah, consume it | R3.3 |  | L |  | -R because the pupil meant it to be a response |
| 16.T | Does it mean that the electrons that the first will use - for example, there are 5, then they will be used and 4 will remain, they will be used and so | F | L |  | EL | -pause |
| 17.S3 | I mean every bulb, if for example 5, the two bulbs will take one one. And 3 will remain that will go to the battery | R3.4 |  | L |  | \*L: CP of 'Remember, recognize' |
| 18.T | Ok. This is one possible answer.  Is there another answer you chose? Will come back to S3. Is there another answer different from their answer? Which one is your answer?...  So, your answer is number 5; the current is the same everywhere in the circuit. Ok. Does anyone have another answer? Yes | F…  I | H |  | C0 | … T realized now that S3 has mixed up more than one alternatives and asked the group for which answer they choose  \* H: CP of 'Create, generate hypothesis' |
| 19.S4 | That it's equal. Shared equally | R4.1 |  | L |  | \* L: incorrect answer |
| 20.T | Shared. Shared the current equally. Ok, we'll see the two answers.  Does anyone have another answer? | F  I | H |  | C0 | \* H: CP of 'Create, generate hypothesis' |
| 21.S5 | The current just pass by but doesn't decrease | R5.1 |  | H |  | \* Although mentioned before by T, but the pupils are still confused about, and from this turn and going on, S5 provide a detailed summary, so; H: CP of 'Understand' |
| 22.T | Doesn't decrease, ok. This means the same. The same everywhere in the circuit. Or? | F | H |  | EL | \* H: CP of 'Understand: explain' |
| 23.S5 | I mean the bulb doesn't take a current. It (current) passes by it (bulb), but doesn't take it | R5.2 |  | H |  | \* H: CP of 'Understand: explain' |
| 24.T | Yeah, but what does it take from the current? | F | H |  | EL | \* H: CP of 'Understand: explain' |
| 25.S5 | The electrons, the current # | R5.3 |  | L |  | # S5 is Interrupted by T |
| 26.T | The current is electrons. This person (). Imagine this person as Mister electron, what did the bulb take from him to glow? | F | H |  | EL | () T draw near a drawn circuit in the board, draws a man carrying a bag |
| 27.S5 | Current (). Energy. Energy | R5.4 |  | L |  | () Another student iterates: energy  \*L: CP of 'Remember, recognize' |
| 28.T | What did it take? Energy. In this bag, there is energy. It just took energy. Did it take the electron itself? No, it took an energy that the electron is carrying | F |  |  | Ev |  |
| 29.S5 | Miss, then the energy -- (…?) () | R5.5 |  | L |  | - - hesitation , (…?) inaudible  () Another student mutters: 'go back' |
| 30.T | Will the electron be used up? The electron itself? | F | L |  | EL |  |
| 31.S5 | Every electron has energy. Every time an electron comes and puts its energy and then goes again to take | R5.6 |  | H |  | \* H: CP of 'Understand: explain' |
| 32.T  33.T | And goes and take energy. Beautiful. Good S5. So, the number of the electrons, what? …they just pass by taking with them enough energy for the bulb to glow. Where did it take this energy from?...is this point clear?  Here, I have two different answers, which is, Is the current shared? Or it's the same? This is what we wanna know today by studying a beautiful scientific concept… | F  F |  |  | Ev  C0 |  |

**2. Characterizing the talk**

|  |  |
| --- | --- |
| Class of the talk | Teacher-Pupil talk   * Example1, Turns 1-20 : I/D - Turn 21-25: I/A - Turn 25: NI/A * Example2, Turns 1-7: I/A - Turn 7-9: NI/A -   Turns 9-31: I/D (24-32: I/A , 31: NI/A) - Turn 33: NI/D |
| Purpose of the talk | * Example1, I/D: Responding to a pupil challenging a scientific view   I/A, NI/A: confirming the scientific view   * Example2: I/A, NI/A: Working on a scientific problem   I/D: Exploring and negotiating pupils' opinions  NI/D: Reviewing pupils’ views |
| Content of the talk | * Example1; I/D: Personal/Scientific view of Theoretical Scientific content   I/A, NI/A: Scientific view of Theoretical Scientific content   * Example2, I/A, NI/A: Scientific views of Theoretical Scientific content   I/D, NI/D: Personal views of Theoretical Scientific content |
| pattern of the talk | * Example1, I/A: IS1-C0T-I-R2.1-C0-I-R2.2-EL-R2.3-C0-I-R2.4-C0-I-R1.2-EL-R1.3-EL-R1.4-EL-R1.5-EL-R1.6-C0-(I…EV)   I/A: I-R3.1-EV-I-R3.2-EV  - NI/A:--- (EV)   * Example2, I/A: I-R1.1-I-R1.2-EL-R1.3-EV - NI/A: I-R2-EV   I/D (I/A, NI/A): I-R3.1-C0-(I-R3.2-EV-R3.3)-EL-R3.4-C0-I-R4.1-C0-I-R5.1-EL-R5.2-(EL-R5.3-EL-R5.4-Ev-  R5.5-EL-R5.6-Ev),C0 - NID: --- (C0) |

**3. Quantitative indicators**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class of talk** | Question (Cognitive level) | | Response (Cognitive Skill) | | Follow-up | | |
|  | Low | High | Low | High | Ev | C0 | EL |
| Ex 1, Dialogic | 4 | 7 | 8 | 1 | 1 | 5 | 5 |
| Ex 1, Authoritative | 1 | 1 | 1 | 1 | 2 |  |  |
| Ex 2, Dialogic (1-24 + 33) | 5 | 5 | 7 | 4 | 3 | 3 | 4 |
| Ex 2, Dialogic (24-32) | 1 | 2 | 3 | 1 | 2 |  | 3 |

Q. The two bulbs in this circuit are identical

(a) How bright will the bulbs be?

Tick ONE box *(√)*

 Both bulbs are lit. Bulb 1 is brighter than bulb 2.

 Both bulbs are lit. Bulb 2 is brighter than bulb 1.

 Both bulbs are lit, with the same brightness.

 Bulb 1 is lit. Bulb 2 is off.

 Bulb 2 is lit. Bulb 1 is off.

(b) How would you explain this?

Tick ONE box *(√)*

The first bulb uses up all of the electric current, so there is none left for the other one.

The first bulb uses up some of the electric current, so there is less left for the other one.

Bulb 2 is closer to the battery, so it gets more electric current.

The electric current is shared equally between the two bulbs.

The electric current is the same everywhere in the circuit.

**4. Narrative account**

Here we have two examples; both of them are long, especially the second one. In both, a big confusion takes place when trying to characterize their type of talk. The confusion concerns the categorization of the type of talk, whether Authoritative or Dialogic.

The excerpt in the first example shows Interactive and Non-Interactive Dialogic types of talk. If this talk was initiated basically by the teacher, then its characterization would be undoubtedly Authoritative. However, it was S1 who initiated a wondering question about the possibility of a bulb to glow in open circuit, just because the circuit is not opened from both of this bulb two ends. This question came after four lessons in discussing electric circuit and the two roles of the battery of working as a pusher for the electrons and a producer for the energy necessary for the bulb to glow. This question illustrates the pupil's difficulty in putting the roles of the battery together to understand that any cut anywhere in the circuit will terminate the work of the battery for the whole circuit. So, again a misconception persists here, not because relevant information are not understood, but because of the difficulty in putting the elements of one system together.

However, putting myself in S1's place when asking this question and based on her views revealed through this excerpt, shows, in fact, an attempt to think about the situation of the bulb in a microscopic level. She agrees that the current wouldn't be able to go through the circuit, but she imagine that as the electrons are already there in the wire and with a battery and a circuit closed before and after the bulb that electrons still can pass through, all of these factors together mean to her that the bulb will glow for a short time and then stops. This means that the knowledge regarding the existence of electrons in the wires and the role of the battery as a pusher have both controlled the pupil's thinking in favour of the way the battery does so in relation to the attraction/repel force between the battery and the electrons in the wires. This is what DiSessa calls it a cuing priority, which means that the first elements (electrons in wires-battery as a pusher) have more cuing priority in the pupil's mind than the other element (how the battery works as a pusher) which results in the element with higher cuing priority to be taken into account and the other with lower cuing priority to be forgotten about. This eventually would result in a mistaken view about the work of the whole system that is composed of these elements together.

Consequently, and based on understanding the context in which this question has been posed, this excerpt has been categorized of high quality because it reflects high cognitive processes in thinking about it even if resulted in mistaken view at the end.

If we try now to justify the characterization of this excerpt as Dialogic and not Authoritative, then I can say that this is so because of the following considerations;

1. It is a talk initiated by a pupil that the teacher had to guide to a certain end that can answer the pupil's question. It cannot be judged Authoritative then because it is directed to the scientific point of view;
2. In her reaction to this question, the teacher did not deny S1’s thinking by disapproving her view, as to say, for example; 'it can't be because the circuit is opened'. Instead, she directed the question to the class and reviewed S1's view about what she thinks it might work. So, the start of her reaction is undoubtedly Dialogic;
3. She then exchanged a talk with another pupil; S2 to get a second opinion about it. S2 has not agreed with S1, and tried to explain her view, but couldn't do it clearly. The teacher tried to capture two points from S2' explanation; 'for the bulb to work, it needs moving charges' and 'for charges to move, they need closed path'. She extracted these points from S2 in an exchange through which she did not provide any positive or negative evaluation. She was just elaborating S2' answers sometimes or just commenting on them other times. This is, therefore, is another consideration in characterizing this excerpt as Dialogic;
4. She moved back then to S1, exchanged some talk with her till S1 uttered the response in turn 19; 'We've said that the battery make the charges move'. The teacher got it by now that S1's problem lies in the absence of the information of 'what does the battery do to move the charges' from her thinking about the whole situation. Through this exchange, again the teacher has not evaluated the responses. She kept extending S1's answers to finally comment on them in turn 20. In this same turn, the teacher ask S1 to explain her view verbally and visually by following the flow of the charges, and from here an Interactive/Authoritative talk started between the two till S1 was convinced that the bulb wouldn't glow. The characterized excerpt here is the one from turn 1 to turn 20, which went slowly and smoothly with the teacher listening to two pupils' thoughts, picking some information from their answers, elaborating and commenting on these answers in general without evaluating them; (IS1-C0T-I-R2.1-C0-I-R2.2-EL-R2.3-C0-I-R2.4-C0-I-R1.2-EL-R1.3-EL-R1.4-EL-R1.5-EL-R1.6-C0). We can see for how long this exchange has lasted for just the teacher trying to highlight some points that can help S1 to conclude the mistaken part in her thinking about the work of the electric circuit as a whole.

For all the mentioned considerations hence, this excerpt has been categorized as Dialogic. The exchange that followed this excerpt and being skipping in this analysis was undoubtedly Authoritative. The excerpt from turn 21 to 25 is another Interactive/Authoritative talk that has being exchanged with a third pupil; S3. In this excerpt, the teacher wanted to confirm the scientific idea of how does the battery work in moving the charges. She started this by approaching the issue from another angle and got a very detailed and highly articulated response from S3. She kept the Interactive pattern for such a short time (pretty enough to make the scientific idea clear to the class) before controlling the explanation task through a Non-Interactive Authoritative talk in turn 25.

It is worth highlighting here the content and the quality of moves in this excerpt. The Dialogic part was a mixture of personal and scientific views in discussing a theoretical scientific content. The two kinds in this mixture, personal and scientific were both presented by pupils. The teacher, therefore, was between exploring the personal view of S1, clarifying S2‘s contribution in trying to scientifically justify her disagreement with S1 and directing the attention herself to the elements that would be important to answering S1’s question. The quality of the questions and answers was also a mixture of low and high cognitive-level. The cognitive processes varied between the low process of remembering as some of the uttered information were explained through the lessons before, and the high processes of explain to construct a model and create to generate hypothesis. For some explanation questions like the one in turn 6; ‘’Why closed path?’’, it can be argued that it is a remembering question as it asks for things that have been already mentioned. However, I argue here that asking this question in this context assigns it to the high cognitive process of explain rather than remember. Asking this question before getting to know about the scientific views of the roles of the battery is different from asking it after pupils are aware with these scientific views. Asking the question in general talk about electric circuit is different from asking it in the context of this lesson as a pupil shows a mistaken microscopic thinking that its correction depend on understanding the precise importance of a closed path to have an electric circuit. This indicates that judging the quality is highly context-based.

For the Authoritative part, the teacher asked for a certain high quality answer and she got it instantly, and the talk went on to confirm that answer through moves of low cognitive levels, but suitable and needed in its context. The pattern of the talk took the typical form of I-R-E; I-R3.1-EV-I-R3.2-EV. For the Dialogic part, though, the pattern was dominated by the two types of the follow-up of elaboration and comment. It would be good to just focus on this pattern divided by the two pupils participated in; I-R2.1-C0-I-R2.2-EL-R2.3-C0-I-R2.4-C0 , I-R1.2-EL-R1.3-EL-R1.4-EL-R1.5-EL-R1.6-C0. This means that in practicing Dialogic talk with just one pupil the sequence goes around the form of; I-R-EL or I-R-C0. Without more initiation than the first one, the sequence takes usually the form of; I-R-EL-R-EL to end with a comment or the two elaborative and comment follow-ups keep exchanging the places in that sequence.

Example 2: This is a very complicated example in terms of its classes of talk because of its subject matter content and its flow as a talk. The whole example goes around the attached question. This question contains two sub-questions. An Interactive/Non-Interactive Authoritative talk goes around the first sub-question, in which there is no confusion. The talk about the second sub-question, however, got more complicated that it was very confusing trying to categorize its classes of talk.

In the Authoritative part, the teacher asked about the answer of the first sub-question, took the answer of one pupil, asked her for a justification, the pupil provided a high quality and scientifically right response, the teacher appraised the answer, and the Interactive part ends here. The teacher then controls the talk to explain into details the scientific point of view. Part of her lecturing about the scientific view, she wanted to direct the talk to another point, and so she put it in the form of a question. She got the short answer of; ‘The battery’ in turn 8, before she holds again the control over the talk. I considered the talk from turn 7 to turn 9 as Non-Interactive, because the pupil’s answer in the middle came just within the teacher lecturing about the scientific view.

So, this Authoritative talk with its two classes of Interactive and Non-Interactive had taken place within the purpose of working on a scientific problem. The talk in its short Interactive part took the general sequence of; I-R-EL-R-Ev. This pattern tends to manifest through Authoritative classes with mid and low authority, as the teacher keeps elaborating the answers of a pupil to evaluate all his contributions as a whole at the end. This Authoritative talk shows moves of high responses as the posed question was of a high quality, and as the pupil did answer that question correctly, the responses were also of high cognitive level.

The Non-Interactive part took a long time relatively through which the teacher talked about different points regarding the electric circuit and which are considered as scientific facts. So, in her feedback about the first sub-question and S1’s responses about, the teacher confirmed the following facts:

* The battery doesn’t produce electrons. The electrons are basically there in the wires
* The number of electrons is the same everywhere in the circuit
* The bulbs take energy to glow but not electrons, and so;
* Energy is consumed in the bulbs, but the number of electrons is not affected. It remains the same

What happened, therefore, that the teacher in her lecturing about the answer to the first question did actually provided the answer for the second sub-question that asks for a justification for the first one. This is one of the moments that the authoritative attitude of the teacher dominates strongly that the teacher becomes unaware of her planning for teaching. And so, when she moved to the second question, she realized that she already has answered it, as can be concluded from her utterance in turn 12; ‘’May be it’s simple now’’. In spite of this, the pupils, in trying to answer the second question look like they didn’t understand what the teacher has already explained as an answer to this question. Instead of having a short Authoritative talk to answer the question and approving the answer; the expected scenario according to the given context, the opposite happened.

A long, confusing and debateable Dialogic talk took place. The context doesn’t show that this was the teacher’s intention. However, the first pupil response is what has stimulated the talk to take the dialogic route and the teacher’s reaction to this response is what has defined the dialogic manner throughout it.

As I have explained earlier, the confusion in classifying the talk in this example (in this part specifically) happened because of the confusion in relation to the subject matter and how the talk did flow between the teacher and the pupils.

When the first pupil; S3 provided a response in turn11, the teacher captured the word of use up, and wanted to make sure that S3 means the word rather than she just misusing it. So, between the turns 11 and 15, the talk was Authoritative per se. When we look at it in regard to the whole excerpt in which it has been uttered, then we see that it is part of a Dialogic talk that the teacher practiced with S3 when listening to her opinion without evaluating it. A second confusion in relation to S3’s response is that she provided the teacher with a response different from the one her group has chosen. Actually, she mixed up different alternatives. We can then imagine that S3 has not understood her group’s choice or even was not aware of it at all. So the confusion just went on, and the teacher ended up confused between mistaken explanation and right choice, and so she invited other pupils to participate. This time, she got the wrong choice, and she kept asking for other opinions. The third pupil offered an explanation and not directly the choice, and here confusion again happened.

Within the Dialogic talk that the teacher kept practicing about the choices of the second question, came S3 explanation that entails different details. For answering the discussed question, the teacher was looking for the right choice and its explanation in regard to the number of the electrons. In her explanation, S3 repeated the information already mentioned by the teacher about the energy that theses electrons carry. The teacher considered the Dialogic talk is opened to the written choices assigned to the discussed question and its relation to the number of the electrons and not the energy. So, although she kept the dialogic manner in taking different opinions about the right choice, she didn’t do the same for the talk about the energy with S3. Inside the Dialogic talk from turn 10 to 31, came therefore Interactive Authoritative talk between turns 24 and 31, and a Non-Interactive Authoritative one in turn 31. After this, a Non-Dialogic talk took place in which the teacher was reviewing the two opinions offered by the three pupils who participated in the Dialogic talk. However, I didn’t consider the Authoritative talk in this part as classes to be classified because I believe that they come as part of the whole Dialogic talk with its two types; Interactive and Non Interactive.

To summarize the detailed account above, I would say that in explaining the glow of the bulbs and their brightness, justification can go to two related direction:

* in relation to the role of the current in causing the lightness and the fact about the conservation of the electrons
* in relation to the role of the energy in causing the lightness and the fact about its consumption

In the Non-Interactive Authoritative talk, the teacher talked about the two. When she decided to practice Dialogic talk about the second question, she wanted it to be in relation to the current and not to the energy. So the Dialogic talk ended up with a sequence of moves that entails inside patterns of Authoritative talk as showed in the following sequence: I-R3.1-C0- (I-R3.2-EV-R3.3) -EL-R3.4-C0-I-R4.1-C0-I-R5.1-EL-R5.2- (EL-R5.3-EL-R5.4-Ev-R5.5-EL-R5.6-Ev) ,C0

The quality also varied between low and high, and its inference also becomes more difficult and debatable because of the teacher lecturing about all the related information. However, it was just obvious from the flow of the talk and the confusion of the pupils that the teacher lecturing couldn’t confer the right scientific facts, and it was like the teacher has not mentioned them at all. This opens, in turn, a wondering question about the importance of Non-Interactive Authoritative talk in achieving the conceptual understanding in specific and positive learning outcomes in general.