GIPPYAg AgriTECH Experience Roadshow 2019

The GIPPYAg project took to the road in August 2019 to take cutting edge agri-tech and science into the classrooms of more than 600 primary and high school students across East Gippsland. Students learnt about where their food and fibre comes from, and the science and technology being used within the agricultural and horticultural industries.

The students participated in exciting, hands-on experience workshops that focused on the use of on-animal sensors and food science technology.

ORBOST

BAIRNSDALE

SALE

LAKES ENTRANCE

The AgriTECH Experience Roadshow was well received by both students and teachers, with students enjoying the activities and learning about new technologies and their applications to the agricultural industry. With over **92% and 70% of students from primary and secondary schools respectively stating they enjoyed the Sweet Science and Fit Bits for Cows session**, it is clear that the activities engaged young people. **Over 75% of primary school students were more interested in learning about food and fibre than those in secondary school (43%). This trend of younger students being more engaged with agricultural issues** was reported in student's responses to several questions. Overall, the GIPPYAg AgriTECH Experience Roadshow was hailed a success and the project team are working towards expanding the program across Gippsland in 2020.
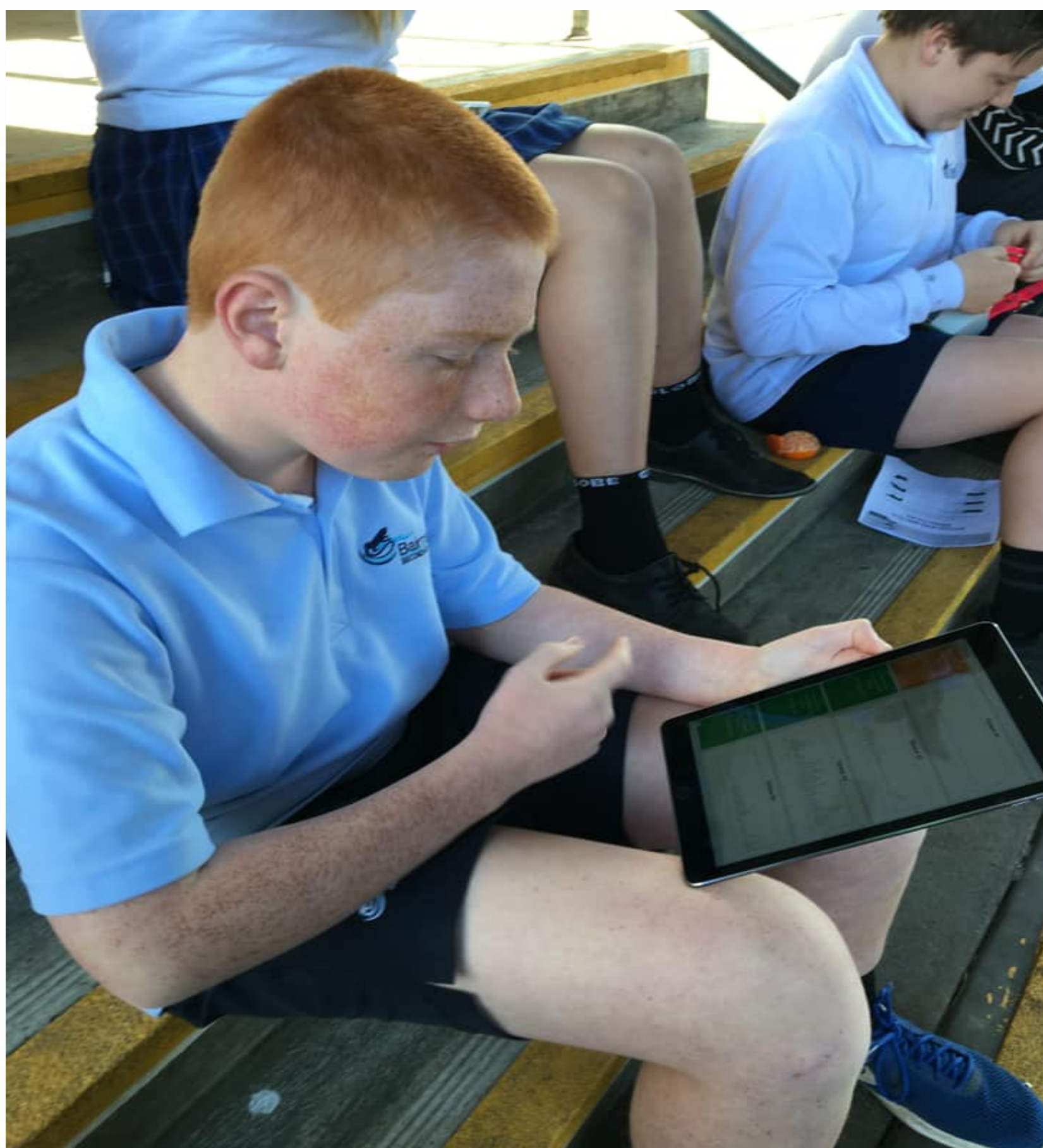
PROJECT OBJECTIVE

The AgriTECH Experience Roadshow aimed to give students an insight into the types of exciting technology and science being used within the agricultural and horticultural industries. The program was designed to be interactive, engaging and informative to ignite an interest in students about the food and fibre industry in Gippsland and encourage them to pursue further study and a career in the field.

BACKGROUND

Two workshops were presented to students, one called 'Sweet Science' and the other called 'Fitbits for Cows'. The Sweet Science workshop showed students how to use Brix refractometers to objectively measure the sugar levels of different fruits. This workshop aimed to give students the chance to make a prediction as to what fruit they thought would contain the most sugar, based on appearance and taste, before using a refractometer to determine the Brix of these fruits. During this session students also learnt about fruit production, including how fruit grows, the ripening process and what quality characteristics consumers are interested in. They also heard about emerging technologies that are currently being developed and trialled to automate the fruit picking process.

The 'Fitbits for Cows' workshop introduced students to accelerometers as an example of an on-animal sensor to collect animal movement data, similar to a human Fitbit. The technology is currently being developed for the extensive livestock industry to alert farmers about potential animal health and welfare issues or predation events. Students were introduced to the technology and how it worked before testing it out on themselves acting as cows. The workshop aimed to provide students with knowledge on emerging animal monitoring technology, from learning about the science behind the sensors to understanding the data collected and how to interpret animal movement recorded on a 3-axis plane.

At the end of the workshop's participants were asked to complete an evaluation survey. The survey asked participants to report how much they enjoyed the experience, how well they understood the real-world application of the technologies and to report their knowledge and interest in the food and fibre industry. While all classes were eligible to participate, only students in Grade 4 or above were invited to complete the survey.

PARTICIPANTS

The AgriTECH Experience Roadshow commenced on the 26th of August in Sale and visited five other locations across East Gippsland over 6 days. Both primary and secondary schools were invited to attend the workshops by the East Gippsland LLEN on behalf of the GIPPYAg project. Details of the schools that participated are shown in the table below.

Location	Date	Schools	Students
Sale	Monday 26th of August	Sale College (inc. special education students) Maffra Secondary College Catholic College Sale Gippsland Grammar	102
Sale	Tuesday 27th of August	Guthridge Primary School	108
Bairnsdale	Wednesday 28th of August	Bairnsdale Secondary College	96
Lakes Entrance	Thursday 29th of August	Lakes Entrance Primary	132
Orbost	Monday 2nd of September	Orbost Secondary College	118
Orbost	Tuesday 3rd of September	Orbost Primary School	119
		Total	665

Workshops in focus: SWEET SCIENCE

The 'Sweet Science' experiment gave students a glimpse into the science behind how to determine when fruit is ready to eat. Students were given five different fruits and asked to create a hypothesis about which fruit they believed was the sweetest and report this to their peers. The students were then asked to rank the fruits in order of sweetness, first judging the appearance of the fruit then by taste. Their hypotheses were tested using a Brix refractometer to measure the sugar percentage of each fruit as an objective measure of sweetness.

Secondary school students were given the additional challenge of investigating the sweetness of different varieties of the same fruit, for example, predicting and testing the sweetness of Granny Smith, Royal Gala and Red Delicious apples. Students were provided insight into the variability of sweetness between varieties of the same fruit, extending their knowledge on biological factors as well as exposing them to rigorous scientific procedures and methodologies.

Workshop facilitator Leanne Lancaster from CQUniversity's Agricultural Education and Extension team commented: "The students loved eating the fruit, but many of them also said they were really surprised by the results. Strawberries have very low sweetness reading whilst apples are high."

The experiment provided a practical application of refractometer technology and demonstrated how important objective measurements are on-farm to ensure fruit quality. Students saw for themselves how variable human perception of sweetness is, for example, blueberries aren't sweet as the reading suggests and they also taste sweeter to some more than others. A very important component of the session was highlighting to students the progress the horticultural industry has made to determine when fruit is ready to harvest, moving from subjective or destructive methods, such as using refractometers to non-invasive Brix handheld devices that use infrared light, to automatic mango harvesters that utilise machine learning and artificial intelligence to pick market ready fruit.

The experience also provided students with insight into the process of fruit production by allowing them to see for themselves the complexity of manually assessing fruit ripeness. Ms Lancaster explained the purpose of the experiment was to raise awareness about food production: "It's easy for the students, and all consumers, to assume that farmers are just looking at the colour of the fruit to decide when to pick. We wanted them to see that there's much more science behind those decisions, and technology which can be used by farmers to ensure the fruit they get at the end of the production line is of the highest quality."

Workshops in focus: FITBIT FOR COWS

The Fitbit for Cows activity exposed students to coding and engineering aspects of agri-tech and how the livestock industry is focused on developing technologies which can be used to increase animal health, welfare and production. Students were guided through setting up an accelerometer-based animal movement monitoring system, where one student dressed up as a cow fitted with an accelerometer collar while the remaining students tracked the cows activity via a microcomputer called a Raspberry Pi and an app on an iPad designed to receive and display the movement data.

Secondary students were given the extra challenge of observing data from a simulated predation event, whereby one student pretended to be a wolf chasing the cow. The students then analysed the change in accelerometer data by visually comparing the 'predation' versus 'normal' cow data, plotting various graphs and understanding how changes in data could be used to alert a farmer about a potential animal attack via their mobile phone or computer.

This activity also showcased the wide variety of careers that are available within the food and fibre sector. Students were informed about the demand for data analysts, scientists, technology developers and agribusiness professionals. It is important to highlight the vast array of careers associated within the agricultural industry, as often the perception of the wider community is that you have to be a farmer to be involved in agriculture and horticulture, which is far from reality, with over 50% of agricultural careers located off-farm. The FitBits for Cows session also demonstrated the commitment farmers and the wider industry dedicate to improving animal health and welfare outcomes, a social licence issue the animal production sector often grapples with.

The practical applications help demonstrate why on-animal sensing technologies are growing in importance to farmers. Workshop facilitator Leanne Lancaster highlighted the importance of delivering hands-on industry relevant modules: "It's a really fun and interactive activity and it also shows students that data is a powerful thing for farmers to have and how important capturing and using data will be in the future. For those students that didn't think that there was much tech going on in our farms today, I think this showcases to them the possibilities within the industry."

The final survey was completed by 173 primary school students and 165 secondary students. The overall response rate was 43%, once all eligible students were considered. The response rate was lower than desired with some some groups running out of time to complete the survey and needing to return to their school. This time issue will be considered in future workshops.

The interactive and hands-on nature of the workshops provided an inquiry-based learning environment that was well received by the students.

Over 90% of primary students and 72% of secondary students enjoyed the Sweet Science workshop, with students commenting that they enjoyed learning how much sugar is in different fruits, being able to test their predictions, eating the fruit and learning that the sweetest tasting fruit isn't always the one with the most sugar.

The Fitbit for Cows experience was equally well received, with over 90% of primary students and 77% of secondary students stating they enjoyed the workshop. Students commented about the uniqueness of the learning approach and enjoyed the interactive and fun nature of dressing up and running around as cows and wolves. They also enjoyed learning about emerging agri-tech and its application to alert farmers about potential threats to better look after their animals.

Both primary and secondary students reported similar learning outcomes, with over 75% of students reported they gained knowledge on the use science and technology to determine when fruit is ready to harvest. Likewise, over 80% of students reported they now have knowledge on how farmers could use accelerometers to detect predation events following the workshops.
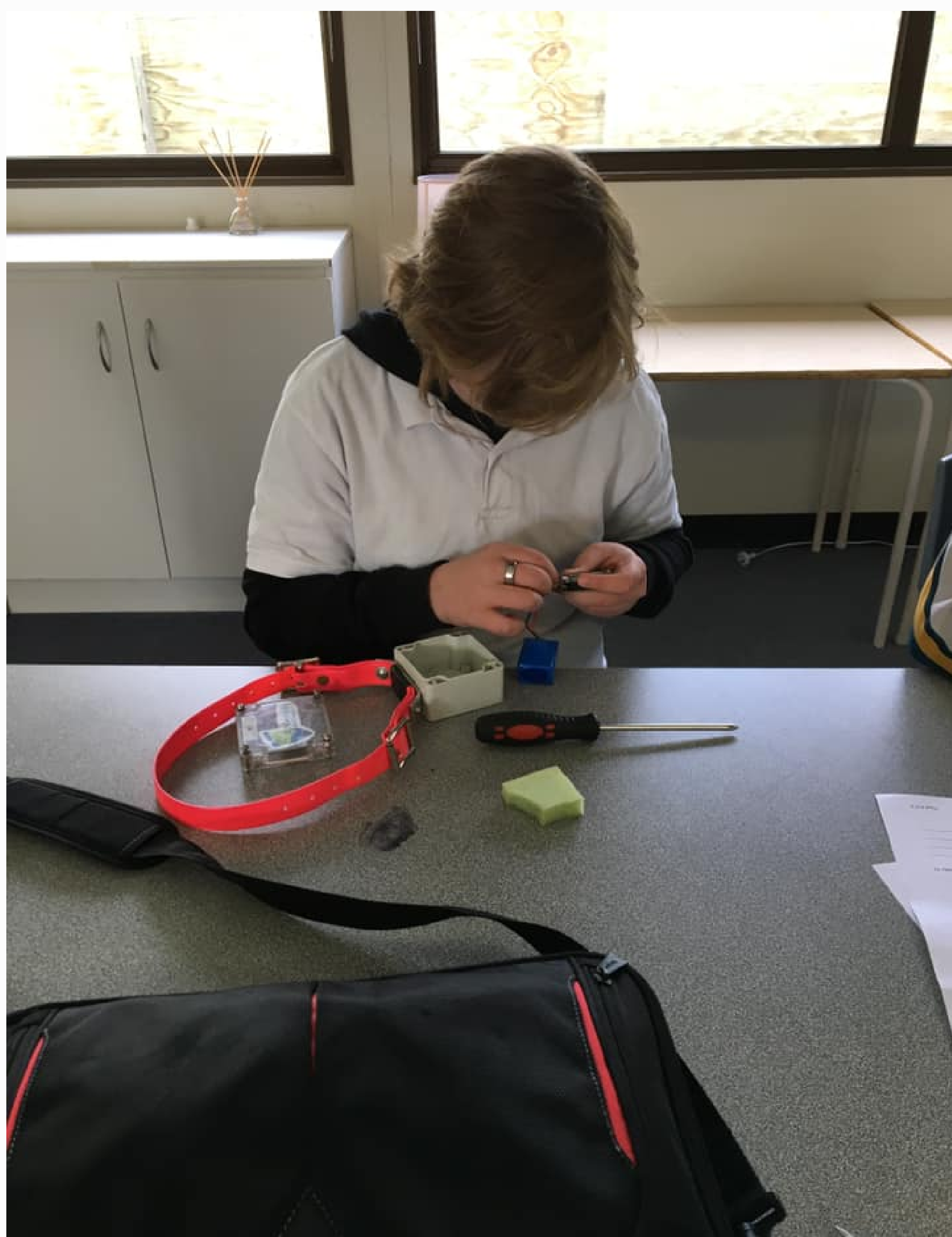
There was a general trend that students were interested in knowing where their food comes from and learning more about the food and fibre industry; this was more pronounced in primary students than secondary students (78% and 44%, respectively). Additionally, primary students could see greater value in food and fibre as an important employer in the Gippsland region compared to secondary students (78% and 57%, respectively).

While the students enjoyed learning about agri-tech within the food and fibre industry, the data shows that agriculture is not a prominent career path for many. Approximately 40% of primary students stated they were interested in a career in agriculture, however, only 13% of secondary students reported agriculture as a potential career pathway, with 50% stating they weren't considering a career in agriculture. The interest from primary students is promising, as identifies an age group where efforts could be focused to help continue and strengthen this interest, however the lack of interest is from students that are nearing a pivotal time in choosing a career pathway is concerning.
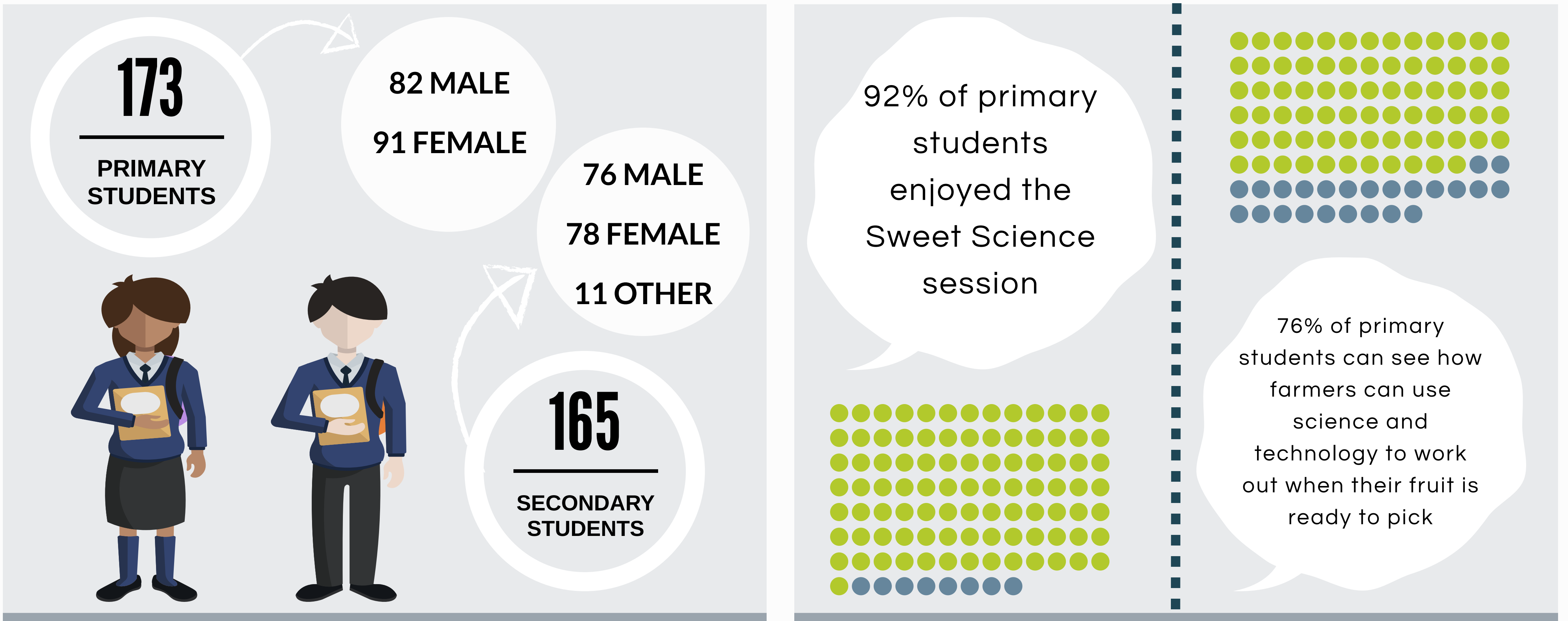
The workshops were also well received by the teachers, as evidenced by Sharon Jones, a teacher at Orbost Secondary School: "As we are rural and remote often our students miss out on these opportunities. It is really important for them to hear information from the source rather than the classroom teachers' that students see every day. Also, we live in a dairy farming town and I think that it is important for students to realise milking cows isn't the only job available."

This information provides the need to design and develop more activities and opportunities to showcase the possibilities in the food and fibre sector for secondary students to ensure the next generation agricultural workforce in Gippsland is secure. The Roadshow has proven that interactive activities that provide practical applications of industry relevant technologies are well received by students and learning outcomes are high; implementing similar activities on a wider scale with greater frequency may provide a potential solution to raising awareness and ultimately interest in the wonderful world of agriculture.
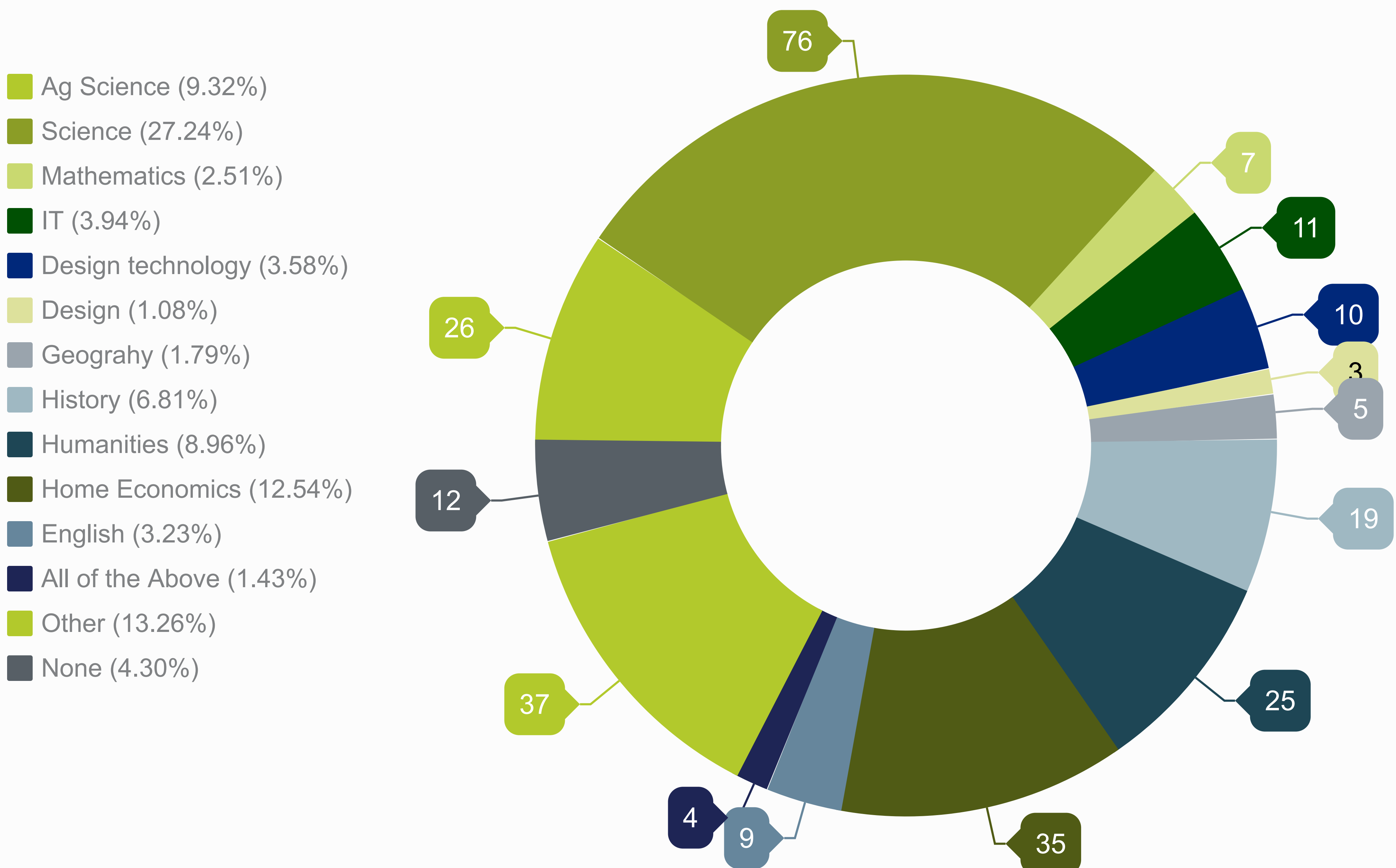
2019 AgriTECH Experience Roadshow Survey Results Summary

THE RESPONDANTS

173 PRIMARY STUDENTS

82 MALE
91 FEMALE

76 MALE
78 FEMALE
11 OTHER

165 SECONDARY STUDENTS

92% of primary students enjoyed the Sweet Science session

76% of primary students can see how farmers can use science and technology to work out when their fruit is ready to pick

THE RESULTS

Secondary students: In what subjects do you learn about food and fibre production at school?

- Ag Science (9.32%)
- Science (27.24%)
- Mathematics (2.51%)
- IT (3.94%)
- Design technology (3.58%)
- Design (1.08%)
- Geograhy (1.79%)
- History (6.81%)
- Humanities (8.96%)
- Home Economics (12.54%)
- English (3.23%)
- All of the Above (1.43%)
- Other (13.26%)
- None (4.30%)

76
7
11
10
3
5
19
25
35
9
4
37
12
26

I'd like to know more about how food and fibre is produced

"We got to do things that we haven't done before."

I'm interested in pursuing a career in the food and fibre industry
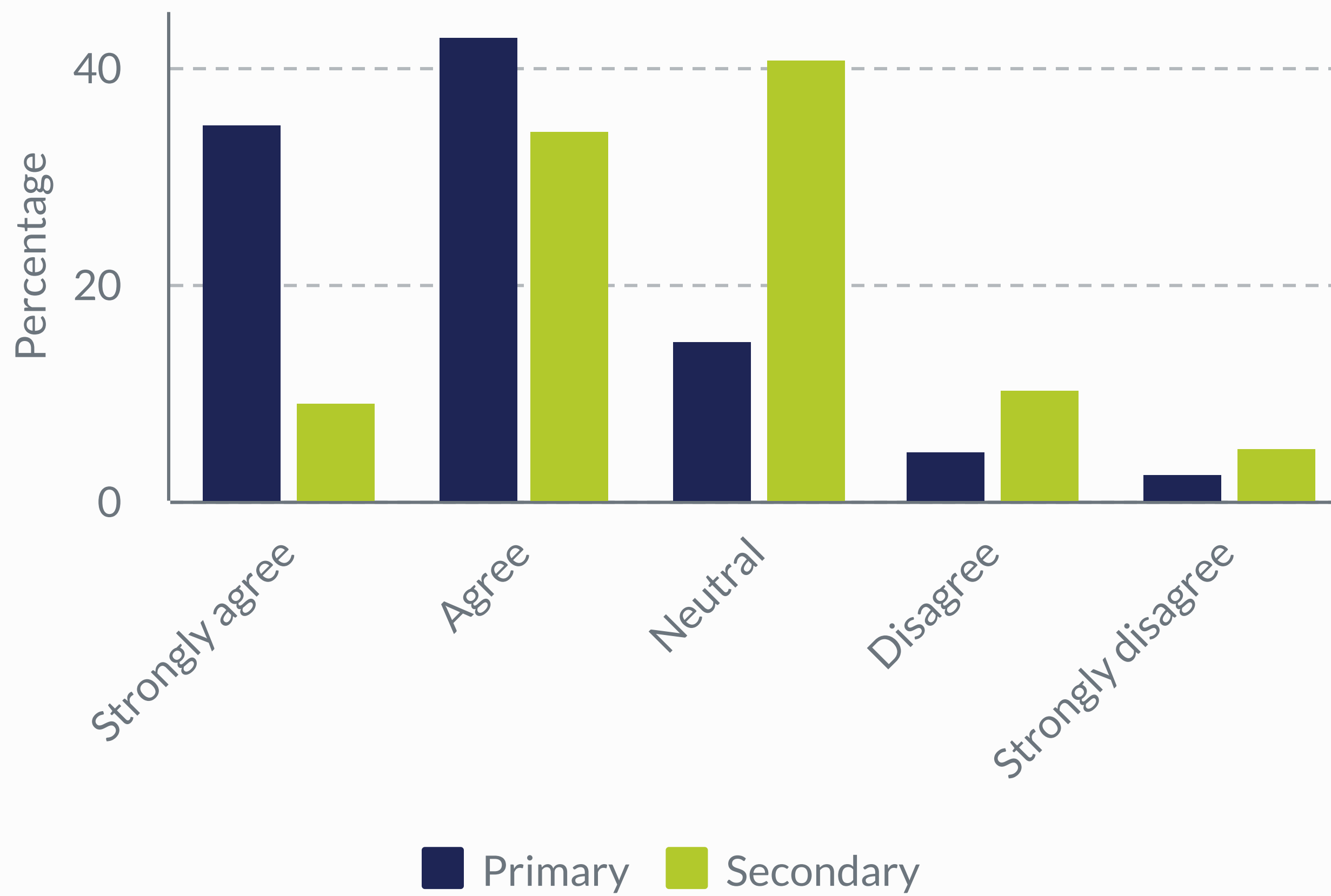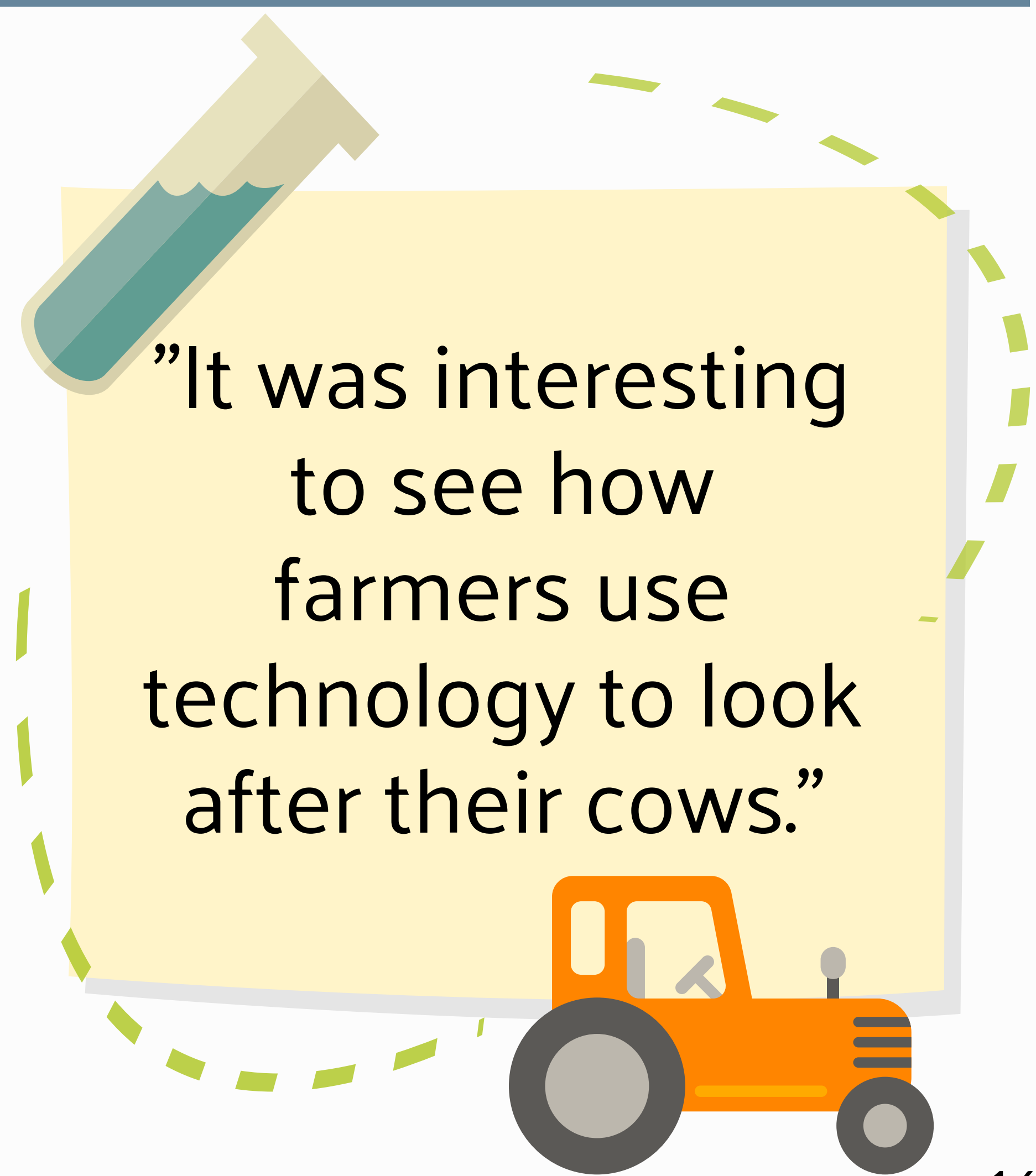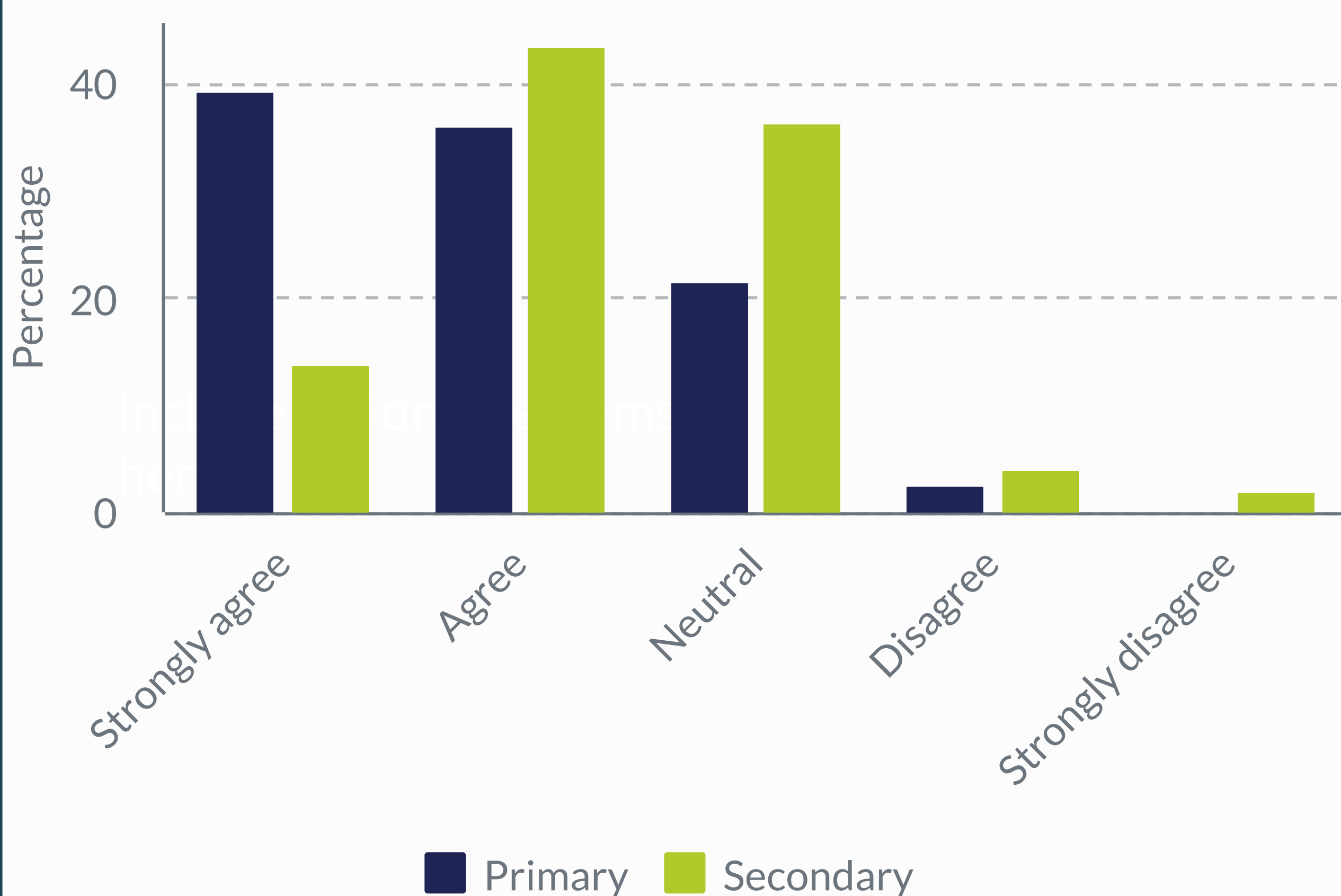

"It was very relevant to our kids, highly engaging and well planned. My group can be challenging to keep their attention, but there was absolutely no trouble doing that for both the sessions."
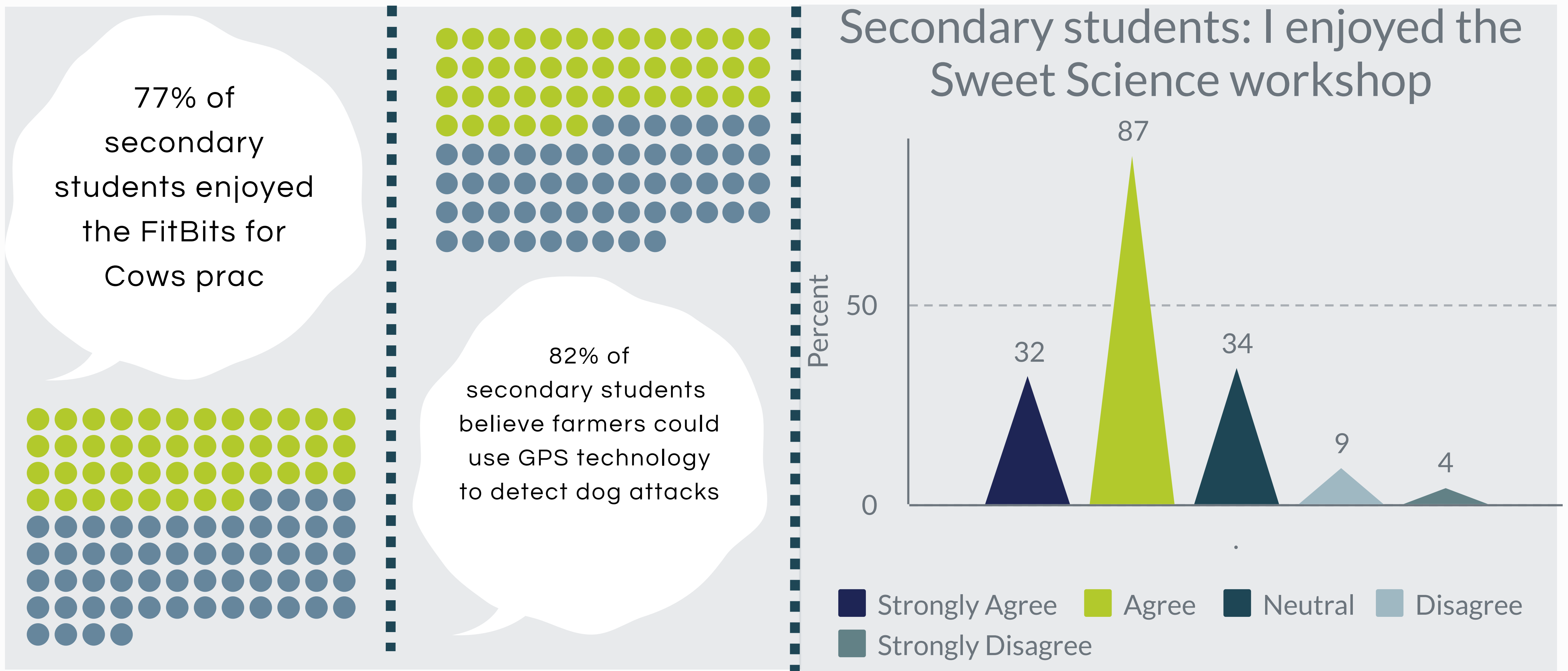- Teacher, Orbost
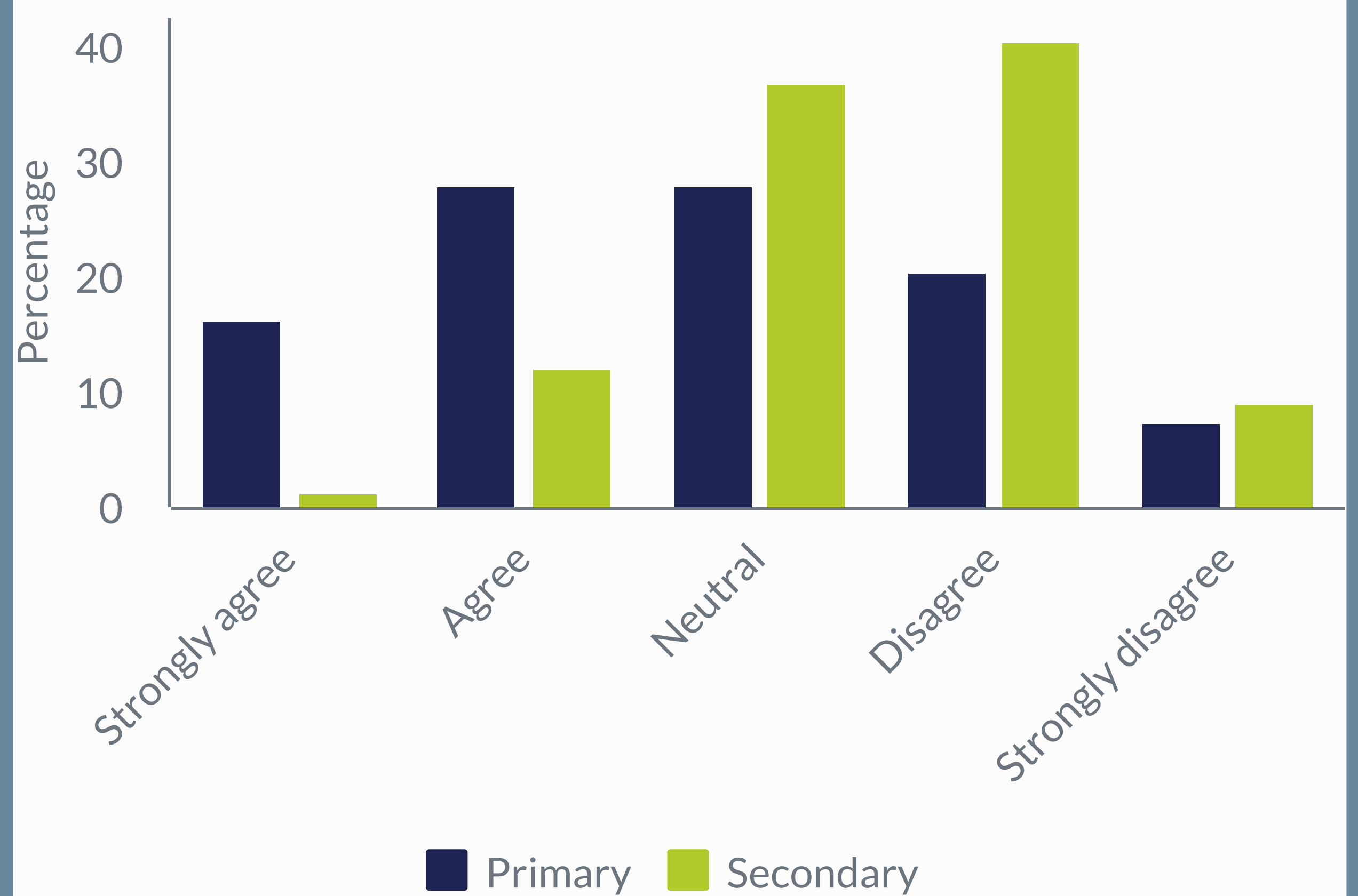
I believe the food and fibre industry is an important employer in Gippsland

"It was interesting to see how farmers use technology to look after their cows."

77% of secondary students enjoyed the FitBits for Cows prac

82% of secondary students believe farmers could use GPS technology to detect dog attacks

Secondary students: I enjoyed the Sweet Science workshop

Percent

- Strongly Agree: 32
- Agree: 87
- Neutral: 34
- Disagree: 9
- Strongly Disagree: 4

THE FUTURE

The Gippsland East Local Learning and Employment Network (GELLEN) partnered with the GIPPYAg project to administer the program. The GELLEN serves to support education and training for young people and build collaborative partnerships to benefit the community. One of the roles of the GELLEN is linking youth with educational programs or industry-specific training to ensure they are equipped with the knowledge and skills to pursue opportunities and pathways in their chosen field.

Due to East Gippsland being located within the food bowl of Victoria, they are passionate about involving young people in the industry to secure its future. The Roadshow is therefore an important program to support wider distribution of knowledge about the food and fibre industry to youth in the local area.

Project Coordinator Rachael Murphy from the GELLEN hopes the roadshow can be extended in 2020 to reach more students and schools within the region. "It is really valuable and important to keep the students in the more regional parts of our area engaged and excited about the direction agriculture is heading," she said.

The different learning styles and engaging activities were stated by some teachers as a strength of the program. Ms Murphy also received positive feedback from teachers, "The facilitators did such a great job, especially with the high school students who are a bit harder to work with, but they were all kept engaged which was really good."

Teacher at Lakes Entrance Primary School, Catherine Brooks, echoed Ms Murphy's sentiments: "I think most students don't see agriculture as a career pathway, so the roadshow gives them some different ideas and increases their understanding of the realities and work of farmers in their region," she said. "It's absolutely essential that students are aware of the opportunities and careers that are available in agricultural sectors as it's not something many of them are exposed to."

With positive feedback from the GELLEN, students and teachers it is hoped that the AgriTECH Roadshow will run again in 2020. There are two other LLENs in Gippsland, Baw Baw Latrobe and South Gippsland/Bass Coast. Following the high level of engagement of the Roadshow in East Gippsland, these LLENs have also expressed a strong interest in bringing the event to their regions. If the GIPPYAg project is extended it is anticipated that over 1500 students will be able to participate in the Agri-tech Roadshow.

The below word cloud shows the most common words used by students to describer their experience of the AgriTECH Roadshow.

CONCLUSION

This case study demonstrates the success of delivering interactive and engaging activities to educate primary and secondary students on emerging agri-food technologies and increase their awareness of the food and fibre industry.

The case study also highlights the extensive networking opportunities promoted by the GIPPYAg project between important stakeholders, namely teachers and the local LLEN's. The diverse range of student outcomes, teacher responses and industry feedback prove that the AgriTECH roadshow was successful in increasing student interest and awareness about the food and fibre industry, with enormous scope and interest to extend the benefits of the Roadshow to other areas of Gippsland.