爸爸陪你点亮那颗小灯泡

儿子上四年级，科学课学到了电。周五一回家他就缠着我：爸爸，我想让小灯泡自己亮起来。我说好，周末咱们就动手。说这话时我心里也没底——毕业这么多年，物理早还给老师了。

准备材料花了一个周六上午。我们骑车去五金店，挑了两节五号电池、一个电池盒、一小卷带鳄鱼夹的导线，又在一堆灯座里认了半天，才找到合适的小灯泡。售货员笑我们：做实验的孩子真多。儿子把材料一样样放进纸盒，像收藏家清点宝贝。

回到家，餐桌变成实验台。我们把导线一头夹在电池盒上，另一头捏着，试着碰灯泡的金属壳。第一次，没亮。第二次，夹子松了，还是没亮。儿子的手有点抖，我假装没看见，只说再试一次。

第三次，指尖刚碰到，灯泡忽然嗡地亮起一小团橘黄色的光。儿子猛地从凳子上弹起来：亮了！亮了！他围着桌子转了半圈，又趴下来盯着那颗灯泡看，像怕它跑掉。那声惊叹撞在我耳朵里，比任何一次工资到账都响。

晚上我们坐在书桌前一起查原理。平板电脑上翻开电路图，电流从电池出发，经过灯丝，再回到电池，绕成一个圈。儿子用手指沿着线比划，比到一半忽然抬头：怪不得夹子松开就不亮——圈断了！我趁热打铁，又让他猜为什么电池会发热。我们一页一页往下翻，看到十点半才合上。

熄灯前儿子忽然说：爸爸，你刚开始是不是也不会？我承认了。他满意地点点头，说没关系，咱们一起学的。那一瞬间我心里有点发烫。大人总想当孩子的答案本，可孩子其实更想要一个一起找答案的同伴。

那颗小灯泡后来一直挂在儿子的书桌旁，用一根铁丝固定着，成了他的小夜灯。每次路过，我都想起那个周六：一盒子材料，一声亮了，一张电路图。陪伴原来不复杂，不过是蹲下来，跟他一起把那个断掉的圈接上。

Dad Helps You Light That Little Bulb

Our son is in fourth grade and just learned about electricity in science class. The moment he got home on Friday he pestered me: Dad, I want to make a little bulb light up by itself. I said all right, we'll do it this weekend. Saying that, I had no confidence either - years after graduation, I had long returned my physics to the teacher.

Preparing the materials took a whole Saturday morning. We biked to the hardware store and picked out two AA batteries, a battery box, a small roll of wires with alligator clips, and after a long search among the lamp holders we found a matching little bulb. The shopkeeper laughed at us: so many kids doing experiments these days.

My son placed each item into a paper box one by one, like a collector inventorying treasures.

Back home, the dining table became the lab bench. We clipped one wire to the battery box and pinched the other end, trying to touch the metal shell of the bulb. The first time, nothing. The second time, the clip slipped loose - still nothing. My son's hands were shaking a little. I pretended not to notice and just said, try once more.

The third time, the instant the clip made contact, the bulb hummed into a small orange glow. He sprang up from his stool: it's lit! It's lit! He circled half around the table, then crouched back down to stare at the bulb as if afraid it would run away. That cry of wonder rang in my ears louder than any payday ever had.

That evening we sat at the desk looking up the principle together. On the tablet we opened a circuit diagram: current leaves the battery, passes through the filament, returns to the battery, and closes into a loop. My son traced the lines with his finger, then suddenly looked up halfway: no wonder it goes out when the clip loosens - the loop breaks! Riding the momentum, I asked him to guess why the battery gets warm. We turned page after page and only closed the tablet at ten thirty.

Before the lights went out he said: Dad, you didn't know this at the start either, did you? I admitted it. He nodded, satisfied, and said it's okay - we learned it together. In that instant my heart felt warm. Grown-ups always want to be the answer key for their children, but what children really want is a companion to search for answers with.

The little bulb now hangs beside his desk, fixed with a piece of wire, serving as his night light. Every time I pass it, I remember that Saturday: a box of materials, one shout of it's lit, one circuit diagram. Companionship turns out to be simple - just crouch down and close the broken loop together with him.

科学小组的周五下午

带班的第五年，我在教室后排支起了一个小小的科学小组，八个孩子，每周五放学后留一小时。家长群里有人担心耽误学习，我没辩解，只把每周五的照片发进群里。照片里那些仰起的脸，比什么解释都管用。

这周的主题是溶解。材料是我提前一周就开始攒的：方糖、粗盐、奶粉、洗衣粉、几块肥皂头，还有六个透明杯和一支温度计。孩子们一到就围上来，像一群侦察兵清点粮草。我让他们自己列单子：要研究什么、需要什么、怎么倒、怎么搅。有个男孩郑重地写下：老师，搅拌的筷子

要一样粗，不然不公平。

实验开始了。方糖在热水里化得飞快，粗盐沉在杯底打盹，奶粉一入水就腾起一团白雾。孩子们轮流搅拌，杯壁上全是小漩涡。忽然靠窗的座位爆发出一声惊叹：老师！洗衣粉的水是温的！我跑过去摸，果然，杯壁微微发热。六个杯子前，六双眼睛一齐亮起来，那种亮，是课本翻页声里永远听不到的动静。

我们没有放过这个意外。我拿出平板，跟孩子们一起查溶解吸热和放热的资料。他们看得极慢，一个字一个字地念，念到氢氧化钠会放热时，那个写公平筷子的男孩举手：老师，所以洗衣粉里也有那种东西？我们顺着往下查，查到洗衣粉成分表，查到溶解时热量跑进跑出。一小时到了，没人走，最后是家长在走廊喊了三声才散。

锁门前我擦着桌子，忽然想起自己小学时的科学老师。他也是这样陪我们瞎折腾的，折腾得我一辈子看见糖水就想去搅一搅。原来教育可以这样传下来，不靠讲义，靠的是那一小时里共同弯下的腰。

我在小组记录本上写下这一页：本周五，发现洗衣粉的水会发热，全班震惊，查资料半小时。写完我又加了一句：下次让他们自己带材料。当老师这些年，我越来越相信，孩子惊叹的那一声，就是课堂真正的上课铃。

Friday Afternoons with the Science Club

In my fifth year as a homeroom teacher, I set up a tiny science club at the back of the classroom: eight children, staying one hour every Friday after school. Some parents worried in the group chat that it would hurt grades. I did not argue; I simply posted photos from each Friday into the chat. The upturned faces in those photos explained better than any argument.

This week's theme was dissolving. The materials I had been collecting for a week: sugar cubes, coarse salt, milk powder, laundry powder, a few soap ends, six clear cups, and a thermometer. The children swarmed in the moment they arrived, like scouts inventorying supplies. I asked them to make their own list: what to study, what is needed, how to pour, how to stir. One boy wrote solemnly: Teacher, the stirring sticks must be the same thickness, otherwise it is not fair.

The experiment began. Sugar cubes melted fast in hot water, coarse salt dozed at the bottom of its cup, and milk powder rose into a white cloud the instant it met water. The children took turns stirring, little whirlpools spinning on the cup walls. Suddenly the seat by the window erupted: Teacher! The laundry powder water is warm! I ran over and touched it - indeed, the cup wall was faintly hot. Six pairs of eyes lit up at once across six cups, a brightness that the sound of turning textbook pages never produces.

We did not let the accident go. I brought out the tablet and looked up dissolving heat absorption and release together with them. They read extremely slowly, word by word, and when they reached the line that sodium hydroxide releases heat, the boy who wrote about fair sticks raised his hand: Teacher, so laundry powder has that stuff in it too? We followed the trail - to the ingredient list of laundry powder, to heat running in and out during dissolving. The hour ended and nobody left; finally a parent shouted three times down the hallway before they dispersed.

Before locking up I was wiping the desks when I suddenly remembered my own primary school science teacher. He too had accompanied us in such wild tinkering, tinkering so thoroughly that a lifetime later I still want to stir any glass of sugar water I see. So education can be passed down like this - not through handouts, but through the bent backs of one shared hour.

In the club logbook I wrote the page: This Friday, discovered that laundry powder water turns warm; the whole class stunned; thirty minutes of research. Then I added one line: next time let them bring their own materials. These years of teaching, I believe more and more that a child's cry of wonder is the real school bell of any classroom.

隔着桌面，磁铁牵起了回形针的手

女儿五岁半，最近对冰箱贴着了迷，出门要摸一遍，吃饭要问一遍：妈妈，它们为什么不掉下来？与其被问一百遍，不如陪她玩一遍。我趁午休在网上下单了一包磁铁，又翻出家里的旧物：回形针、图钉、钥匙、硬币、积木、发夹，装进一只鞋盒，当作我们的实验材料。

快递到的那个傍晚，我把鞋盒倒在客厅茶几上，宣布磁铁实验室开张。女儿先捏起那块黑色磁铁，在桌面上推回形针。回形针像被无形的手牵着，一路小跑跟着磁铁走。她推一下，它跑一下，她咯咯笑个不停。玩到兴头上，她把磁铁挪到桌子底下，回形针竟在桌面上站了起来，隔着木板朝磁铁探身。

女儿愣了两秒，随即爆发出那天最大的惊叹：妈妈！磁铁会穿桌子！她急着把钥匙、硬币、积木全塞到桌子底下去试，钥匙被吸住了，硬币纹丝不动，积木更不用提。她忙得满头汗，一会儿喊这个，一会儿喊那个，客厅像炸开了一小锅爆米花。

晚上洗完澡，我们坐在床上一起查原理。绘本式的科普页翻开来，磁铁周围有一圈看不见的磁力线，纸、木头、塑料都能穿过去，铁做的东西才会被抓住。女儿用手指沿着插图上的线圈画，画到一半忽然跳下床，跑回客厅，把磁铁贴在冰箱门上，再在门外面贴一张纸条：纸条被里面的磁铁按住了。她回来时一脸郑重：妈妈，冰箱是铁做的。

那一刻我特别庆幸自己那天没有嫌麻烦。如果我只是随口答一句因为它有磁性啊，她大概永

远不会自己发现冰箱是铁做的。孩子的科学不是灌进去的，是她自己伸手抓回来的，我们只需要把鞋盒倒在茶几上。

现在那块黑色磁铁住在女儿的枕头边，夜里当小夜灯的开关玩，白天在冰箱上排成一列兵。每次她举着磁铁冲我喊妈妈你看，我都放下手里的活走过去。陪她做实验的这些傍晚，是我一天里最舍不得快进的部分。

Across the Table, the Magnet Took the Paper Clip by the Hand

Our daughter is five and a half and lately obsessed with the fridge magnets - touching them every time we go out, asking every mealtime: Mom, why don't they fall down? Rather than answer a hundred times, I decided to play through it with her. Over lunch break I ordered a pack of magnets online, and rummaged through the house for old things: paper clips, thumbtacks, keys, coins, blocks, hairpins, all packed into a shoebox as our experiment materials.

The evening the parcel arrived, I tipped the shoebox onto the living room table and declared the magnet laboratory open. My daughter picked up the black magnet first and pushed a paper clip across the tabletop. The clip trotted along behind the magnet as if led by an invisible hand. She pushed once, it ran once, and she giggled without end. In the middle of the fun she slid the magnet under the table - and the paper clip actually rose up on the tabletop, leaning through the wooden board toward the magnet.

She froze for two seconds, then let out the biggest cry of wonder that day: Mom! Magnets can go through tables! She rushed to shove keys, coins, and blocks under the table one after another. The keys were caught, the coins did not budge, the blocks hardly worth trying. She bustled until she was sweating, shouting this and that, the living room popping like a small pot of popcorn.

After her bath that night we sat on the bed looking up the principle together. We opened a picture-book science page: around every magnet lies an invisible loop of magnetic field lines; paper, wood, and plastic let it pass through, but things made of iron get seized. My daughter traced the loops in the illustration with her finger, then suddenly jumped off the bed, ran back to the living room, pressed the magnet against the inside of the fridge door, and held a slip of paper on the outside - the paper was pinned in place by the magnet within. She came back with a solemn face: Mom, the fridge is made of iron.

In that moment I was so glad I had not found it a hassle that day. Had I merely

waved it off with because it is magnetic, she would probably never have discovered on her own that the fridge is iron. A child's science is not poured in; she reaches out and grabs it back herself. All we need to do is tip the shoebox onto the table.

The black magnet now lives beside her pillow, serving at night as the switch of her night light and by day standing in a row of soldiers on the fridge. Every time she holds it up and shouts Mom look, I put down my work and walk over. These evenings of experiments with her are the part of my day I am least willing to fast-forward through.