statstutor

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stcp-marshallowen-2b

Porosity Scenario Video Transcript

00:00 to 00:15 Title screen is displayed followed by summary of student's project

00:15 Discussion begins:

Student: "So, basically I'm looking at the porosity of the same membrane but with different coatings. So I've got a control that's not coated at all, and then I've put I think four different coatings on it?" (Student's data is shown on screen)

Tutor: "So you've got one where there's no coating and then you've got four different coatings?"

Student: "Yes."

Tutor: "Yes, so that's five different kind of options all together?" (The five different options are highlighted in the data shown on screen)

Student: "Yes."

Tutor: "Yes."

Student: "And then I've used a fluorescent compound and I've basically looked at the transport from the top of the membrane through to the bottom."

Tutor: "So you've measured that? The amount?"

Student: "Yes. So basically that was incubated for 30 minutes and then I've just sampled the bottom and then read the fluorescence on a plate reader."

Tutor: "Okay is that what this 'LY' column is?" (Student's data again shown on screen)

Student: "Yes. That's the compound name."

Tutor: "Right so, although I don't know a lot about the kind of background and the kind of jargon and terminology, my understanding is that the 'LY' column is what I would call the dependent variable. Because that's the thing you're interested in, understanding how that behaves in relation to the sort of membrane factors if you like, or the levels of the membrane factor."

Student: "Yes. So that was expressed in a percentage, so basically I calculated the amount that went through, and then I converted that into a percentage in Excel and then that's kind of..."

Tutor: "So the first one is 0.07, is that 0.07% or is it?"

Student: "No, that's 0.07."

Tutor: "So it's, yeah so it's 0.07 so that's 7% yeah."

Student: "Yes."

Tutor: "Okay."

Student: "And then I did it over like, a few well, because I ran with it a cell, so there was some which had cells on but these are just with no cells."

Tutor: "All of them had no cells on?"

Student: "Yes so though were ran over 16 days I think. So that's over 16days."

Tutor: "Oh okay, so is this, when you say it was ran over 16 days, does that mean that the same sample was measured after, I can see you've got 'dates or days…"

Student: "Yes so basically the..."

Tutor: "So it's the same sample being measured on Day 2, the same sample was then left to continue then you measured it on Day4?"

Student: "Oh, well the experiment was 30 minutes, incubated for 30 minutes, so then after that that was on Day 2 and then that was repeated on Day 4, so it was the same membranes, but just the experiment was run every two days."

Tutor: "Right, so it's the same membrane but you just repeated the experiment?"

Student: "Yes."

Tutor: "Right, is there any reason why you might think…"

Student: "No, so theoretically it shouldn't, it was just because it was all on the same plate so it was…"

Tutor: "So in my terminology the fact that you've got Day 2 and then Day 4, it's just a repeat, or what we call a replication of the experiment."

Student: "Yes."

Tutor: "Okay. So we don't think there is going to be a time effect, they're just replications?"

Student: "There shouldn't be."

Tutor: "To all intents and purposes? Okay."

03:08 Discussion Point is displayed

03:25 Discussion continues:

Tutor: "What is it you are trying to understand from the data?"

Student: "So basically I want to see if there's any difference in porosity when I coat. So if, looking at the amount of compound that has gone through, I want to see if the coatings block the pores so that there's less compound that goes through."

Tutor: "Okay so my understanding would be, say, to look at the average percentage of is it, can I refer to it as percentage porosity or just refer to it as porosity?"

Student: "If you just say percentage LY that will be the amount of compound that goes through."

Tutor: "So, is it that you want to understand how the average or mean percentage LY varies between the five, you know or it might depend on the type of coating?"

Student: "Yes."

Tutor: "Is that right?"

Student: "Yes."

Tutor: "Okay."

04:15 Discussion Point is displayed

04:26 Practical Exercise is displayed

04:31 Discussion continues:
Tutor: "I mean you came today saying you think its Analysis of Variance?"

Student: "Think so."

Tutor: "And I'm sort of happy that that's the right way to go with it. Because, the reason being you've got five groups that you want to compare."

Student: "Yes."

Tutor: "So what I would do is, I would first of all undertake an Analysis of Variance. You've only got one factor, and that one factor is the type of coating and you just happen to have replications. I see no reason to have time as a factor, to me that wouldn't make sense."

Student: "Okay."

Tutor: "So I think all you need to worry about is the first two columns, the 'Sample' column and the 'LY' column". So you've got one factor and it's what we call between-samples factor.

05:13 Discussion Point is displayed

05:25 Student's modified data is shown on screen with the column labelled 'Sample' having been modified.

05:35 Discussion continues with the tutor showing student how to undertake the analysis using SPSS:
Tutor: "So again we want the 'LY' percentage as your dependent variable, because that's what we're interested in measuring. And 'Sample' is the factor because we want to break that down by factor. And it's as simple as that. So if we click on OK, that will do the sort of, minimal amount of analysis for you, and all you get out of that is the Analysis of Variance box there. And have you ever done Analysis of Variance before?"

Student: "It was a while ago."

06:11 Screen displayed asks "What you would do/say next?"

06:21 Discussion continues:
Tutor: "I'll explain what the main value is that you're looking at, it's basically the sig value at the end here. And if the, let me state the, basically what you are doing is your comparing two hypotheses, and the hypotheses are that either the population mean for each type of coating, so, let's call them Coating 1, is the same as the mean for Coating 2, is the same for the mean for Coating 3 and so on up to mean for Coating 5. These are referring to the population means so this is a Greek letter "mu", so that refers to the population means and you've measured the sample means. So

you want to be able to say whether that's true (Tutor is pointing to the hypothesis the population means are all the same) if you were to collect data on a much larger amount of samples. And the alternative hypothesis is that they're not all equal. Okay so you're interested in whether there's any evidence that there's a difference between the coatings in some way with respect to the mean percentage LY. Is that oaky?" (Student agrees)

Tutor: "And if your sig value, it's like any significance test or any hypothesis test, the standard approach is if your sig value is less than 0.05 then that gives you evidence in favour of H_A. Now, it (the sig value in the SPSS output is being referred to) is coming up as zero, it's not zero it's just zero to three decimal places."

Student: "Yes."

Tutor: "Either way it's very much less than 0.05, so you do indeed have evidence that there are differences between the five coating levels."

Student: "Okay."

Tutor: "Now, it might be that one coating level is quite different to the rest or it might be that all five are completely different from each other (Student agrees). And that's obviously the next thing that you'd like to know." (Student agrees)

Tutor: "What you can do, you can repeat that an analysis, but what you can do is request what are called post-hoc tests."

Student: "Right."

Tutor: "So basically, if that (Tutor is pointing to the sig value) had come back as saying no there are no significant differences, so for example suppose that sig value was, say, let's say it was 0.32, then that's as far as you need go, it wouldn't make sense to look any deeper because you are saying there are no differences. But because we've come up with a conclusion that there are differences, it does make sense to dig a little bit deeper, so it does make sense to look at the post-hoc tests. Does that make sense?"

Student: "Yep."

Tutor: "So what I would do now, is just repeat everything you've done, and I…, you can repeat it from this Output Window (*Output window from SPSS is shown on screen*) , you don't need to go back to the Data set Window, you can click on the Analyze there. Serves the same purpose. 'Compare Means' then the 'ANOVA', and then can you see you've got a button called 'Post-Hoc'?"

Student: "Yep."

Tutor: "Now what you get listed are a whole range of different approaches that you can use to doing post-hoc tests. 'LSD' stands for Least Significant Difference, there's Bonferonni", that's a popular one and Tukey is as well. There's lots of others there and there are some reasons why others might be better than others in certain circumstances, but my advice would be to do a couple of them".

Student: "Okay."

Tutor: "If you're getting consistent conclusions from them, then you know, the conclusions you come to aren't dependent on the technique. Perhaps two of the most popular ones are bonferonni and Tukey, so shall we select both of those and have a look see what they're telling us?" (Student starts using SPPS to do the post-hoc tests)

Tutor: "And click on continue and then click OK. And you'll get the same Analysis of Variance box that you had before, but you've got the addition of the post-hoc tests as well, and what this does it looks at pairs of coatings so it'll compare the no-coating with the Bovine Collagen, it'll compare…" (Session carries on….)

10:07 Closing Remark is displayed.