

‘Can classroom talk support student- centered teaching?’ - A Study of Maltese Physics Classrooms

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Maltese Educational System (Compulsory education)

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graph TD; A["Maltese Educational System (Compulsory education)"] --> B["Primary Education (5-11 years)"]; A --> C["Secondary Education (11 - 16 years)"]; B --> D["Years 1 - 6"]; C --> E["Years 7 -11 (Forms 1 -5)"];
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Primary Education
(5-11 years)

Years 1 - 6

Secondary Education
(11 - 16 years)

Years 7 -11
(Forms 1 -5)

Teaching of science in Malta

Primary years

Students follow a science curriculum program that progresses throughout the years.

Secondary years

Forms 1 – 2

Students learn integrated science

Forms 3 - 5

Students can choose to study
Physics, Biology and/or Chemistry

Physics is compulsory in State schools

Classroom Discourse

The talk used by teachers and students in classroom interactions

- **What views do teachers and students have about classroom discourse?**

- Work done by Lemke (1990) and other researchers
- **Pattern of classroom talk: The I-R-E/F pattern (Initiation-Response-Evaluation/Feedback)**
- Dominance of teacher talk (Wilson, 1999)
- Students participate only in Response phase
- Responses are expected to be given immediately

Teachers' wait time

- Work done by Rowe (1972)
- The amount of time that the teacher waits for an answer.
- **3-5 seconds** of wait-time allow students to reflect and give elaborate answers.
- Many teachers find it difficult to get a wait time of up to 3 seconds or more (Rowe, 1986).
- In fact, in her study, Rowe (1986) calculated a wait time of 1 second.



Communicative Approach

- Work done by Mortimer and Scott (2003)
- Gives an insight on how teachers work to develop students' ideas in the classroom.
- Two dimensions of classroom talk:

Interactive - Non-Interactive

- Takes into account the level of student participation

Dialogic - Authoritative

- Considers the extent to which students' ideas are taken into account by the teacher

**AUTHORITATIVE
& INTERACTIVE**

**DIALOGIC &
NON-
INTERACTIVE**

During a lesson, classroom
discourse shifts from being

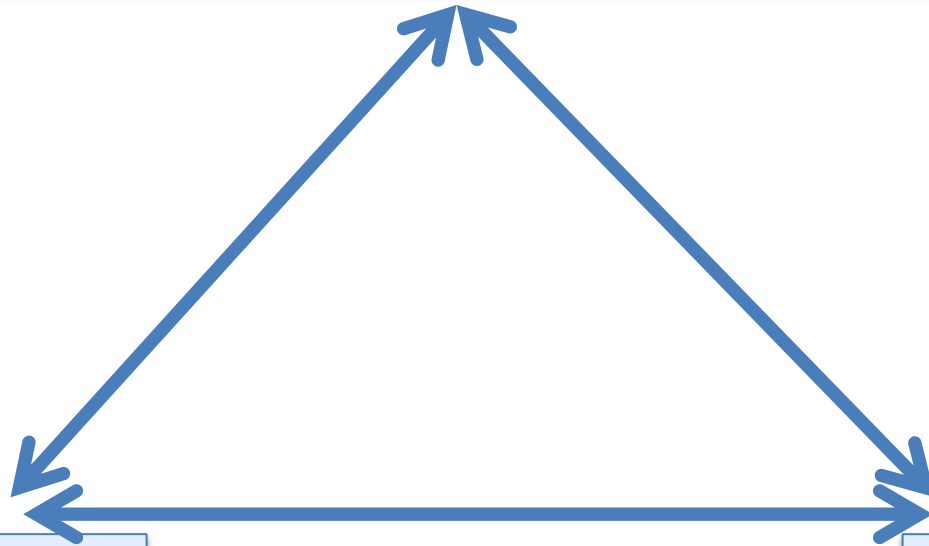
**AUTHORITATIVE
& NON-
INTERACTIVE**

**DIALOGIC &
INTERACTIVE**

14 Classroom observations
and audio recordings

Questionnaires
with 188
students

Interviews
with 14
teachers



Main Findings

IRE pattern- INITIATION phase:


- The first phase in IRE talk pattern.
- All fourteen interviewed teachers stated that they ask questions because they are interested in students' ideas which are not necessarily based on science.



IRE pattern- INITIATION phase (continued...)

- In contrast to this, from the questionnaires, **67%** of **188** students stated that although teachers asked questions, they still focused on their own ideas and explanation when introducing new ideas.
- The students' response was supported by the classroom observations as teachers were observed to ask mainly **close-ended questions** in a manner that elicits only particular answers from the students.

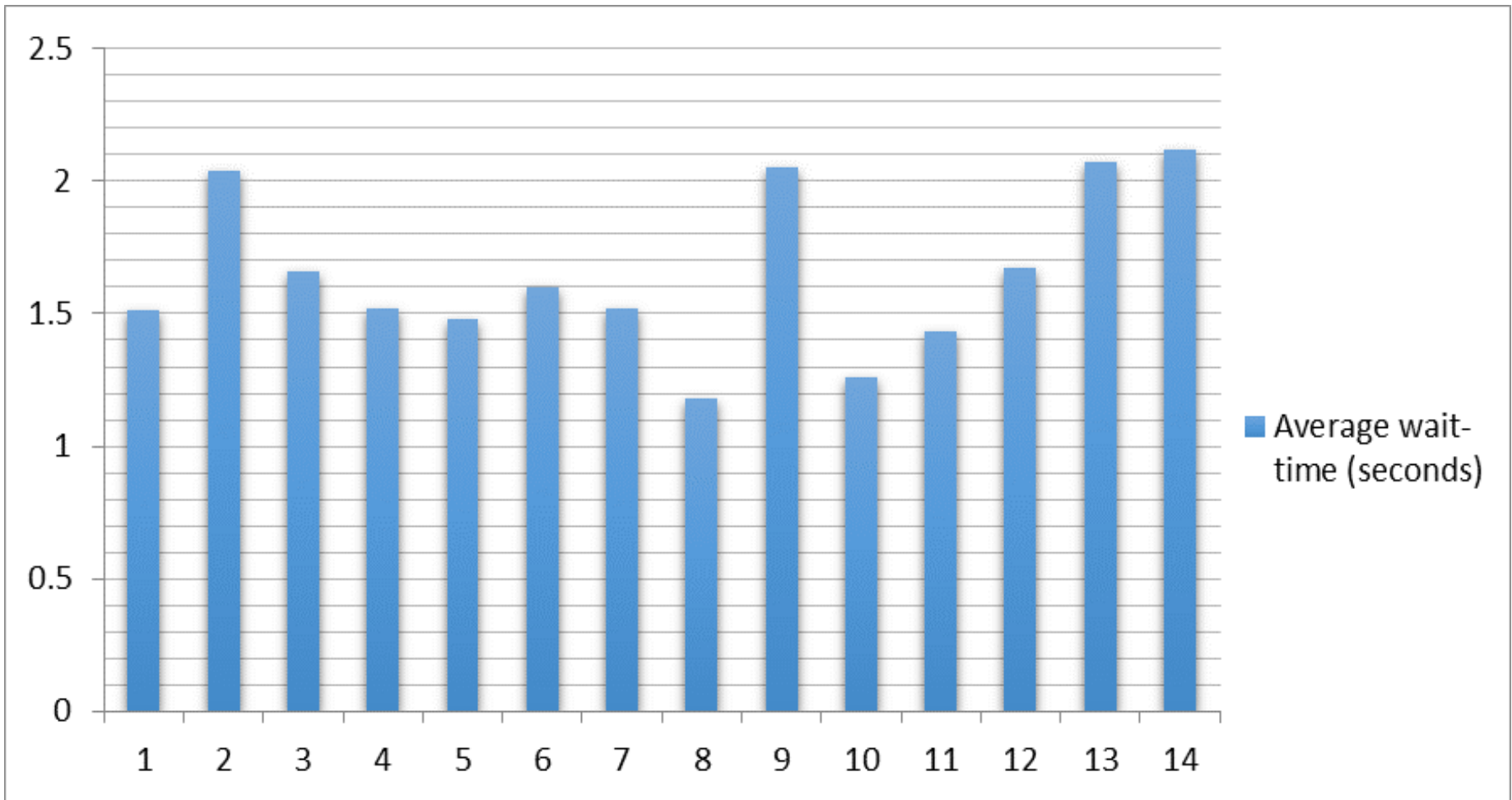
DOMINANCE OF TEACHER'S QUESTIONING

Lesson No.	Total time of the lesson	Total number of Teacher Questions	Total number of Student Questions
1	33' 50''	82	17
2	52' 02''	108	11
3	28' 10''	34	7
4	82' 40 ''	174	16
5	44' 16''	80	20
6	36' 20''	26	49
7	39' 01''	80	7
8	34' 06''	29	18
9	60' 19''	164	22
10	36' 31''	36	11
11	37' 38''	41	20
12	85' 34''	147	3
13	33' 40''	49	5
14	40' 24''	44	12
 Average:	48' 00''	78	16

IRE pattern- **RESPONSE** phase:



- Half of the teachers [7/14] stated they give enough time for students to answer. The other half could not decide but stated that due to time constraints they had to limit the wait time.
- **87%** of the students cohort stated that they are given enough time to answer a question.
- Observations and audio recordings showed otherwise.



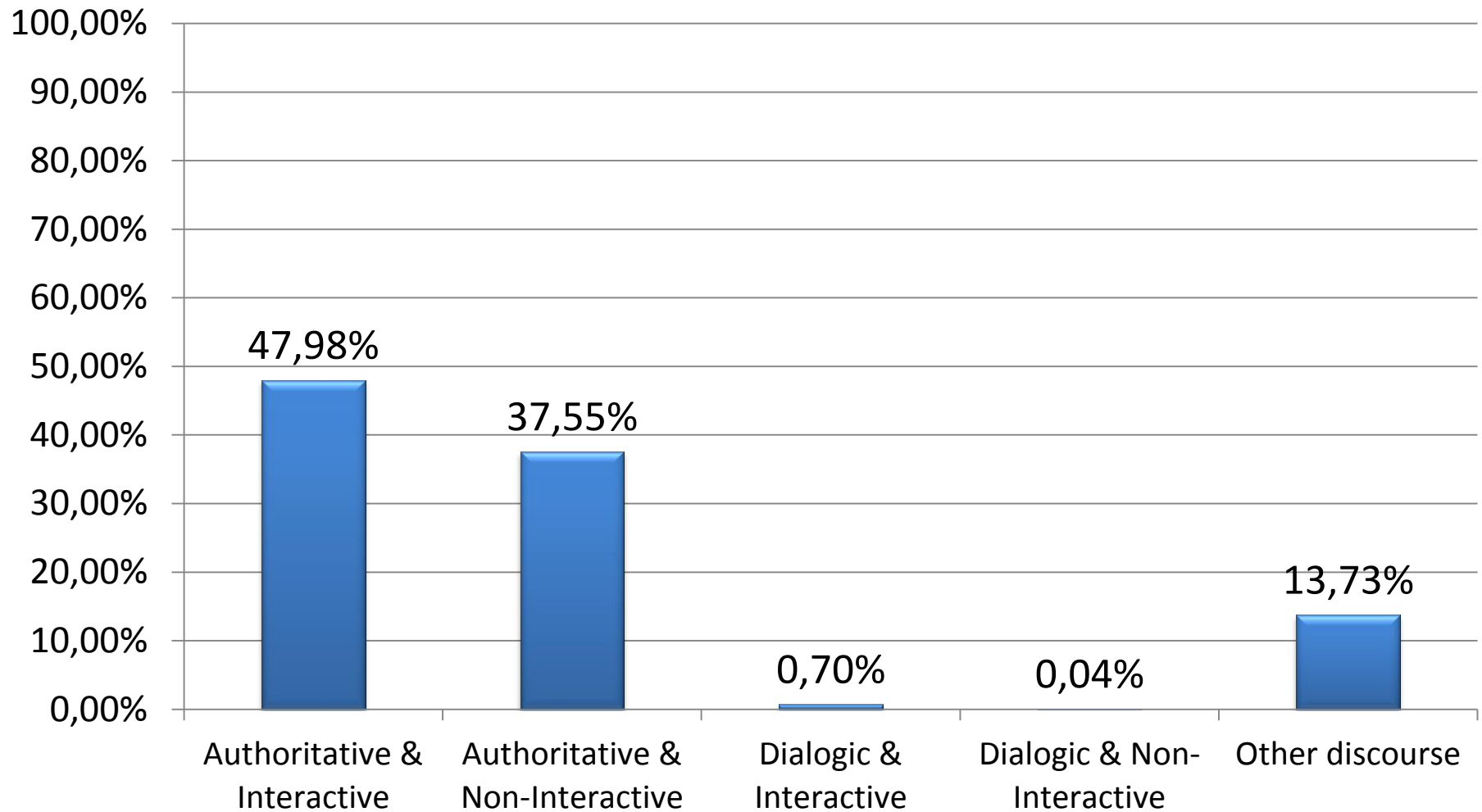
Average wait time calculated for every lesson.

- From this study, it was found that the teachers wait an average of **1.7 seconds** for the students' response.

IRE pattern- EVALUATION phase:

- [10/14] of the teachers stated that they correct students' answers when wrong or incomplete.
- *“Sometimes when I am rushed to move on or lesson gets over extended, I do end up giving answers but I prefer that students come up with answers themselves.”* (Female teacher, State School).
- The main finding obtained from student questionnaires and classroom observations is that the teacher still gives his/her own final answer mainly because of **time restrictions**.
- This is confirmed by the analysis of the audio recorded lessons where teachers mainly used **authoritative discourse**.

Communicative Approach



The percentage time during which different communicative approaches (Mortimer and Scott, 2003) were used by Maltese teachers

Communicative approach ... a way to student-centred learning?

- The many documents related to science education that are published yearly persist in encouraging student-centred learning strategies.
- They invoke innovative strategies such as the use of role play, interactive white board and social media that can provide a platform for student-centred learning.
- These are useful and essential **but are these enough to encourage student-centred learning?**

Teacher-student relationships and classroom discourse

To ask of other human beings that they accept and memorize what the science teacher says, without any concern for the meaning and justification of what is said, **is to treat those human beings with disrespect and is to show insufficient care for their welfare.**

It treats them with disrespect, because **students exist on a moral par with their teachers**, and therefore have a right to expect from their teachers reasons for what the teachers wish them to believe. [Norris, 1997]

Can one empower a shift towards dialogic and interactive classroom discourse?

- The above question is not devoid of **challenge and uphill struggles**.
- Even if only as a starting point, **in-service courses** can make teachers more aware of this type of discourse and its characteristics
- In order to manage to do this shift **a time of hands-on classroom practice** is necessary
- Furthermore, teachers need to be **accompanied by mentors** [Education officers, Heads of departments and peers] so that concerns that teachers raise regarding time management and syllabus constraints do not prove disheartening.

Teachers' perseverance

Changing one's mind-set – what measures?

- **Questioning** . . . work on asking more open-ended questions and less close ended questions. This encourages students to think about a particular idea
- **Wait time** . . . work on lengthening the wait time by consciously allowing students more time to think
- **Feedback** . . . work on the type of feedback [verbal and non-verbal] that we give to all students' answers [scientifically correct or incorrect ones]

Teachers' discourse

Classroom discourse and student-centred learning

- Teachers argue that the content that needs to be **'covered'** is a concern that hinders them from moving towards student-centred learning. They are aware that when students are learning science, they need to **think** about scientific concepts .
- Furthermore, teachers are painfully aware that a dialogic-interactive form of classroom discourse is **time consuming** and may lead to time constraints and **ethical issues** [such as rushing through a topic].
- A teacher's **past learning experiences [her/his luggage]** also hinder him/her from embracing this form of discourse as the starting point of teaching.

Teachers' mind set

Classroom discourse and cake baking

When I argue with you it is as if I should try to get you to make a cake by supplying you with eggs, flour, sugar and baking powder: in the end, I hope, you will do the mixing and baking. This is why it is that, when your judgment has been influenced by someone's successful arguing, you have the feeling that not only that person, but reason itself has persuaded you. [Binkley, 1995]