Investigating hamstrings

Annotation

Eliza poses a comparison statistical investigation (comparing flexibility before and after exercise). She collects multivariate measurement data (the variables are before and after, and the measure is hamstring flexibility in centimetres). Eliza uses two different displays to analyse her data and chooses the more appropriate display (a dot plot) to answer her question. She communicates her findings in context.

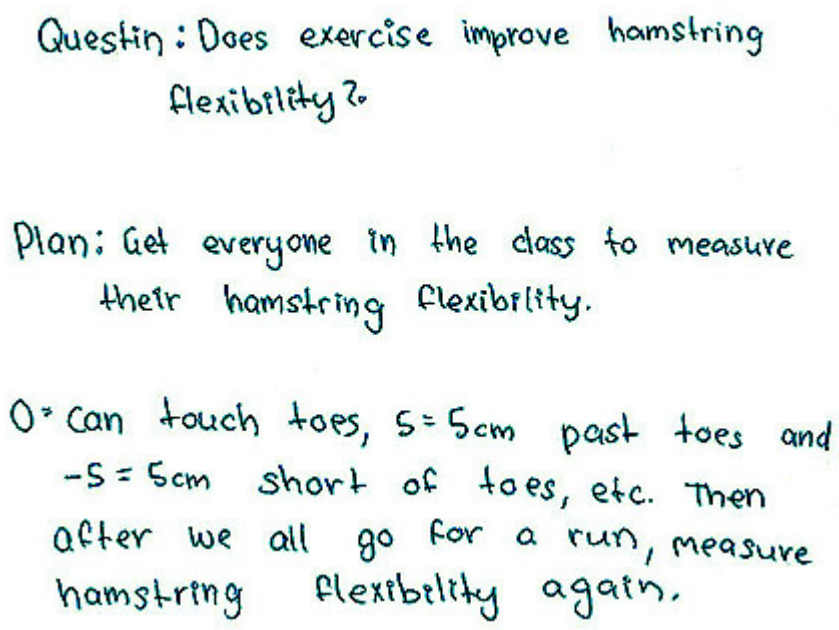
Problem: Investigating hamstrings

The teacher asks the students to complete the following task:

Pose a question that can be answered by conducting a statistical investigation. Carry out the investigation and present your findings.

Student Response

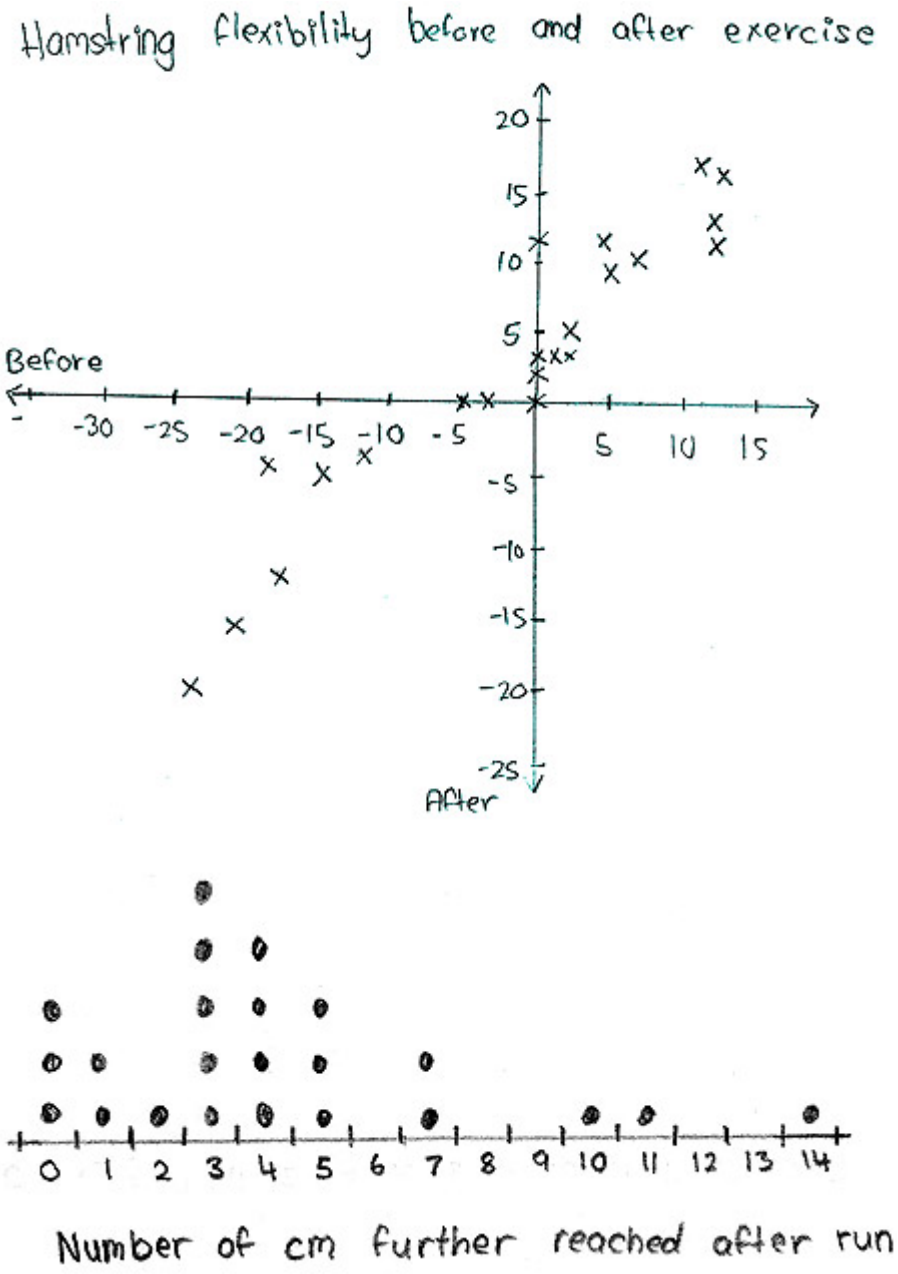
Eliza's work sample is as follows:



Results

Person	Before	after	Improvement
Ben	0	11	11
Pita	2	4	2
Jeremy	-15	-5	10
Eliza	11	16	5
Mai	0	3	3
Kimi	-11	-4	7
Jano	19	-5	14
Tom	-3	0	3
Mono	0	0	0
Mercedes	-25	-20	5
Nina	-21	-17	4
Anne-marie	12	16	4
Jade	-17	-13	4
Felicity	0	1	1
Arlo	2	5	3
Lema	5	8	3
Noah	7	10	3
Nita	11	11	0
John	4	11	7
Jeni	-5	0	5
Benita	11	12	1
Carla	0	0	0
Cody	1	5	4

Displays



Conclusions

From the scatter plot, I can see that there is a relationship between hamstring flexibility before and after exercise – if you were flexible before you are still flexible after. But this graph does not show if exercise makes you more flexible. The dot plot shows that most people could reach 3 to 5 centimetres further after exercise, so I would say “yes”, exercise does make hamstrings a little more flexible. Three people showed no difference, but no one got less flexible, and a few people were way more flexible.

Teacher:	Can you tell me what you did?
Eliza:	First of all, I told everyone how we measure hamstring flexibility, and I showed them myself. Everyone got into partners and used a ruler to measure how close to the toes people got.
Teacher:	Why did you do it that way?
Eliza:	I had to demonstrate because some people weren’t using the ruler properly, and they were measuring from the wrong place. Some people wanted to measure in millimetres, but I told everyone to measure to the nearest centimetre to keep it all the same.

Teacher: What did you find out?

Eliza: I was surprised at the range of results. Lots of people couldn't reach their toes, and one person was 25 centimetres away! There were also a lot of people who could go past their toes – the best was 16 centimetres past. Quite a few people got exactly 11 centimetres, and I wonder if this is partly because that is what I got when I demonstrated to the class. Maybe they tried a few times until they got my score.

Teacher: What else did you do?

Eliza: I made the scatter plot first but it didn't actually answer my question. So then I worked out the improvement column and used it to make a dot plot and this showed the improvement after exercise really clearly.