

SIMPLE MEMORIES FROM A SIMPLE MATHEMATICS LECTURER – LEELAVATI PRIZE LECTURE

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I was told I needed to write this about 6 months ago. Since then I've been wondering what to write. Along the years I've said or written almost everything there is to say about the maths village. Saying the same things twice, three times bores me to death. I can give the same lecture numerous times, even making it better and more fun to give each time. But for ordinary life which isn't maths? Never mind twice, I don't even want to tell it once.

I decided to write a few memories from the Maths Village - moments which surprised me, made me think, shook me or made me happy. They are fairly ordinary memories, they might not include any original ideas but these are moments that have affected me. Let's say they are what have given my life some spice.



A man's voice. He introduces himself on the phone.

"I am Colonel X..."

My colleague on the phone is afraid of course, we are then in a period in Turkey when the military has all the power and when ordinary citizens are afraid of soldiers. With a trembling voice, she (?) says

“How can I help you?”

“What have you done to my son!”

Not a question, an exclamation! Our colleague is even more frightened.

“What did we do my Colonel? What happened to your son?”

Clearly the colonel is a bit of a prankster and knows the effect that he has.

“How did you do in fifteen days what I couldn’t do in fifteen years?!” he continues.

Our colleague relaxes, it seems the change has been positive. Apparently the kid, who used to be a complete recluse, never did his chores and was constantly glued to a screen, came home a completely different person...

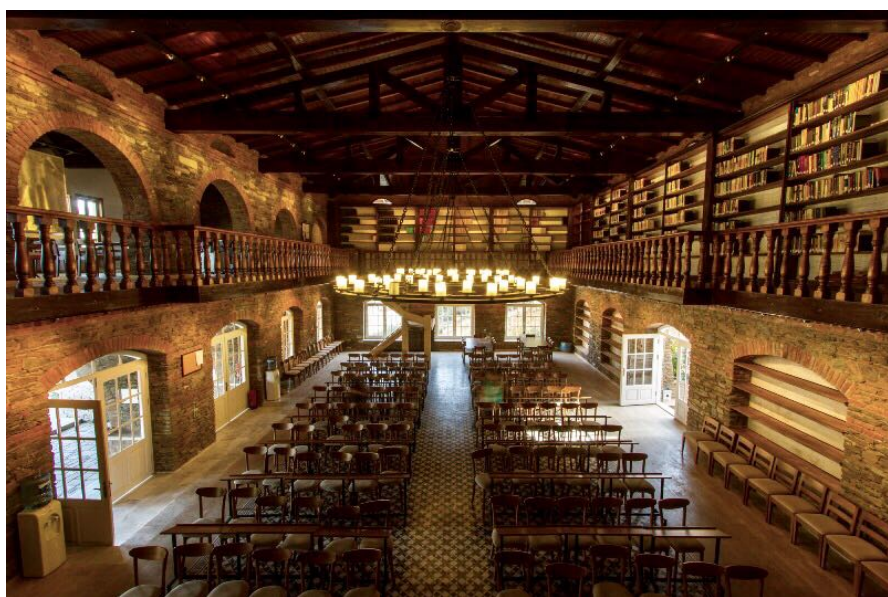


When they told me about this phone call, I started thinking about what we had actually done that could have caused such a change and I think I found the answer: we hadn’t done anything! We specifically did nothing. A relaxed and free environment, lecturers that trusted and respected the students, architecture that was modest and unpretentious, nature as far as the eye can see... And of course hundreds of other young people sharing the space day and night, cooperating in the daily work of the village, from cleaning toilets to chopping carrots...

This next story is really unbelievable, it seems straight out of a film. A mother called a colleague and thanked her a thousand times for the changes the Village brought about in her daughter. Our colleague kept wondering what we had done to deserve such a shower of praise. Then she eventually found out. Apparently the woman’s daughter had previously been cripplingly shy; unable to make eye contact with anyone; she always had her head bowed, mumbled. Her mother assumed we knew all this, as it would have

been impossible to miss. This girl was also completely transformed when she came home from the Village. She was confident, stood up straight and was able to speak aloud. This is why the mother was thanking us.

We often have kids come to the Village who are different, or who have behavioural issues. Some are autistic, some are dyslexic, some are hyperactive, some, like the girl in this story, are passive and shy. A problem we encounter often is diction issues. Interestingly, very often these particular students have a great talent for mathematics. We determine their needs and act accordingly. Their classmates are understanding of this. But in the programme this girl participated in, no-one in particular had jumped out at us. They were the most ordinary group in the world! According to the mother, we should have been able to see the daughter's issues immediately - so why didn't we? The girl must have changed the day she set foot in the Village. I really have no idea what happened to this girl that could cause such a sudden change.



One day I am supposed to teach about a hundred high school students. I enter the classroom and start observing the students, all the while chatting about this and that. My purpose is to see how curious, how motivated they are, and to deduce from how they sit and how they communicate with each other what kind of a lecture I should give. I always do this. In the first two or three minutes I observe them while I am talking. I decide whether I should be strict or soft, how much I should talk, how I will present the concepts - all in those first few minutes. I must say that even though I have been wrong a few times, my rate of successful guesses is quite high. In this case, I decided: I can't lecture this kind of students, and this many of them, for two hours. They have to be active, think, find things out on their own. If I talk at them for two hours, they won't listen to me, they'll get bored. I decided to pose a question. My questions are generally hard enough to need at least one hour of thought, but not so hard that the student can't make at least a bit of headway. Usually for the first 10-15 minutes I make

sure that everybody has understood the question, and then I retreat. I position myself as a psychologist does to his patients: the students can only see me out of the corner of their eyes, and then only if they want to. But this time the students are too excited. They are constantly raising their hands and asking questions. I'm running around, unable to keep up. Clearly they love the question. I am happy as can be, drunk on the victory of having vanquished a hundred young monsters. One kid in particular is very excited. He not only raises his hand but jumps up and down to make sure I can see him! The little devil is very clever in his thinking, too. Anyway, the lecture was drawing to an end. I solved the question and gave its explanation on the board. They already knew more or less what I was going to write, after all they had thought about the question for more than an hour. They couldn't express it in the same way but they had the intuition, they nodded at everything I said impatiently as if to say "we know that, move on". The lecture was very successful. On my way out I met one of their teachers. She (?) had been worried about one of the kids who was hyperactive. Apparently he would never sit still, he would walk around, climb up the walls. She had been worried he would annoy me by doing this. But her fears had been in vain, the kid had thought for two hours. She couldn't believe it!

Oh! I was like that at school too. I can't begin to describe how bored I got in primary school and in middle school. But I loved when the teacher had to leave us alone for a while and would leave us with a problem. I'd go into a trance. This kid was not actually hyperactive, he was just bored of hyper-passivity.

One day, I had a very small class. I was teaching very well, if I say so myself. It's not always like this - I can usually do quite well but this time my success was extraordinary. Thirty to forty students were hypnotized. I again asked a question and sat off to one side while they thought, and I wondered what made that lecture so successful. I got it! I had loved those children! It might be a cliché that you need to be able to love in order to teach, but I had never seen this fact illustrated so concretely.

Some youngsters hate thinking. This doesn't happen with children, children are always curious, but it can happen after puberty. At first I would argue with these young people. "Think!", I'd say, "You don't have to find the answer, but think!". Of course it was no use. If you tell someone to raise their arm, they will. If you tell them to nod, they'll nod. But what are they to do when one tells them to think? Thinking is not an activity like running, there is no recipe for it. After a while I stopped telling these youngsters to think. Let me tell you an episode related to this that surprised me, even though it is not surprising at all.

I gave a class a problem and pulled back, as usual. The class were not bad - they all understood the question quite quickly and started working on it. Except for a young man in the first row. He was looking outside, staring at the ceiling, making the boy on his right laugh, playing with the hair of the girl on his right... I kept watching him. It took all I had not to go and say something. I kept telling myself "It won't be any use, this is how he is, nothing I can say will change that". About 15 minutes later he picks up his pencil. I thought "I think he's taken the bait!". After all, how long can one sit without doing anything? It's almost always the case - these distracted people eventually start thinking. It was the case with this one. He started scribbling something as he slouched on his bench. Then he sat up and wrote some more. He sat back and thought. He leaned

against his friend and thought. He started writing again, turned his paper over, wrote some more, asked his friend for more paper... That young man thought for more than an hour. I had won another victory. By doing what? Specifically by doing nothing!

When I pose a question in class, I tell the ones who have partially or completely solved it to go sit in the back of the class, so that they don't tell the others, to give the others a chance to think. Eventually being sent to the back of the class becomes a reward. One day I'm in front of a very good class - the back of the class is getting more crowded every second. The back of the class gets fuller than the front; there is no more room back there. Of course, then the ones in front feel like they are being punished. I feel sorry for them and guide them towards a partial answer at least. One of these students comes up with an answer that merits being sent to the back for, but the back is completely packed. "Sir, am I not going to be sent to the back?" he asked. I said "But there's no room...". "Sir pleeeeeease send me to the back". I did of course!

One day I posed a problem in class again. I intended to sit back as usual, but they weren't letting me. The class is in turmoil, everyone's giving a different answer. And they're all wrong! Even though I told them "no answer you will give before half an hour has passed can possibly be correct!", nothing can stop them. I say "Look guys, we didn't make this Village so that we could ask easy questions and you could answer them right away... Think a little!". It's no use. I decree that no-one is allowed to give an answer before half an hour has passed. Still they persist. I'm despairing, I don't know what else to do. Every one of the 40 students comes up with an answer every two seconds. At last, I said "Ok, I'm leaving. I'll be in the courtyard right outside. You can see me out the window. Talk, argue among yourselves, and decide on a single answer. And I don't want only the answer, I also want the justification. Convince each other, and when you are all convinced, come and get me." And that's what I did. Fifteen minutes later I peek through the window. What an amazing scene! The students are huddled in little groups and are arguing excitedly. Some have gone up to the chalkboard and are explaining things to others. I forget now whether they actually found the answer. They probably got quite close. I think it shocked them that I would trust them enough to leave the classroom. That had never happened to them. Nor had I ever done such a thing myself. It is such a difficult problem to know what kind of attitude it is best to take towards which kind of student...

One day in class there is a kid who refuses to think. He doesn't bother anyone, he just doesn't care about the question. I don't think he even understands it. I go up to him and ask "Have you understood the question?". He looks at me impassively and just says "No." It's clear that he is rebelling, against me and everything around him. That "no" isn't one of helplessness, it's a "no" of defiance. I ignore the challenge. I touch his shoulder softly and bend towards him. "Shall I explain?" I ask. "All right", he answers. It was the magic touch!

I get a group of 20 primary school students one day. It's clear that they are very smart. I need to give them a hard problem, or they'll solve it in 15 minutes. So I ask a tough one. I must have overshot; no-one can find the answer. Grumbles start rising in the classroom. They demand a hint. I say "Not a chance!", because they are working really well - they are sure to get it eventually. They are insisting on the hint, but some of them don't want one. The class splits into two factions, those who want a hint and

those who don't. I sit back, pretend to read my book. All of a sudden half of the class erupts in protest. They've prepared a sign "WE WANT A HINT!". They start marching around the classroom, chanting "HINT, HINT!!". They even climbed to the top floor of the library and shouted from there. I laughed so much but I never did give them that hint.

I'm teaching a class of about a hundred 12- or 13-year-olds. I decide to ask them little combinatorics questions. I ask my first one. I tell them I don't want them to tell me the answer - I want them to write it down and show me, so that the others can't hear and get a chance to think. A girl sitting in the front row writes the correct answer, and explains it very clearly and in perfect Turkish when the time comes. This kind of student is very rare. Clearly she is very talented. My second question is a bit harder. After a couple of minutes she again gives the right answer, and again explains it very well. The third question is even harder. After 5 to 10 minutes she says "360". I am surprised she got it wrong - she must have made a calculation error somewhere even if her reasoning is correct.

"You must have made a calculation mistake somewhere, check again, I tell her."

"Ok."

and she bows over her calculations once more. Meanwhile, the other students are showering me with answers. All of them are wrong. The girl says:

"Sir, I haven't made a mistake."

"There has got to be one, I am sure you can find it."

Eventually another student says 720, and I tell them they are correct. In no time the answer 720 has spread throughout the classroom. They must have told one another. The girl insists,

"Sir, I still get 360."

"Ok, I'll explain it on the board now."

The moment I get to the chalkboard I realize the answer is 360!

Tell me, in which other discipline but mathematics can a 13-year-old girl challenge a wizened 60-year-old man who has devoted his life to the subject? What a contrast to the others, who happily copied the wrong answer from one another.

I have more memories of course - how could I not? I teach more than a thousand hours per year, to thousands of students. For example, the slight smile that glows on a student's face when they understand something. Every teacher has experienced this, enjoyed it. Are those memories? Definitely. Are they worth telling? They are so common... But so important to me. Just one of those smiles makes my day.

Take the girl that was in our last programme. She's a triplet - two girls, one boy, and they are all at the Village. On the first day, she tells me "Sir, please don't ask me any questions, my math is terrible". I said "But you've gone and sat in the front row?". "Yes," she said "I came to the Village as a last shot, to see if I can finally understand...".

She became one of the best in the class almost immediately. On the third day, she solved a problem that no-one else in the class could solve. When she arrived at the Village she had been determined to study medicine; 15 days later she had changed her mind to mathematics...

Her brother, on the contrary, was already getting good marks in maths before he came to the Village. He really was very intelligent. On his last day he told me "The thing that surprised me the most was that my questions got answered completely and thoroughly".

I almost forgot! One day I am teaching Analysis to high school students. Not calculus, analysis with all its epsilons and deltas. It's a great class. I witnessed such scenes: while I was writing on the board, one of them goes

"Wait a minute... What on earth is this, I don't understand a thing..."

Another goes,

"I know, dude... Sir!"

"Sir wait a sec!"

The kids were rebelling against not understanding, protesting until they did. The three other lecturers on this programme were flabbergasted, like me. It was an amazing two weeks.

I am sorry to have taken your time with my simple memories. But I had to write this note, and this is what I wanted to write about. I have shared my most precious memories with you. Let this be the last one:

It was a year before my father's death. My cartoonist friends from years ago had come to visit him, we were sitting on his balcony. My father introduced me to his friends like this:

"Some people are born with a mission. Some are born painters, some are born musicians, this boy of mine was born a teacher."

At that time I was doing research. I guess my father knew me so well that he could see this side of me. It's the best compliment I've gotten in my life.

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