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**Investigating the role of maths intelligence and failure mindsets and
the responses of teachers and mothers to pupils' maths intelligence
mindsets and/or achievement in Riyadh, Saudi Arabia.**

Volume 2 of 2

by

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Appendix C Study 2: A qualitative exploration of maths teachers' mindsets and reactions to pupils' successes and failures in primary classrooms in Riyadh, Saudi Arabia

C.13 The coding manual table featuring interview analysis

Theme 1: The impact of national policy on maths education

Description: This theme captures teachers' views of how the maths curriculum, as well as education policy and systemic issues by the Ministry of Education in Saudi Arabia, impacts pupil achievement.

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
Maths curriculum	The positive aspects of the new maths curriculum	<p>This code relates to the following subordinate codes:</p> <ul style="list-style-type: none"> • More engaging for pupils because they used real-life examples. • Lessons become easier to teach because they included specific maths skills which students had to acquire. • The presentation of the lessons in the book was engaging, as there were more problems which developed pupils' thinking skills. 	4	2	6	<p>"... After the new curriculum, I feel that the percentage of underperforming students has changed, from eighty percent to thirty-five or even thirty percent. ... The significance of the current curriculum is that it encourages critical thinking skills which help students to think, and welcomes discussion exercises, which let students have a chance to discuss their maths problems verbally, where in the past maths was only about solving problems." (P29)</p> <p>"There is also the fact that the student in elementary school is much easier to evaluate since evaluation is done on a lesson by lesson basis in terms of the mathematical skill to be learned in each lesson, which isn't the case in the middle and high schools, where student evaluation is a bit more difficult." (P21)</p> <p>"Yes, also the curriculum, specifically that they currently link the curriculum to life with real-life experiences." (P13)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
	The negative aspects of the new maths curriculum	<p>This code considers the following subordinate codes:</p> <ul style="list-style-type: none"> • Too much information on the curriculum to teach students. • The curriculum was higher than some pupils' level. 	1	2	3	<p>"Another factor is that the syllabus is too long, and it provides a lot of information" (P7)</p> <p>"But, the current curriculum is above students' comprehension level. They have to give them this information gradually. .. I mean, only the smart people will master these lessons, while the average-level students and below average students find such lessons very hard to comprehend." (P23)</p>
Teaching system regulations	The negative aspects of the teaching system regulations	<p>This code refers to the following subordinate codes (non-specialised / classroom size / pressure):</p> <ul style="list-style-type: none"> • Allowing teachers who were not specialised in maths to teach pupils maths. • A large number of pupils in the class. • Not enough time to cover everything during the class. 	8	4	12	<p>"... to be honest, maths needs time. I mean, that a forty-five-minute period is not enough when you have to correct exercises, assess and ensure student participations in classwork, and discover the outstanding students who have mastered the required skill and those who haven't. All this needs time. The problem is that we don't have enough time for all that." (P14)</p> <p>"I suppose that the high number of periods that teacher administer per week limit his/her success and thus limit the students' success." (P7)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Pupils had too many classes during the day. • Teachers had to teach too many classes every week. 				<p>"a large number of periods" (P7) (Researcher Note: the participant means that the number of the periods put the student under pressure).</p> <p>"...another reason is the overcrowded classrooms, with more than 38 students per class, which leaves the teacher no time to develop remedial plans. That is why I developed the concept of mini-classes so that outstanding students could help me explain the lessons to underperforming students." (P16)</p>

Theme 2: The importance of the school's ethos and provision of adequate resources

Description: This theme incorporates teachers' perspectives of how school officials recognise pupils' maths achievement, how positive school leadership can ensure pupils' success in maths and how ineffective school leadership and management can affect pupils' outcomes. It also includes accounts of the difficulties some teachers experienced due to a lack of resources.

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
Ways for schools to recognise pupils' maths achievements		<p>This code relates to the following subordinate codes that explain how schools acknowledged pupils' successes:</p> <ul style="list-style-type: none"> • The school sometimes provided motivational incentives and prizes to pupils. • Staff honored excellent or improved pupils during the morning assembly, in the class or individually with a gift, or a certificate of appreciation, or both, from a school leader, deputy principal or the pupil counsellor. 	5	10	15	<p>"We, of course, honoured the student in the morning assembly as the best student. Researcher: Who honoured her, you or the school administration? No, the Student Counsellor was duly informed. That was at my former school not this one. The student was recognised by the Student Counsellor, and of course she eventually had a chance to participate in a Quran Recitation Contest. She was an excellent student. Researcher: By recognition you mean a Certificate of Recognition? and a present from the school administration." (P28)</p> <p>"The Student Counsellor sometimes requests to submit the names of students who are improving in maths during the two or three weeks into the curriculum, so that they can be recognised in the morning assembly and be given presents." (P24)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
Lack of school supplies and resources		<p>This code considers the following subordinate codes:</p> <ul style="list-style-type: none"> Lack of acknowledgement by the school for achievement as no motivational incentives and prizes given. Schools should have provided laboratories, materials and tools which help pupils to succeed or there was a lack of these and classroom furniture which might have affected pupils' performance. 	3	6	9	"The role of the school administration is primarily motivational and that is why when a student obtains a prize, I try to get the administration office to deliver it to the student so he knows that prize being presented to him comes from the school administration and not from me personally." (P11)
School leadership and management	Effective school leadership and management	<p>This code refers to the following subordinate codes:</p> <ul style="list-style-type: none"> A follow up of pupils' progress by the school leader, deputy headteacher or the school social worker. Put in place a system for underperforming pupils, in which they were taught the same subjects and skills by a 	1	3	4	"Participant: At the end of the semester, all students at a given grade, be it third, fifth or sixth grade, whatever, who failed a particular mathematical skill, will have such skills re-taught in a specific class, but in a different way by more than one teacher. I mean such skills are re-taught by a teacher other than the class teacher so that students get introduced to a new teaching method that is more suited to them than the first method, which wasn't suited to them in the first place.

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		different teacher at the end of the semester.				<p>Researcher: So, you mean that the teacher might get replaced this week? Participant: Yes, the teacher probably gets replaced, where another comes. Researcher: You mean by a teacher other than the class teacher? Participant: Yes, because they say that the problem is might be because of the teacher." (P14)</p> <p>"Success can be ensured with parental engagement and close follow up by the school's vice president and student counsellor. Surely, this helps successful students remain at the same level." (P1)</p>
	Ineffective school leadership and management	<p>This code reflects the following subordinate codes:</p> <ul style="list-style-type: none"> • Maths teachers were not allowed to attend training courses. • The pupil counsellor did not inform the parent about their child's poor performance. 	0	2	2	<p>"The third reason is that mathematics teachers aren't allowed to attend training workshops and are always kept at school as if a mathematics subject is something to be afraid of." (P7)</p> <p>"the role of school and family is to help teacher, for example, the parent must be informed that his child is underachieving either during sessions of the parent-teacher association or by text messages. How else a</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
						parent would know that his child is underachieving if the student counsellor doesn't inform him of that unfortunate fact? So, the student counsellor has the greatest responsibility to convey that information to the parent." (P5)

Theme 3: Classroom teaching strategies and behaviours

Description: This theme covers two key issues raised by the participants. The first issue is that teachers held strong beliefs regarding the teaching practices used by other teachers and the effect on their pupils. The second issue relates to the participants' own teaching behaviour and pedagogical practices in their classrooms, including their teaching methods, motivation strategies and how they coordinate support for their pupils.

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
Teachers' beliefs about other teachers' classroom behaviour	Ineffective teacher behaviour	<p>This subordinate code relates to the teachers' negative behaviour or attitude toward the pupils:</p> <ul style="list-style-type: none"> Teachers should not have been too serious or nervous, or should not have criticised and demoralised their pupils. There was a lack of teachers' interest in following up with their pupils, and a lack of consideration of pupils' individual differences. Teachers did not help pupils to overcome their fears. 	3	8	11	<p>"this interactive projector helps me a lot, as well as that PowerPoint CD player, which is highly effective, although some teachers don't use it and stick strictly to the teacher's manual and sometimes don't even apply its guidelines and explain the lesson as she understands it. Bear in mind that students differ in terms of learning patterns. Some respond to visual material; others respond to audio material and still others respond to both. We do attend workshops, but the problem is that not all apply what they learn" (P16)</p> <p>"Researcher: Do you mean that the role played by a student's family accounts for thirty percent of the student's success while that played by the teacher counts for the rest? Participant: That's right. I mean if the teacher doesn't frequently use motivational phrases or exercise patience, he will get nowhere with the student." (P8)</p> <p>"The teacher might not break the ice with the students, and a teacher who projects too firm and strict an image this may cause the student to be apprehensive of the subject. So, the student must feel an affinity for the teacher, otherwise it will</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Pupils were not motivated in any way by their teacher. 				be very difficult, as we have already indicated, for the student to have an affinity for the subject taught by that teacher." (P4)
		<p>This subordinate code reflects the negative aspects of teacher teaching:</p> <ul style="list-style-type: none"> • Poor teaching. • Teachers were unable to deliver the information to their pupils. • Teachers did not give pupils a chance to think and solve the problems, which led students to fail. • Teachers did not use the strategies, technology or the materials available at the school in their teaching. 	5	3	8	<p>"Naturally, there are other factors. Such factors include less skilled teacher, bad delivery," (P10)</p> <p>"The teacher has a big role to play here. I mean it is up to the teacher to make the student love the subject she teaches. ... If the teacher just walks into the classroom, routinely explains the lesson and then walks out, the student will certainly be put off the subject due to lack of diversification and the unchanging routine followed by the teacher during each and every mathematics period. It is all writing on the board with dull explanation to follow and does not use different methods of technique in their teaching." (P24)</p>
	Effective teacher behaviour	This subordinate code covers the positive aspects of teacher teaching:	9	10	19	"Awareness of the importance of mathematics is key. The teacher has to instil in the students the awareness of the importance of mathematics in their future lives. This is a far

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Good teaching. • Simplified their teaching for pupils or made their teaching attractive to their pupils. • The role of a teacher was as a mentor/ guide to their pupils. • Used the newest and most effective teaching methods, tools and strategies or included games. • Helped their pupils become interested in or fall in love with the subject. • Linked maths lessons with reality. 				<p>cry from just walking into the classroom, delivering a routine and dull explanation, focusing on certain exercises while omitting others, because they will not be included in the exam or not important for you." (P25)</p> <p>"I'd say the first thing is that they feel that the subject is enjoyable and not just something boring they have to bear with. This can be achieved by using strategies and introducing activities that link mathematics with their everyday life." (P21)</p> <p>"Naturally there are many factors, such as attractive presentation, using modern technologies in explanation along with the use of motivation and instilling a competitive spirit in the students which is the most impactful factors." (P10)</p>
		This subordinate code relates to the teachers' positive attributes toward pupils:	6	8	14	"Naturally, if the student receives the same level of care by teachers in subsequent educational stages, the student will continue to excel. However, if neglected, the student will become bored with the subject and see no point in seeking

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Took an interest in their pupils. • Took into account the individual differences between students. • Teachers encouraged/motivated their pupils. • Used a range of stimuli. • Created an atmosphere of competition among pupils. • Desired that pupils loved her/him so that she/he loved the subject. 				<p>self-development in the first place." (P14)</p> <p>"Naturally there are many factors, such as an attractive presentation, using modern technologies in explanation along with the use of motivation and instilling a competitive spirit in the students which is the most impactful factors." (P10)</p>
Teacher teaching methods	Ways of explaining	<p>This subordinate code relates to the teachers' ways of attracting/ teaching maths in the class to their pupils:</p> <ul style="list-style-type: none"> • Linked maths lessons to reality. 	15	15	30	<p>"Look! I always try, as much as I possibly can, to make them love maths and understand that our whole life is based upon mathematics, by giving them real life examples. I'd say, for instance, mathematics is everywhere even when it comes to choosing the clothes you're wearing because then you have to know the correct measurement and so forth. So, the first thing is to try and get the students to love the subject of mathematics." (P16)</p> <p>"I'd call upon students to come up to the board and solve</p>

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		<ul style="list-style-type: none"> • Tried to simplify teaching for pupils or connect with pupils on their level. • Tried to make teaching more engaging by including games. • Let students answer the question on the board to incorporate movement and/or to break the monotony of studying. • Flexible when dealing with pupils or did not put pupils under pressure. • Allowed the student to ask questions during tests. • Took into account the individual differences between pupils. • Encouraged and motivated students, used stimuli with pupils and tried to make them love maths. 				<p>exercises in order to break the monotony usually associated with math." (P4)</p> <p>"I, as a teacher, recognize my outstanding students in front of his other teachers or his classmates, whether by writing encouraging phrases in his follow up record and honoring them or by giving them presents every week." (P15)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>This subordinate code covers the teachers' way of ensuring that pupils understand maths:</p> <ul style="list-style-type: none"> • Taught pupils how to study correctly. • Allowed the pupil to solve the problem in a different way than they had been taught. • Ensured that pupils understood the point before moving on to another point. • Focused on the basics of maths. • Focused on showing the student how to solve the problem mentally. 	12	9	21	<p>"Sometimes, when I'm explaining a skill-related exercise using a certain way, an outstanding student comes up to me and says, "I have a different way to solve this exercise, Ms." So, I'd call her up to the board to explain her solution. Surprisingly, some students favour her solution, which is alright with me, because the main thing is for them to master the required skill. Also, some students have highly educated parents, so when they explain a certain skill to their daughters they give her many possible solutions and they would come to me and say, "My father taught me to solve the exercise this way," and I'd say "Go ahead! Explain it to your classmates" and they are always eager to prove themselves." (P16)</p> <p>"By focusing on things that the student will still need over the following years when he graduates from elementary school like multiplication tables, division and so on and so forth, so he has an excellent grasp of such mathematical concepts going forwards." (P1)</p> <p>"By making sure that all students understood the question by explaining one example to them before we move to the next section. I ask the students about a skill and if I determine through their answers that they all understood it, I move on to the second example so as to ensure at the very least that they have fairly mastered it." (P7)</p>
		<p>This subordinate code reveals the teachers' way of guiding</p>	15	14	29	<p>"My technique is to keep him standing until another student gives the correct answer and then I repeat the same question</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>their pupils when they answered incorrectly:</p> <ul style="list-style-type: none"> • Asked her/his classmate to answer the question and then re-asked him/her (the pupil who had answered incorrectly) the same question. • Gave the pupil a hint. • Determined what was wrong exactly with the pupil's answer and requested an amendment. • Asked the pupil to pay attention to the board to find out the correct answer. • Asked pupils to provide the teacher with the answer directly or on the board, to find out which step the mistakes were in. 				<p>to him, because then he will know the correct answer." (P14)</p> <p>"I'd re-write the question and ask him to answer it step by step until we get to the point where he got it wrong." (P7)</p> <p>The same comments I write, I would say it to her verbally, things like, 'Please rethink your answer', 'Concentrate!', 'Why did you answer the exercise this way?', 'This method is wrong', or 'Please follow the steps as I explained'." (P16)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Asked the pupil why s/he had answered it like that, to identify their mistake. • Asked the pupil to amend their answer. • Asked the pupil to follow the correct steps. • Asked the pupil to identify their mistakes. • Asked the pupil's classmate to only correct the incorrect part. • Asked the pupil to review their answer. • Asked the pupil to compare her/his correct answers on the worksheet with the answers they had got incorrect in the exam to find their mistake. • Asked the pupil to answer the question on the board, and then asked the pupil's classmates if the pupil's answer was correct or not. 				

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>This subordinate code relates to the teachers' rules for their pupils in the class:</p> <ul style="list-style-type: none"> • Made rules in the class for pupils such as do not laugh when a pupil answers. • If pupils violated the class rules, they lost a point. 	2	1	3	<p>"I always take this into consideration. So, any student who laughs at a classmate answer or makes fun of him gets punished by me. This has really paid off as a student then feels that he can answer any question or try to answer without being under any kind of pressure and thus the whole class participates and every student feels that he can raise his hand and say whatever is on his mind without being afraid that if he gives a wrong answer, he would be the subject of ridicule." (P2)</p> <p>"but the student who breaks the class rules or commits such infractions gets docked, lose point or more, so students are always keen not to lose points." (P21)</p>
	Re-explanation	<p>This code reflects the following subordinate codes:</p> <ul style="list-style-type: none"> • Re-explained the point to the pupil who did not understand it. • Explained the question to the pupil who answered incorrectly and/ or reviewed the lesson with pupils. 	14	12	26	<p>"The other way is to have them come to my office and explain it to them individually" (P17)</p> <p>"I usually ask students, "How many of you answered this question correctly," so I know exactly how many failed to answer this question correctly and if only a quarter of the students, for example, got the correct answer, then I'd know that this skill hasn't been sufficiently mastered and then I explain that particular segment again, because when more than 50% of the class gives an incorrect answer to the same question then the students must have a problem in understanding the question so I try to solve using another</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> Gave private classes/tutoring to the underperforming pupil to re-explain the point/skill/lesson to them. Re-explained the point to the pupil in a different way. 				<p>method." (P19)</p> <p>"One way is to administer the so-called 'remedial classes' which usually start in the middle of the second semester. These remedial classes are administered to underachieving students at a rate of one period per week in the early morning." (P5)</p>
	Pupils' tasks and activities inside and outside the classroom	This code relates to two subordinate codes; the first subordinate code refers to the tasks and activities that the teacher gave to their pupils, while the second subordinate code is the material that the teacher gave to the pupils to help them when they answered their homework, exam questions or exercises incorrectly, in order to raise her/his performance level. In addition, the material that the teacher gave to the excellent pupils to help them for further progress and improve their performance.	14	12	26	<p>"There is a worksheet for each skill which is taught on a weekly basis. If a student fails to answer this worksheet, I return the worksheet to them. The excellent students who answer the worksheet, on the other hand, move right on to the next skill." (P5)</p> <p>"give him similar problems to solve to make sure he understood it." (P1)</p> <p>"sometimes, I'd ask her to memorize the multiplication tables and give her a worksheet with relevant examples of multiplication problems. That is of course, assuming that the problem is due to the student not having memorised the multiplication tables even though a sixth-grade student is supposed to have already memorised the multiplication tables." (P21)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Asked pupils to do one or all of the following: prepare leaflets, concept maps, maths cubes or research, answer worksheets, complete a project or do their homework. • The pupils who did not bring their homework had to do it twice as a punishment. • Engaged the pupils in maths activities such as the multiplication festival activity. • Showed pupils the barcode on the book, gave pupils a tutorial CD, gave pupils a laptop/phone to search for something or watching appropriate material or asked the pupil to find an answer to their question from websites and bring it to class. 				

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Gave pupils examples from the book or similar problems. • Gave additional exercises to the excellent or underperforming students. • Asked pupils a verbal question. • Involved their pupil in activities outside the classrooms to make them interested in studying at school. 				
	Ways of attracting pupils' attention in the class	<p>This code involves the following subordinate codes:</p> <ul style="list-style-type: none"> • Asked the pupil to answer a question orally. • Asked the pupil to solve the problem on the blackboard. • Involved the pupil in a practical part or exercise in the classroom. 	4	6	10	<p>"Participant: ... when I start the lesson, I, for example, call the students out by their names, "Come, [Student Name], and come [Student Name]," which I am aware that their class performance level is poor; I try to make them feel intrinsically motivated to the conducive classroom environment. Let's say that the class will have a lesson about subtraction. I say: "[Student Name] works at a store, where one customer enters the store to buy something..." so he can imagine the plotted scenario as well.</p> <p>Researcher: You mean to make the students actively participate with you?</p> <p>Participant: I encourage them to interact with me during the</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Changed a pupil's place in the class to be near the blackboard. • Showed videos during teaching. • Played characters in the classroom. • Read the questions to the pupils one by one in the exam. • Linked a pupil's answers to a previous question with the lesson explanation to get the pupil's attention. 				<p>presented lesson, ..." (P12)</p> <p>"I use activities including getting the student to sit closer to the blackboard and always calling him up to solve problems so that he participates more and responds better." (P10)</p> <p>"For that kind of student, I try to attract her attention using video clips to get her to concentrate until I feel that she has gotten the information and then she can go back to being distracted." (P16)</p>
	How teachers evaluated pupils	<p>This code reflects the following subordinate codes:</p> <ul style="list-style-type: none"> • Used different ways to evaluate pupils. • Prepared the tests with varying levels of difficulty. • Conducted periodic tests. 	7	2	9	<p>"My teaching strategy, which I use on a daily basis, is to test them on the previous lesson in a special notebook, where I assess their learning through two or three questions; at first, these questions seemed to be difficult for them, but now they started to pass and get the full mark. They solve the equations and they frankly get very excited about tests" (P20)</p> <p>"When a student secures excellency in all school subjects except Math, this issue might be linked to strong hereditary, and I wouldn't consider such student's performance to be</p>

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						<p>poor because she has worked hard. I have examples of students who perform poorly; they are diligent and try to solve equations, but when it comes to exams, they somehow cannot answer questions on their own. Therefore, I wouldn't consider these types of students' performances to be poor because they put their efforts through and accordingly, they must pass the subject, even if they are not intelligent enough in Math. What else can I say?</p> <p>Researcher: How can a student pass maths if she hasn't solved the test equations correctly?</p> <p>Participant: I let her pass in maths! I have no other option; she passes due to the other assigned works.</p> <p>Researcher: Like what?</p> <p>Participant: She, for example, submits all her assignments. When I give her a worksheet, she basically solves the problems. I cannot let her fail when she puts an amount of effort on other tasks." (P23)</p>
Motivation strategies teacher used inside and outside the classroom	Mindset messages to the pupil	<p>This subordinate code relates to how the teachers increased pupils belief in their ability:</p> <ul style="list-style-type: none"> Told the pupils that they could succeed in maths. 	13	11	24	<p>"We all have minds, Allah distinguishes us from the other living beings by the mind and therefore, there is no hard matter in the life. You have succeeded and passed to grade 5, your curriculum is not difficult, but rather it fits your mind. They design it to fit your mind, I always tell the students, 'Once you send a negative impression to your brain, your brains will stop working. Instead, you should always say: I am strong, I cancan, and I am intelligent'." (P24)</p> <p>"Like I've said before, I tell him that maths is an easy subject,</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Told the pupils that they had the same abilities as a superior/excellent pupil. • Encouraged pupils by telling them the teacher was sure that they would do better or by writing that they could do better at the task. • Before the exam, the teacher said to the pupils that the exam was easy. • Explained to pupils that maths was an easy subject. • Told the pupils that the teacher was sure that they would get full marks. • Teacher told the pupils that that was their real level or that was not their real level. • Asked the pupils to challenge themselves and 				<p>and he can understand it and pass the maths exam smoothly." (P1)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		to tell themselves that they were intelligent.				
		<p>This subordinate code covers how teacher avoided pupils becoming frustrated:</p> <ul style="list-style-type: none"> • Did not single out one pupil as being particularly good in the class or in front of her/his classmates. • Did not reprimand the pupil for failure. • Avoided writing a harsh comment for students. • Did not demoralise their pupils. • Justified the pupil's failure to his/her classmates to avoid embarrassing a pupil. • Did not put X marks. • Did not write a comment, but simply wrote it was the wrong answer. 	10	12	22	<p>"I always say things like excellent or well-done to the best student, but I don't like to draw the spotlight on him, because if I do outstand him, other students will get frustrated and even reluctant to participate in class activities or to answer questions expecting that only he will be able to give the correct answer." (P3)</p> <p>When a student is called up to the board and answers incorrectly, I try not to frustrate him, so I take him aside and tell him, "You have answered most of the problem correctly, so I'll call upon one of your classmates to complete the solution." (P1)</p> <p>"Researcher: Do you write anything on the test paper? No, just that she hasn't mastered the required skill." (P28)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> When the answer was wrong, the teachers said there was some truth to it. 				
		<p>This subordinate code reports how the teacher expressed sadness regarding a pupil's poor performance or reacted to a pupil's performance decreasing:</p>	3	4	7	<p>"Sometimes, I wouldn't say that I openly reprimand them, but may be give them a look of disapproval or say things like, "Weren't you paying attention?" (P4)</p>
		<ul style="list-style-type: none"> Drew a sad face. Told their pupils that they felt sad because they (the pupils) would not receive a gift. Showed appropriate physical contact with the pupil such as patting the pupil's head and his/her shoulder. Had a look of disappointment on their face when pupils answered 				

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>incorrectly or obtained a bad mark.</p> <p>This subordinate code reflects how the teacher linked maths to geniuses or excellent pupils:</p> <ul style="list-style-type: none"> • Linked maths with geniuses. • Teacher said to the underperforming pupil to try to be like their brother, who was an excellent pupil. 	1	2	3	<p>“One of his brothers used to be one of my outstanding students, so I’d say things like (Be an ace just like your brother,) thus, encouraging him to emulate his brother.” (P6)</p> <p>The first thing is to tell her that she is special, because those who succeed in maths must have special abilities, and all the people who major in maths go on to become physicists and are regarded as geniuses. “So, if you wish to achieve a distinguished status academically as well as socially, you have to love the subject and excel in it so you can specialise in one of the mathematical disciplines later on and become a member of that elite group of scientists and geniuses.” (P17)</p>
	Developing a relationship through writing or discussion with pupils (individually or with all pupils in the classroom)	<p>This code relates to the following subordinate codes:</p> <ul style="list-style-type: none"> • Made references to the pupils’ future and/ or wished the pupil a brilliant future. • Teachers said to the pupils “One day, I hope you become a teacher, 	8	7	15	<p>“I’d tell her “You’ll achieve greater goals, take part in international contests and fulfil all your dreams. And one day you’ll be a world-renowned medical doctor.” (P16)</p> <p>“I’m sure you’ll make me really proud of you in the years to come,” and “You will be a medical doctor, an engineer or a teacher, and I’d say proudly that I was once your teacher.” (P10)</p>

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		<p>doctor .." or " One day, I will be proud of you".</p> <ul style="list-style-type: none"> Wished the pupils further progress or to reach their goal in the future. 				
		<p>This subordinate code involves how the teacher emphasised the importance of studying maths:</p> <ul style="list-style-type: none"> Advised the student to work hard/ improve their skills in maths. Advised the pupil to continue to progress in maths. Wished the pupils further progress in their studies. Talked to the pupils about the importance of effort for success. Asked their pupils to do their homework or do 	13	14	27	<p>"Even if my student has achieved what I want, I motivate him more and do not let him feel that he has achieved the maximum level to cease development, I rather send more encouragements along the way." (P14)</p> <p>"Yes, I target all students, where I write on their papers and in the case of the neglectful student, I write to him on his paper, "Please strive diligently and achieve further progress." (P5)</p> <p>"All you need is more attention at home. Answer more exercises and if you don't understand my explanation ask your classmate and she'll explain this section to you and help you answer the exercises." You see, this is my method. I'd explain the lesson and do my best to make her understand and she'd master the skill sometimes, but I found that peer education is the more effective strategy. To tell you the truth, I found that she was more receptive to her classmate's explanation." (P16)</p> <p>"I swear, the most important thing for me is self-reliance. I tell the student if she does not know certain matter, to use</p>

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		<p>more training to solve maths problems.</p> <ul style="list-style-type: none"> • Urged their pupils to watch useful videos, play maths games and look at websites related to maths. • Asked their pupils to participate in the class. • Advised the pupil to ask the teacher, their classmates or family when they did not understand. • Suggested their pupils hire a private teacher. • Tried to simplify maths for pupils. • Encourage their pupils to love maths and not the maths teacher. 				<p>Google. I log on my laptop and teach her how to search for information from other sources, for example, "If your mother is not around and I have explained lesson that day and finished the class, and went home, how can you improve better?" I teach the student by telling her to open a certain link, for example, I search on the Internet and tell her to write the lesson on search engine and there will appear to her easy websites to learn from. This year, we have the barcode and if the barcode does not open, I tell the student to review my program, meaning that I teach them the method because they are excellent in logging in the games and Instagram and know a lot of things, where I employ their knowledge to do so." (P22)</p>
		Engaged with pupils about subjects outside the field of maths such as sport or hobbies, or joked with pupils during the class, to encourage pupils to love maths.	1	5	6	Look! I have my own special technique when explaining maths so that the subject is not to be dull and to avoid delivering a monotonous explanation over a 45 minute period, because diversification is key if the student is to like you and the subject you teach. I believe that most students get bored if explanation takes more than 15-20 minutes and that is why I

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						begin the period with exercises and end it with exercises. So, the period begins with exercises covering the previous lessons followed by a 15-20-minute explanation of the current lesson interspersed with may be five minutes of fun and jokes and ends with exercises to ensure that the students have understood the lesson. (P4)
	Encouraging pupils to try	<p>This code involves the following subordinate codes regarding the ways teachers motivate their pupils:</p> <ul style="list-style-type: none"> • Did not tell the pupils that there was a problem if they had answered their homework incorrectly, but emphasised the important thing was that they had tried. • Encouraged pupils to try again. • Gave an example of a struggling person. 	10	11	21	<p>"Or at least, you should try, it doesn't have to be right, the important matter is that you try and there's no problem for me if the solution is wrong." (P17)</p> <p>"As for the solving problem assignments, I tell the student to try to solve it and it doesn't have to be the correct answer. The most important thing for me is that I make sure that the students have opened their books had a go at answering. In class, I discuss their answers and find out the errors, so that the students will not repeat their errors. However, I conclusively ask the students not to solve their assignments through the Internet and not to let others solve their assignments for them, so that the students will try more than once to solve their assignments regardless of their correct answers. Although I am a teacher, I sometimes answer a question and find that my answer is wrong. There is no one who does not make mistakes. To be honest, I sometimes make simple errors in the class and my students correct it for me. I naturally admit my mistake, because everyone makes mistakes." (P23)</p>

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						<p>"However, make my students feel completely comfortable. I share the information with them as much as possible and remind them that the creative persons were like us at their beginning, where they are human beings like us, and with the attempts and positive attempts, they became scientists, where they set laws and created inventions based on their attempts." (P2)</p> <p>"You must use your mind no matter what type of the solution crosses your mind; even if such solution is wrong, there is no problem, and you should learn. I make the pupil feel that he is not under pressure and that I use only the marks, mark him with (X) or apply traps errors." (P2)</p>
	Retaking the exam to the pupil	<p>This code relates to the following subordinate codes:</p> <ul style="list-style-type: none"> • Gave the pupil a second chance when she/he did not pass the exam/skill. • Let the pupil choose the lesson and/or time for the re-test. 	10	11	21	<p>"I ask my student, "You will have a make-up test. Which day suits you?" Then, she might choose Sunday. I wouldn't test her on that day, I'd choose to do so on Monday or Tuesday, just to give her an opportunity...I even sometimes write to her mother, "Please, specify which day suits you well to assign your daughter for a make-up test?" That is to check about the mother, whether she is at home, hospital or abroad" (P22)</p> <p>"We offer the student an opportunity, a second and a third one, too; even till the last day or the last hour of school year. This is our policies. Our system shows that the opportunity exists for students, and it reflects the Ministry's as well, where offering opportunities last till the last hour of school year." (P2)</p>

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	Challenging pupils or creating competition among students both inside and outside the classroom	<p>This code includes the following subordinate codes:</p> <ul style="list-style-type: none"> • Gave pupils difficult problems to solve or an example of previous official competition questions. • Taught lessons that developed pupils' higher-order thinking skills during private classes to outstanding pupils. • Held competitions, either general knowledge or maths competitions, for the pupils in their class, ranked them after they had completed the exercise, gave them a score instead of a comment of praise in the exam, or gave them a certificate of thanks including the pupil's rank among their classmates in the class to create 	14	14	28	<p>"As for the 'barcode' last year, I linked questions to it, where I distributed the questions to the students and they scan the barcode using the iPad and then it appears on the board... First, the student reads the question and tries to solve it. Sometimes, one of the papers reads, "Congratulations, you've won a gift," instead of having a question." (P29)</p> <p>"After I explain and complete the lesson, I ask them to write down the equations that we solved on the board. I then give them a question to be evaluated, where the student who finishes writing down the problems on the board gets to solve the given equation; after that, I begin to mark down the first top ten students based on the correct answers and their results are marked using the phrase 'Excellent' and with a star, to engage competition. As for the other students whose answers are also correct, they are marked by the phrase 'Excellent' along with a star too, but without classification. Students get excited and they come running at a high speed to compete to be in the top ten; which strengthens their competitive side within them." (P2)</p> <p>"The Ministry of Education, as well, sent us Mathematics Olympiad test papers to choose students. They requested that from me, so I picked the excellent students and when we sit together, I give them a high level of questions that are way above and beyond class level material, so they are more than</p>

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		<p>competition between pupils.</p> <ul style="list-style-type: none"> • Randomly chose a pupil in the group to answer the question to motivate all of the members of the group, or in the event that the teacher noticed a decrease in the performance of students, the teacher started using the reinforcement board. • Conducted competitions between pupils from different grades or classrooms in the school. • Involved the pupil in competitions available in the school or involve them in competitions between schools in Riyadh, or registered the outstanding students on a maths website, paid for pupils registration with teacher own money. 				<p>a bit difficult." (P19)</p> <p>"Once I've finished explaining a given lesson, I'd give each group a number of questions that are to be answered by all students and the student who answers a question correctly get a star, and I give all the groups one difficult question call them ALKhwārizmī." (P18)</p>

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	Ways of increasing pupils' confidence	<p>This code reflects the following subordinate codes:</p> <ul style="list-style-type: none"> • Used appropriate physical contact with pupils such as patting the students' heads or his/her shoulder. • Involved pupils in presenting the morning assembly to increase their self confidence. • Told pupils that they were his/her (the teacher's) friends. • Gave pupils confidence in front of their classmates. • Gave the underperforming students the easiest task or an easy question. • Let pupils choose the question that she/he wanted to answer. • Asked pupils to solve the problem on the board. 	11	9	20	<p>"If you encourage the student more often, he will get bored of it. Therefore, you should ask the student to answer the question on the board or ask him to explain to help his classmates; This action gives the student more confidence and lets him feel that when he answers, the others rely on him; therefore, he would prefer to share and teach his classmates than receive a praise, where he will get bored of such praise over the time." (P13)</p> <p>"I try to give the student some examples based on his/her skills, where I do not ask him/her the difficult questions, but rather ask him/her to answer certain questions. I ask him/her, "answer five questions, only five of them," for example, when I give him/her twenty questions and he/she answers five of them, he is excellent and I tell him/her that he is doing well, where I do not want him to answer all the questions, but only I want him to answer based on his skills." (P15)</p> <p>"For example, a student that no one wanted in their groups, saying that she makes them lose in the class contests because she doesn't understand. I hated that sentence, "she doesn't understand." So, I made a point to call her up to the board and ask her a very easy question so that she can answer it to boost her self-confidence and encourage her more, even if I know that this is an easy question. " (P19)</p>

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		<ul style="list-style-type: none"> • Asked pupils to explain the correct steps needed to reach the answer. • Asked a pupil to explain the lesson to his/her classmates. • When an underperforming pupil raised their hand to answer, gave him/her the priority to answer. • Did not give the whole test to an underperforming student all at the same time. • Felt satisfied if a pupil solved most of the questions instead of all of them. • Focused on the positive side of the student. 				
	The auxiliary methods teacher used in the class	This subordinate code includes tools, strategies and educational methods that teachers used in their	14	11	25	“I also use the collaborative learning strategy. For example, one group writes a question for the other group to answer” (P21)

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	and with their pupils	<p>classroom. This code includes if the teacher did one or more of the following:</p> <ul style="list-style-type: none"> • Used tools during teaching maths. • Used programmes to present the lessons or activities in maths. • Used educational methods/strategies in general (without mentioning a specific strategy). • Used educational methods/strategies such as active learning strategies (Collaborative learning “groups” - Peer teaching). In addition, this subordinate code includes the role of both pupils and teachers once these strategies had been activated. 				<p>"In the decimal fraction lessons, for example, we often use Halalas (coins) or other tangible objects, such as cubes, mostly during theoretical classes; where students are usually more receptive to that than just reading about it in the textbook. So, in order to illustrate the volumes lesson, we use tangible objects, such as water containers, Pepsi bottles...etc. in order to familiarize students with such measuring units as litres, milligrams and so on." (P13)</p> <p>"Peer Learning, I use this concept where excellent students teach underperforming students." (P6)</p> <p>"We also try to ensure that the various groups are well-balanced, so that we don't get a group where all of the members are outstanding or a group where all of the members are underperformers. So, every group must include one or two outstanding students and the rest are average." (P21)</p>

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		<ul style="list-style-type: none"> Gave pupils the opportunity to participate in the teaching tasks, which meant that teachers let pupils be the teacher (teach their classmates or teacher) in the class, allowed pupils to come up with ideas for activities/projects to do in the class, allowed pupils to write a question/competition for their classmates, allowed pupils to correct his/her classmates' answers or evaluate their classmates as a teacher would. 				
	<p>The teachers' ways of announcing pupils' results and tasks</p>	<p>This subordinate code relates to the pupils' results which could be from their school work or from maths websites:</p> <ul style="list-style-type: none"> Announced the results of all of the pupils in the class. 	15	15	30	<p>"Every student comes up to my office, I show him his grade to review it, without mentioning it verbally." (P8)</p> <p>"Yes, certainly! If a student does not pass one or more of the skills* or underperform, I give him his score individually in order to spare him the embarrassment from his classmates, and taking into account the student's psychological side." (P1)</p> <p>*(Researcher Note: Each subject has several primary and</p>

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		<ul style="list-style-type: none"> • Only announced the results of outstanding pupils during the class, while underperforming pupils were given their results separately to avoid embarrassing them. • Asked pupils whether or not to announce their results. • Teacher compared pupils' scores with others from other classes. • Announced and presented pupils' marks/work from maths' website to their classmates. • Gave the result of each pupil separately. 				<p>secondary requirements that the pupil is assessed on).</p> <p>"I tell all of my students their grades...and I pass out their papers to them...Yes, to make them feel competitive; why I share their grades out loud? Competition can increase their motivation, so that the students will work harder to improve their grades. I love competition, I love competition." (P20)</p>
		<p>This subordinate code relates to the pupils' tasks as follows:</p>	3	1	4	<p>"Not exactly like a triangle, but the students know that the uppermost part is reserved for the most outstanding students with the model and most integrated charts; the middle section is reserved for satisfactory charts, while the lowermost section is reserved for charts, which aren't even</p>

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		<ul style="list-style-type: none"> Presented the best pupils' answer/work on the classroom wall. Ranked pupils work on the wall, based on their level of mastery. Asked pupils to present their portfolio to their classmates. 				passable, but are only displayed as an encouragement to the student, who is thus made to feel that her contribution is appreciated." (P26)
	Teachers' rewards and praise systems	<ul style="list-style-type: none"> Gave outstanding pupils a gift before other pupils. Only rewarded excellent pupils. Rewarded underperforming pupils who improved at the same time and gave them the same gift as outstanding pupils to motivate them. 	1	3	4	<p>"Motivational phrases weren't exclusive to him. When he improved, his reward was in the form of motivational phrases and his name was always the first to be called to receive presents. Researcher: What do you mean by, 'he was the first to receive presents'? Participant: I mean of the five or six students to receive presents in recognition of their excellent performance; his name was the first to be called." (P4)</p> <p>"The main thing is that I treat her the same as my most outstanding students. So, I give her the same presents as I do the others, in order that she doesn't feel inferior to them or otherwise feel that the present she receives is less valuable." (P28)</p> <p>"I arrange the trips for outstanding students in coordination</p>

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						with the school administration ... Researcher: Only outstanding students? Participant: Yes, so that underperforming students try to emulate them." (P11)
		Gave different verbal reinforcement according to the students' age or what the pupils preferred.	1	4	5	"Yes, I may use stickers of encouraging phrases. Sometimes she would tell me what she wanted me to write in her follow up record, therefore, I'd say to the student, 'You tell me what I should write to your mother about you' So, she would dictate and I would write what she wished me to write. She'd say for example, 'Write to my mother that I was an excellent student this month and that I'll be even better next month.' I mean I took the words right out of the girl's mouth and wrote them to her mum. Yes, yes, she told me write to my mum that I got a gift today and next time I will get an even a bigger one, so I wrote what the student preferred and wanted." (P22) "That depends upon the age group. I mean to show my appreciation for a first grader, I'd say things like, 'Excellent' or 'Way to go', you see? For older students, I may say things like, 'You are a doctor,' which isn't suited to a first grader, because he will not understand what I mean by that, you know. So, motivational phrases depend upon the age group." (P6)
		<ul style="list-style-type: none"> Gave different rewards depending on the pupils' age, depending on the 	11	6	17	"I have what I call five star presents which are reserved for excellent students. Sometimes, when a student's performance is far above excellent and I see that she can't

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		<p>performance of the student or on what the pupils preferred.</p> <ul style="list-style-type: none"> Let each pupil choose the gift he/she wanted from a set of options. 				<p>make up her mind whether to choose the wood block puzzle or the snakes and ladders game, I'd say 'you are in the five stars group so you can take them both honey. You deserve them both'." (P22)</p> <p>"Here, let me show you some presents, which I only give to the most outstanding student, such as air fresheners and decorated boxes to put her things in." (P16)</p>
		<ul style="list-style-type: none"> Clarified the rewards system at the beginning of the year. Motivated pupils by putting the gifts in front of them. Promised their pupils they would obtain a reward, would be given an excellent grade, or their name will be nominated to enter the maths exam, set by the Ministry of Education, once the task was completed, they had achieved a better score or they had worked harder. 	5	9	14	<p>"Researcher: Do you always choose outstanding students to explain lessons to underperforming students in class? Participant: Exactly! Exactly! This serves as a motivation for both, because I tell the outstanding student that if you help one or two underperforming students master this or that skill, then I'll let you take some time off for sports, so he becomes enthusiastic about the whole thing and makes sure that the underperforming student understands so that all take some time off for sports as a reward." (P1)</p> <p>"To students who get poor grades, I'd say, "If you get the full marks in the next test, I'll give you full marks in this test as well," as a form of motivation." (P10)</p> <p>"Participant: I have a machine in which we fill with money, you know, like the machine in the game stores, the machine which catch the money and raise it up. Researcher: Do you mean the grabber machine? Participant: Exactly, I have a machine of a computer size.</p>

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						[THROWS HER HANDS IN THE AIR] which I order it from outside Saudi Arabia; I put money inside it and students get excited; I put for example two riyals; three riyals; five riyals; and ten riyals, and if a student does not participate on that day, I ask her, 'Why didn't you participate today?' She would say, 'I didn't try using the grabber machine.' I would reply, 'Alright then, you need to memorize in order to use it.' The students are encouraged, and on the following day, they get excited to participate to get the money. This method sometimes helps me in defining the simple skills." (P24)
		Frequency of teachers or school administration rewards: <ul style="list-style-type: none"> • Did not give gifts every day to avoid pupils becoming bored. • Honoured pupils or gave them gifts every time they completed their reward points table, every month, every time there were tests or at the end of the semester or year. 	14	9	23	"There are sometimes special honour recognitions and there are treat rewards. Whenever the teacher considers that a student or a group of students deserves such an honor, he will honour them at any time during the semester, but the timing is always specified, such as at the end of each semester or end of each period. (Researcher Note: he means at the end of each students' evaluation period)" (P14) "It is not necessary to treat students with gifts in each class, because it is difficult to be honest, even the student will get bored of the gifts on each class, but I distinguish between them by the common places. (Researcher Note: writing down the student's place in the workbook when she solves the problem, whether first, second, third places, etc.)" (P12)

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						<p>"Researcher: When does the student get the gift? Is it every month or every week? Participant: The student may get the gift at end of the day. .. I put, for example, four or six blanks and whenever the student answers throughout the class, she gets the gift, and she might get it in two days after she fills out the blanks." (P29)</p>
		<p>This subordinate code reports pupils' attitude or completed tasks that deserved praise or a reward from teachers as the following:</p> <ul style="list-style-type: none"> • Praised, thanked or rewarded individual pupils or the group after: pupils had mastered a maths skill, had given the correct answer in the exercise or exam, gave an answer was close to the correct answer, those whose performance improved, student who attempted to answer, to students whose performance dropped to motivate them or when they participated in the 	13	11	24	<p>"because the student's answers are wonderful .. I give her two gifts and not to miss any gift ... and for her good appearance and voice, as well. I sometimes make them read a mathematical equation and give a gift to the student having the best and theatrical voice, not the plain voice, sometimes staged, such as Laila bought...etc., and plays with her voice. So, I treat the student based on that." (P22)</p> <p>"I use things like the cards I've told you about and tell them that they don't have to answer correctly every time and that it is OK to answer questions incorrectly as long as they have given it enough thought and for that they deserve a motivational card." (P11)</p> <p>"They are awarded points which are calculated on a monthly basis to determine the winning group, which is given symbolic presents." (P26)</p> <p>"I tell I tell him "Way to go champ! You got half the example right and we will complete the answer for you so that in the</p>

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		<p>class or did their homework.</p> <ul style="list-style-type: none"> • Only rewarded the group who finished answering the questions first, students who obtained the highest score in the class or the top student in the class. • Among the outstanding pupils, teacher decided to reward them according to the academic and behavioural aspects. • Praised or rewarded pupils in relation to non-academic aspects such as positive behaviour in the class, because of how students had organised their book, when they did a character voice when reading the problem or even if simply when seeing a pupil around the school to encourage her. 				<p>days to come you'll be able to answer it fully on your own".” (P11)</p>

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	<p>Teachers' rewards that they used with their students</p>	<ul style="list-style-type: none"> • Praised, thanked or rewarded the pupil when they taught their classmates something. <p>This code involves three subordinate codes which cover the ways teachers rewarded their pupils in the classroom. Teachers stated that they gave the pupil one or more reward, as follows:</p> <p>Positive physical reinforcement:</p> <ul style="list-style-type: none"> • Honoured the pupil by giving them a certificate of thanks and/or gift that was bought with the teacher's own money in the classroom, during assembly or during the closing ceremony. • Gave motivational incentives and prizes such as vouchers/coupons or 	<p>15</p>	<p>15</p>	<p>30</p>	<p>"Yes, nice rewards are very, very important." (P2)</p> <p>"At the end of each lesson and after I complete the lesson, I give the students an exercise to mark and evaluate them during the lesson, such as two out of two or three out of three. When the student obtains the full mark in each lesson, it means that she has mastered the lessons and there is no need to re-evaluate her because such evaluation includes all the previous skills. I give this evaluation to the student to identify whether mastered the lessons or not. I have more than five students whom I exempt from the evaluation because they have been pre-evaluated." (P24)</p> <p>"I have stickers, ... such as "Special Book", "Thank you for your hard work" and "Distinctive Student", where I make such stickers and put them in the books." (P30)</p> <p>"For example, when a student is excellent, I let him leave for the break ten or five minutes before time of the break, where I call him by his name, '[student name],' and I tell him that he is, 'excellent today and will be rewarded by leaving early for the break to have his breakfast before the students,' and so on." (P14)</p>

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		<p>points, which their pupils could save to obtain a gift.</p> <ul style="list-style-type: none"> • Gave the pupil some candy, a special jacket/ a ribbon for their uniform, shields, money or breakfast food. • Gave the pupil a score. • Drew a happy face or stars, put a star sticker/stamp on the pupil's paper or put a prize star. <p>Positive moral reinforcement:</p> <ul style="list-style-type: none"> • Rewarded pupils by allowing them to have fun playing sport, have a break (early break to go to the school canteen), go on a school trip, or allowing them to become the leader of the group or of the class, to present the morning assembly, be involved in the closing ceremony, or take a photo or write pupils' names on 				<p>"I break the class into groups and have in place an easel*, and each group gets to climb one step on the stand for each correct answer. At the end of the class, the group that gets to the top, say 'group c' for example, deserves a present which that group picks from a cart like a supermarket's shopping cart. Accordingly, they obtain presents daily. *(Researcher Note: A stand means a board)." (P19)</p>

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		<p>twitter or the honours board, whether in the class or outside the classroom.</p> <p>Negative reinforcement:</p> <ul style="list-style-type: none"> • Gave the pupil a bonus, which they could use when she/he obtained a bad mark, and amended their mark. • When pupils completed all of the maths exercises in a chapter, answered the exercises correctly in the class or give a distinct answer, it was considered a form of evaluation for her, and she was exempt from taking the test. • Gave pupil full marks even if they had made a small mistake because he/she had worked hard during the semester. 				

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
	Teachers motivated the pupil with words of praise and thanked the student (orally, in writing or through body language and gestures).	<p>This subordinate code provides the general praise that teachers gave their pupils, as follows:</p> <ul style="list-style-type: none"> • Gave (whether orally and writing) general praise, or thanked the pupil/pupils, made comments such as 'Excellent', 'Well done', 'Thanks' etc ... • Told pupils that they (the teacher) was proud of them. 	15	15	30	<p>"Well done, may Allah bless you, ... with appreciation" (P8)</p> <p>"I write words of encouragement, such as 'Way to go,' 'I'm really proud of you,' 'your teacher is proud of you' and so on" (P26)</p> <p>"Wonderful, may Allah bless you, excellent, well done." (P27)</p>
		<p>This subordinate code covers how teacher praised and thanked their pupils in front of others as follows:</p> <ul style="list-style-type: none"> • Praised and thanked the pupil in front of others such as their classmates, a school leader, deputy principal or the school 	12	14	26	<p>"the students give round of applause for her; this is the most important thing for me, it is so nice when her classmates applaud, where that act motivates her."(P20)</p> <p>"In the PowerPoint, I present a tape of memories, so that it includes the names of the excellent and distinctive students...where I put the tape of memories in the PowerPoint to show the students' names; every day, to all the three classes that I teach to see the name of the excellent student whose name is written in the tape of memories. .. I keep names of the excellent students in the tape of memories and when a student's performance level increases, I add her</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>social worker, or their parents.</p> <ul style="list-style-type: none"> • Pupils in the classroom congratulated their classmate. • Demonstrated appropriate physical contact with the pupil when praising such as a handshake, applause, hugs, patting the pupil's head and his/her shoulder, putting their head against the pupils' head, encouraging the pupil with facial expressions or touching the pupil's head. • Asked pupils to applaud their classmate. • Asked pupils to lift up their classmate to allow him to feel the euphoria of victory. 				<p>name in that tape. When a student for example is absent, I tell her that I feel sad because she was absent; accordingly, I take off her name out of the tape so she can raise her level of performance through less absence days and to review her lessons." (P29)</p> <p>"or sometimes I go to him and shake his hand and say, 'way to go' or ask his classmates to applaud him as a form of encouragement." (P10)</p> <p>"If answering the assignment is in the notebook, I sometimes have a notebook and ask them to answer the assignments; when a student properly and correctly answers his assignment and he is creative in arranging, producing the assignment in a good way, his notebook is raised before his classmates to see his hard work. In this case, the student will get happy and feel that we appreciate and praise him. This act reinforces the student's positive behaviour...I said when I encourage the student before his classmates, this greatly affects him." (P2)</p>
		This subordinate code reports how teacher praise pupils' abilities as follows:	11	4	15	<p>"I write: You are creative" (P6)</p> <p>"I always write to my students, 'You are wonderful, intelligent</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Praised a pupil's abilities. • Told a pupil that they were a talented pupil. 				<p>and genius.' I always in maths praise the performance level by using words related to intelligence and high abilities." (P17)</p> <p>"I say words like 'how talented you are'" (P21)</p>
		<p>This subordinate code involves the special praise which teachers gave to their pupils, specifically: Distinguished the winning group by giving them a special name, gave special praise to the pupil, compared the pupil to a mathematician or referred to the pupil by his/her future job title.</p>	10	11	21	<p>"You are excellent, you hero" (P8)</p> <p>"Well done. I call him by one of the motivating phrases, such as doctor, engineer or teacher." (P10)</p> <p>I frequently say, "You are the King of Maths." (P22)</p> <p>"I write to her, (You are a Mathematician.)" (P28)</p>
		<p>This subordinate code considers how teachers praised pupils when they: gave the correct answer, improved their performance, answered a difficult question, a pupil's effort, a pupil's attempt or the correct step that pupils used and</p>	13	10	23	<p>"I'd say answer the question even if the answer isn't correct. That's good that you tried, and the main thing is that you felt the desire to answer and may be your answer is wrong this time, but the next time you will answer correctly Allah willing." (P10)</p> <p>"Yes, sure, I told him things like, (May Allah protect you! You answered all the problems correctly. Excellent work!)" (P1)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		discussing the wrong step with a pupil.				"(Thank you for improvement of your performance level.)" (P29)
Teachers' coordination to support all of the pupils, including excellent and underperforming pupils	Teachers' follow-up strategies with pupils	<p>This code reflects the following subordinate codes:</p> <ul style="list-style-type: none"> • Followed up on all of their pupils in maths and other subjects. • Followed the pupils' progress during the following years/when they had moved to the next year. • Observed pupils to see if any of their maths performance had dropped. • Asked the pupil about the reason for the decrease in their performance. • Teachers were aware if there were any special circumstances, aside from academic issues, that may 	13	12	25	<p>"Sure, I keep close tabs on all my student so much so that I may know personal things about them that even the student counsellor doesn't, such as the time when I was the first to know that a student's father had passed away and I did my best to help her through that ordeal. So, it isn't only a matter of teaching the subject matter to students without any emotional involvement as the emotional aspect of the student-teacher relationship is extremely important. ... In fact, such emotional interaction helped that student to become one of the best performing students in my class...for example, I always make a point of asking after that students' parents, asking questions like, 'how is your father doing now?' This helps the student to improve considerably even if she hadn't previously been among the best performers. In fact, this student was just average but such personal interest by the teacher may make her do her best to justify the teacher's interest." (P23)</p> <p>"I'd take her aside and ask her questions like, 'Why don't you study?', 'Do you have any problems?' or 'What parts of the lesson do you not understand, or do you feel it's too difficult for you?'" (P20)</p> <p>"In my own class, I personally keep tabs on my students and whenever I notice any decline in any student's performance, I</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>have affected pupils' achievement.</p> <ul style="list-style-type: none"> • Provided verbal motivation to the pupil to help them to overcome her/his difficult family circumstances. • Focused on following up and assisting the underperforming pupils. • Identified the reason for a pupil's low level of performance. • Informed pupils of their weak points that needed focusing on. • Focused on pupils' homework. • Asked the pupil about the point that she/he did not understand. • Made the pupil feel that teacher was interested in her/him. 				<p>never hesitate to ask about the reason why this happening and may even ask personal questions if need be." (P3)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>This code reflects the following subordinate codes:</p> <ul style="list-style-type: none"> • I cannot guarantee that students will continue to succeed or they will not fail again. • I alone cannot improve a student's performance. 	6	8	14	<p>"Because I can't deal with their children on an individual basis. In fact, this is almost impossible, because I have more than one hundred and thirty or almost one hundred and fifty students, but you as the student's mother or father should be aware that your child has a problem and it is you who must help solve it." (P12)</p> <p>"No one can guarantee anything, least of all the student's continued success, because the future is in the hands of Allah and there are many factors involved in this thing." (P9)</p>
	Issues with the school administration	<p>This subordinate code provides the following:</p> <ul style="list-style-type: none"> • Teacher gave the deputy headteacher or the social worker the names of underperforming pupils to contact their family. • Teacher asked the deputy headteacher or the social worker about the reason for the decline in the pupil's performance. • Asked the learning disabilities specialist about 	2	8	10	<p>"I usually write in their follow up record three times; once I've reached the third, he is then reported to the Vice Principal. Naturally the student's parent is summoned to discuss the reasons for the student's repeated failure. The failed student is also reported to the student counsellor who is supposed to work with the student and meet his parents and inquire as to the reason why the student keeps failing in order to come up with a solution and then the student is reported to the Vice Principal." (P9)</p> <p>"At the beginning of the school year, the first thing I'd do is to go to the student counsellor and get a full list of the new students in my class who have health issues or social conditions, you know, I mean which of those new students is an orphan or has divorced parents or has any problem in general. This is the first thing that I want to know. The second</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		the name of the pupils who had a learning disability that could or would affect their abilities in maths.				<p>thing that I'd do is to go to the learning disability specialists at the Resource Room and ask them if any of the students registered with them are in my class. For example, since this is the first year for me to be assigned to teach the third grade, I ask about the second graders who were registered with them last year and are now in the third grade, so they give me a list of their names, which I make a note of. This is the first thing that I'd do at the beginning of each school year in order to make sure that any students with particularly difficult social circumstances or health issues are given more power (attention) than the rest of the students." (P12)</p> <p>"but the student counsellor communicates with them and if I observe a marked decline in any student's performance level, I instruct the student counsellor to summon the student's mother so as to determine what is wrong and generally solve any problem instead of letting it fester till the end of the year." (P21)</p>
		Teacher gave the social worker the names of pupils who had to be honoured by the social worker or the principal, asked the principal to come to class to honour the students or took the pupils to the principal or the	1	5	6	<p>"I always send a note to the Vice Principal and the student counsellor to inform them beforehand that I'll be coming over with this or that student, so I can be sure they'll praise him and have a certificate of excellence ready to be handed to him as encouragement." (P15)</p> <p>"we call the school leader to the class to honor him." (P10)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		social worker to honour them.				
		Teacher transferred pupils with special or additional needs to the appropriate place, whether to the Learning Disabilities Department or to the Gifted Department at the school.	1	6	7	<p>"If the student is excellent and I see that he is not only as an excellent student but as talented one, I have him transferred to the talented student section where talented students are handled by specialists. That is if I or any other teacher see a particular student as naturally talented." (P5)</p> <p>"If she fails to pass the required skill, then a special committee is notified, and she is transferred to the learning disability section." (P27)</p> <p>"Look! If a child is obviously suffering from a learning disability, I refer him to the resident learning disability specialist who is better able to help him." (P6)</p>
	Issues with the pupils' families	<p>This subordinate code reflects how teachers contacted parents to inform them of their child's academic performance, as follows:</p> <ul style="list-style-type: none"> • Contacted the pupils' families, asked the family to cooperate with them, identified the reason for the pupil's decline in 	12	13	25	"...have your family call me..." (P4)

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>performance or constantly recorded pupils' performance in the pupils' follow up record.</p> <ul style="list-style-type: none"> • Asked the pupil's parents to sign the pupil's test paper, however, if the pupil has not mastered the skill (passed), the teacher kept the test paper as proof. • Asked the pupil to ask his/her parents to contact them. 				
		<p>This subordinate code reports how teachers praised and thanked families, and how they advised them to improve and reward their child, as follows:</p> <ul style="list-style-type: none"> • Teacher praised and thanked parents for following up on their child in the pupils' follow up record/reports or face to 	8	9	17	<p>"I summoned her mother and talked to her about how creative and accomplished her daughter was, but that she needed further enhancement at home. ... The mother was also recognized for her effort because I, as a teacher, I believe that the home and the surrounding environment play a considerable role in the student's success and that is why I personally summoned the student's mother to receive the recognition she deserves." (P27)</p> <p>"Researcher: What does the Certificate of Appreciation state? Participant: We extend our deepest thanks to the family of the student so and so for their kind care and close follow up."</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<p>face in the school, sent a gift to her mother for following up on her daughter, or asked the pupil to thank their parent on behalf of the teacher.</p> <ul style="list-style-type: none"> Teacher advised the family to develop the pupil's maths skills, provided them with a programme to help the pupil or asked the family to reward the pupil for their excellent performance. 			(P14)	<p>"I get in touch with the student's family. I contact her mother or her father. I remember that one year, I had to call a student's mother, but she didn't seem to understand what I was trying to say, so I called her father and told him, "Your daughter is a very good student but isn't getting the proper attention at home," either because nobody appreciate her talents or they didn't know how to act upon such a thing. I felt that she could be the best student in her class even though other subject teachers said that she was far from being an excellent student, but I knew that she's got the brain for it. She just needed someone to help her fulfil her potential, which she did, and she was promoted to the following year with flying colours." (P25)</p>

Theme 4: Teachers' beliefs about their pupils

Description: This theme provides teachers' perspectives concerning their pupils, specifically: their previous maths knowledge, feelings, abilities, physical health, motivation and psychological factors affecting their studies. Moreover, it also considers the impact of teachers' motivation strategies on pupils' academic outcomes, feelings and personalities.

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
Pupils' previous maths knowledge	Good foundation	This code covers the following subordinate codes: <ul style="list-style-type: none"> • Had received a good standard of maths teaching in the lower grades. • Attended kindergarten. 	7	5	12	"... I think that having the pre-school stage now has really helped, because it has provided better preparation for students than former students had in the previous years, where a student went directly to the first grade..." (P13) "They are indeed the basic factors in addition to the fact that students are well grounded in the earlier years of the primary stage, particularly in times tables, they tend to perform much better at later stages." (P1)
	Poor foundation	This code involves the following subordinate codes: <ul style="list-style-type: none"> • Had not received a good standard of maths teaching in the lower grades. • Did not attend kindergarten. 	8	7	15	"The reason for his failure may have been a lack of proper grounding and having no interest in maths during his earlier years, so that he didn't know basic mathematical equations, such as addition and subtraction, which are the easiest maths problems, so he is certainly not well established." (P1)

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
						<p>"Definitely! A first grade student is supposed to be able to read, write and know basic numbers, having attended one school year or one semester in kindergarten but, in fact, he doesn't know anything, since he didn't attend kindergarten! Such circumstances must be considered." (P11)</p> <p>"The reason for her failure may have been lack of proper grounding in mathematics during the earlier years, because that she didn't know basic mathematical equations, such as addition even though she was in the fifth grade." (P26)</p>
Pupils' feelings	Toward maths - Love maths	<p>This code captures the following subordinate codes:</p> <ul style="list-style-type: none"> • Loved maths. • Was keen on their studies. • Self-educated. • Liked their homework. • Completed additional exercises by themselves or when given to them. 	14	14	28	<p>"... There is also the student's keenness to learn, which comes naturally even if the student's parents aren't doing what they should in terms of follow-up. Of course, there are parents who try to enhance such keenness, I remember students who kept asking me for a make-up test even though they had scored nine and a half out of ten, meaning that they passed the required skill with flying colours, losing just half a mark, but they still weren't satisfied, that is how keen they are. ..." (P12)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Asked the teacher or used programmes and websites to help them when they did not understand the point. • Focused during the lesson. • Did not believe that maths is difficult. • Offered a different way of solving the problem other than the way their teacher presented in the class. 				"...some students even when in the case of homework and class exercises, I ask them to solve specific problems, in order not to overburden them. Note that a mathematics lesson usually contains 30 problems, both for training and confirmation, so, I usually solve five or six confirmatory problems and give them four to seven exercises as homework. However, outstanding and creative students would solve all the exercises and come to me to grade it for them...and when I ask them why they solved them all and what motivated them to do that? To see whether they were told to do so by their parents, they would say "No, I just love maths and solving more exercises is more beneficial." (P4)
	Toward maths - Hate maths	<p>This code considers the following subordinate codes:</p> <ul style="list-style-type: none"> • Hated maths. • Believed that maths is difficult. • Did not link maths with reality. • Neglected their studies. 	13	14	27	<p>"Not very keen on regularly solving homework assignments, always failing to bring maths tools. These factors were obviously having an impact on the student." (P4)</p> <p>"In fact, when I conducted a school survey, I found that most students hated maths, saying that it was an extremely complex</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> • Did not review the lessons. • Did not do their homework. • Did not bring the materials needed. • Did not find the tools need to help them to succeed. 				<p>subject." (P11)</p> <p>"So, the main problems we are struggling with is student negligence and lack of practice at home." (P16)</p>
	Toward teacher - Love teacher	Pupils loved their teacher.	6	7	13	<p>" ... the third key factor is the student's love of the teacher. It is almost impossible for a student to excel in each subject unless she loves the teacher of that subject, because that will bring out the student's potential and helps her to better interact with the teacher ..." (P27)</p> <p>"... the main reason why the student loves the school subject is his love of the class teacher. This is the first thing that ensures success in math, particularly since the emotional factor plays a significant role in the early years of the child's life. So, if a student loves a teacher, he will certainly love the subject taught by that teacher. This is always the beginning of getting the child to love mathematics." (P9)</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
	Toward teacher - Hate teacher	<p>This code captures the following subordinate codes:</p> <ul style="list-style-type: none"> • Hated their teacher. • Felt uncomfortable with the teacher. • Did not cooperate with the teacher. 	4	4	8	"Naturally, there are certain psychological factors that are involved. In fact, a feeling of discomfort experienced by the student towards the teacher, or the other way round, whether due to a personal problem with the teacher or with one of the student's classmates during the teacher's class, may lead to the child to hate the subject taught by that teacher, particularly in the primary stage where the emotional factor is predominant." (P9)
Pupils' abilities	High ability	Pupils with a high level of ability, intelligence or talent.	8	5	13	"In maths, talent comes first and foremost, talent in maths, first thing talent... mathematics requires intelligence ... / ... The student was intelligent, however, her other teachers always said that she wasn't smart enough, but I said that she was and indeed. I wasn't disappointed. For your information, in most cases, it is the maths teacher who discovers the intelligent student, the excellent student and the student who will excel in their future, other teachers could not discover that because they only require students to memorise the lesson..." (P23)

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
	Low ability	<p>This code refers to the following subordinate codes:</p> <ul style="list-style-type: none"> • Capabilities were weak. • Suffered from learning disabilities related to maths (e.g., Dyscalculia). • Were easily distracted (absent-minded) or less focused. 	8	5	13	<p>"... the other reasons is the weakness of the student's performance,.. / I tried to do everything with him, for example, I gave him exercises, sat with him in private classes, also the learning disabilities specialist sat with him, but to no avail. I came to the realisation that it was impossible for him to improve during that year. I don't know about the following year maybe he has improved. I do not know, but I was almost certain that it was impossible for him to improve his performance." (P5)</p> <p>"I have a student who I'm sure has learning disabilities" (P19)</p> <p>"...some students have a relatively short attention span and you have to keep on at them if they are to master the required skills,..." (P20)</p>
Pupils' physical health		Had a visual impairment or difficulty hearing.	3	0	3	<p>"Another school-related factor may be the class environment. I mean the student may be seated too far back in the classroom, so that she can't see or hear well" (P21)</p> <p>"I have a student that doesn't pay proper</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
Pupils' motivation	Positive aspects which motivate pupils (intrinsic motivation)	<p>This code reflects the following subordinate codes:</p> <ul style="list-style-type: none"> • Had high ambitions, motivation, desires or goals they wished to reach. • Succeeded because they were curious about maths. • Challenged themselves or their classmates and that helped them to become excellent. • Only wanted to succeed to move to the next grade or because they did not want to fail in maths. 	6	6	12	<p>attention when she isn't wearing her prescription eyeglasses" (P20)</p> <p>"Desire, as I've previously mentioned. There is also a sense of curiosity" (P10)</p> <p>"The second reason is the fact she reads lessons in advance so that she comes to class well prepared and she even used to say, 'Look what I did on my own, Ms? Please check my answers so I know whether or not I understood correctly.' It was like a self-challenge." (P26)</p>
	Negative aspects which do not motivate students	<p>This code covers the following subordinate codes:</p> <ul style="list-style-type: none"> • Unwilling to study maths. 	2	2	4	<p>"The main reason why they fail is that they don't want to think. In fact, as a society, we don't want to think. We need the information to be handed to us on a platter. Do you understand what I'm trying to say? They need ready answers that they can</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> Did not want to use their minds to think about an answer. 				<p>memorise and be done with it, while mathematics has to be taken in steps and each step requires thinking and effort. Our students aren't like that. They want things made simple and easy for them to memorise and be done with it." (P17)</p> <p>"The first thing is the student's unwillingness to learn maths" (P15)</p>
Psychological factors affecting pupils' study	Psychological stability	Were psychologically stable.	0	1	1	"The student's psychological and intellectual stability, all of these are factors that help the student to succeed." (P2)
	Confidence	Had high self-confidence.	1	2	3	"...in number reading lessons, such as reading a twelve-digit number or hundreds of billions, I tell the students to go home and write a number of twelve cells. Then, challenge their fathers, mothers, brothers, uncles, whatever, to read it, sort of as a contest, you know. Sometimes the student's father, mother or uncle may not be able to read the number, having forgotten what they had learned quite a number of years back and then the student reads the number for them to make them feel that he has really learned things and they say 'Mashallah! May Allah protect you!

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
						<p>You are really becoming an educated person!' This praise coming from the student's family is half the way to success as it changes the way he views the subject and boosts his self-confidence and that he isn't a failure after all..." (P2)</p> <p>"When they believe in themselves and feel that they have high abilities and can get the answer correct, and when they do get the correct answer their performance will improve exponentially, because that will boost their self-confidence." (P19)</p>
		Had low self-confidence.	4	1	5	"The student must have confidence in himself and his ability to answer correctly. This is key. In fact, the fundamental problem that students have is their lack of confidence in their ability to answer correctly." (P3)
	Anxiety – Pupils' fear and/or shyness	<p>This code refers to the following subordinate codes:</p> <ul style="list-style-type: none"> • Did not participate because he/she was afraid of answering incorrectly. 	2	3	5	"Take the average or below average students for example. They have reservations about participating in class activities. They are afraid that their answers may not be correct, so they never raise their hands ...even if the problem is easy for

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
		<ul style="list-style-type: none"> Afraid of studying maths. Afraid of their teacher. Afraid of their classmates' laughing when he/she made a mistake. Did not participate or ask during the class because she/he was shy. 				<p>them to answer, they are still afraid. So, the students must have confidence in themselves. ... The students must have confidence in themselves, and we as teachers have to try and boost the student's self-confidence." (P3)</p> <p>"Last year I had a few students like that, but this year, I noticed that a particular student was quite introverted, keeps to herself, never speaks to her classmates, never participates in class activities and is too shy to solve a problem in the book and when we solve the problems on the board, she copies the answer and when I look at her, she lowers her head. She is unnaturally shy. When I asked her teachers from last year, they confirmed that she was introverted. So, I sat with her and asked her, 'What is the matter, honey? I'm just like your mother, tell me what is wrong,' I even gave her remedial classes, but she wasn't responsive." (P29)</p>
The effect of teachers' motivation strategies on pupils	Academic effect	Pupils' performance improved significantly.	7	4	11	"She told me that she had recently noticed her daughter's growing passion for maths; a passion that they both, the student's family and school administration, noticed. When

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
						the mother knew that I'm the maths teacher, she told me that I was the best, and gave verbal encouragement along these lines." (P26)
	Feeling and personality effect	<p>Pupils felt happy when she/he:</p> <ul style="list-style-type: none"> • Obtained a certificate of thanks or a gift/star. • Got a good mark. • Taught their classmates. • Their classmate clapped for them. • Teacher praised or positively reinforced her/him. • Their name was written on the honours board. • Their personality changed positively and their self confidence improved. 	7	4	11	<p>"...students are quite easy to please. A star sticker will make them quite happy. Researcher: I mean during the class; so she continue to be successful and never went back to her failing ways and ceased to fail math? Participant: Look! A student who tastes success never goes back to her failing ways. It is almost impossible. When a student is recognised for her achievement, even once, she feels that she has achieved a special status that she no longer wishes to give up.." (P30)</p> <p>"Only a week or two ago, I was surprised and even shocked when a student handed me a gift-wrapped package and when I asked him 'What is this?' he said that it was a present and when I asked him about the reason why he was giving me a present he said because you had written the word 'excellent'. It was then that I discovered</p>

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
						<p>that the word 'excellent', which we as teachers and as adults take lightly, had had a hugely positive impact upon this student, to the point that he went to this father and told him that he had to give a present to this teacher (participant mentions the teacher's name) and when I asked this student's father about the reason why he thought he had to give me a present, he said it was because you had written the word 'Excellent' on two occasions!" (P5)</p> <p>"Yes, and at the end of the month I add up the number of stars for each student and give them presents accordingly. Of course, I give them all presents, because it makes them very happy," (P18)</p>

Theme 5: Parents and parent-school engagement

Description: This theme relates to teachers' views regarding parent involvement with the school and parenting characteristics.

Sub-theme	Main code	Subordinate code / Includes	Number of female sources	Number of male sources	Total	Example quote
Family follow-up and engagement	The positive side of family follow-up and engagement	Families followed-up and took an interest in their child's studies, as well as cooperated with the teacher.	11	14	25	<p>"... When the student's parents are informed that their child has failed maths and they respond positively right away, the underachieving student bounces right back and changes for the better. For example, if I've just informed the parents of six students that their children have failed to pass the skill, I find that only the parents of three of those students came to find out the key points that must be addressed and managed an appreciable change for the better in their children's performance, while the parents of the other three students take matters in stride and things remained the same." (P3)</p> <p>"parental follow-up is important but isn't necessary the follow-up have to be from parent, because we have excellent students who are orphans. I have a student who is an orphan and lives at a childcare home and has no father, mother, sisters or brothers and yet he is an excellent student or a bit less than excellent because there is follow up there. When I asked him whether there were people at the child care home following up on his performance at school, he said yes, that they looked at the lessons that he studied, reviewed his test scores and even came to school to ask the teachers about him." (P6)</p>

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	The negative side of family follow-up and engagement	There was a lack of family follow-up and interest in their child's studies, as well as no cooperation with the teacher.	11	12	23	<p>"Yes, sometimes you feel that an average student has the potential to be an excellent student but doesn't really fulfil that potential probably due to parental negligence ... Of course parental negligence mainly because a ten or twelve-year-old child isn't expected to know what his best interests for their future are or the significance of learning this subject and studying as a whole. Therefore, parental negligence is a fundamental and important reason why a student fails." (P9)</p> <p>"I remember a similarly underperforming student who eventually passed the maths skills requirements, and I'm very proud of having got her to that level even though her parents were very negligent. In fact, when her mother came to me last year and I explained to her how very underperforming her daughter was, she said that she does not care, and she asked me not to test her on all the skills (primary and secondary skills) and only test her about the primary skills which let her pass the grade. It was obvious that the mother wasn't well educated, and she was convinced that nothing good will come out of her daughter, as she kept saying, "What will she be? Certainly not a doctor or anything that matters. Just give her the passing grade." (P19)</p>

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<p data-bbox="1480 244 2110 1066"> "However, other students who face a difficult family situation, for example I have a student in the third grade who is intellectually among the best in his class. Mind you, one of the advantages of being a maths teacher is that you get to be able to spot mathematically gifted students in your class. This student has a problem, which is that his parents are separated, and he lives with his grandmother so there is no follow up. Whenever I administer a pop quiz or set a date for a test, he comes to class unprepared and scores poorly on the test not because he is a bad student but because there is no follow up, you understand. So, every now and then I have to repeat things in order for him to catch up. He has an excellent maths mentality, but there is no parental follow-up, and no one really cares what he does or how he performs at school. So, even though we hand each student a test schedule, so he knows the date and time of the test, this student comes to school, not even knowing that there is a test in the first place. He has no father or mother to tell him you have a test on this or that day and you have to sit down and prepare for it." (P12) </p> <p data-bbox="1480 1118 2085 1248"> "So, the main problem we have to deal with here isn't the student himself but the lack of parental cooperation. So, the whole thing is hopeless no matter what we do. You know when that situation </p>						

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						<p>changed? It was when the end of school year was a week or ten days away and the parents knew that if their child failed to master the maths' skills, he would have to repeat the year. During that week or ten days, however, they came alive and got him to master fifty percent of the required skills. I mean he mastered fifty percent of the skills that were taught over an entire year in a period of ten days. Of course, this was a positive thing and I expect the parents turned the house into a veritable beehive, having finally awakened to the gravity of the situation even though we have been begging them to help their own child all year long!" (P12)</p> <p>"and there is a student who scores one out of ten and when you give him a note for his father, no one contacts you." (P12)</p>
Family behaviour	Negative family behaviour	Parents spoiled their children, criticised and/or demoralised their children, allowed their child to frequently be absent, or the student was afraid of their mother's reaction when she lost marks.	5	4	9	<p>"Some parents spoil their children rotten. I mean we have students who are really smart but are spoiled rotten by their parents." (P29)</p> <p>"Because the student attended class one day and missed the next. .. he's constantly absent. It turned out that his father is married to two wives, so the day his father is at home is when he attends classes." (P6)</p>

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						"I remember that the child's father came to me with his son at the beginning of the school year and told me in as many words, 'Don't bother with him. He is a failure'. I said to him 'Why would you said those awful things in front of your son?' You should say this to me without your son overhearing it because if he's heard his father call him a failure, he will certainly do his best to prove him right and be a failure! Then, at the end of the semester, his father came to me and asked me 'did you give him a fail?' and I told him, 'No, he passed the maths test, but he failed Arabic or some other subject.'" (P8)
	Positive family behaviour	The family encouraged and supported their child in their studies or to love maths either because one of the parents loved mathematics or specialised in maths.	6	5	11	"Encouragement of the student by the parents is another reason. So, if the parents are keen to follow up on the progress of their child at school, the student will be even keener on their studies." (P24) "It is because the student is supported by their parents, who instil in their child a love of maths and more often than one of the parents, whether the father or mother, has something to do with maths or has such a love for it that he instils that love in the child. This is how it comes about in most cases." (P3)
Parents' education		Educated parents	2	1	3	"Also, nearly all the students' mothers are educated and that is a good thing about this school and I'm

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						<p>very pleased about that, since educated mothers will help their daughters with mathematics and the burden isn't only on me, do you understand me? This is quite different from students at the school I used to teach in... (Participant mentions the name of the district), where I had to do everything, as the student's bag remains unopened at home weren't opened until the student got to school the next day." (P18)</p> <p>"Yes, because educated parents will surely have a positive impact upon the student. Of course, there is differences between educated parents and illiterate parents. Naturally, there are exceptions to the rule. After all we did well at school even though our parents were uneducated, but it is the exception that proves the rule. In most cases, however, if the parents are uneducated, their child isn't enthusiastic about education." (P11)</p>
		Illiterate parents	1	1	2	<p>"I sat with the mother and found out that she was illiterate." (P29)</p> <p>"The Illiteracy of parents ... as I said before, the family and the learning environment are paramount. I mean when I summoned the father of this underachieving student, he said that he can neither read nor write, so there is nobody to help him with</p>

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Family circumstances		The family were having difficult social/ family circumstances, the parents had divorced and this affected their child's stability, economic level (poor) of the family affected their child, or had a negative psychological effects on the child.	5	5	10	<p>his study, who will help him with his study." (P13)</p> <p>"The home environment plays an even greater role. I mean if, Allah forbid, there are marital problems between the parents, the children are the ones who are primarily impacted by such problems, particularly here on this side of Riyadh (The researcher comment: she mentioned a specific neighbour in Riyadh) where the home environment is much more impactful than the school environment particularly in view of the problems of poverty, ill-breeding, etc." (P28)</p> <p>"I swear by Almighty Allah, specifically for underachieving students at this school who are living in miserable conditions and are not even living with their own parents, but rather with a maternal aunt or a paternal aunt or with a person other than their father or mother." (P28)</p> <p>"I was following up with him, to be honest. I even asked him lots of questions. So, the student was torn between his separated parents; sometimes staying with the mother and other times staying with his father. So, adverse family circumstances have had quite a negative impact." (P10)</p>

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Hereditary factors (Genetics)		The child inherited a talent in maths from their family.	1	0	1	<p>"I can't say that the home environment is the only determinant, because some girls have been raised in pretty tough circumstances home-wise with heaps of problems between mother and father and yet they are outstanding students. There are certainly other factors at play, including psychological and hereditary (genetic) factors. I believe that heredity (genes) play a major role in maths. Do you agree? ... I, for one, feel that that heredity plays a major role. You always find that families differ in the aspect in which they are distinguished, for example, one family is distinguished in maths, while another family is distinguished in something else, so heredity does play a major role, ..." (P23)</p> <p>"As I said previously, the heredity (genes) play a major role, particularly in the primary stage, ... Yes, heredity, particularly in the primary stage, where you have to be really smart to pass in math." (P23)</p> <p>"Some of them are due to hereditary, the student never has a talent in maths ... and sometimes a girl is keen and hardworking, but still fails in math." (P23)</p> <p>"Genes, I have a student in the sixth grade, and she is outstanding in mathematics, really smart, and there was another outstanding student which I taught previously. At first, I didn't know that they were</p>

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						related but when I asked, I was told that they were cousins, so heredity does play a key role." (P23)