Use of take-home ingredient kits to improve learning in a large online Brewing Science class

A-32

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Introduction & Background

FST 3124 has become the Food Science & Technology department's largest course. Currently, enrollment has increased 10-fold since its inception. Increasing class sizes necessitate a change in pedagogical approaches. This often results in less hands-on activities and demonstrations due to time, space, and cost limitations - in favor of replacement with educational videos. This can result in a disconnect to class material and student engagement. We hypothesize that providing students with ingredient kits for take-home experiments will enhance student's interest and improve their learning.

Materials & Methods
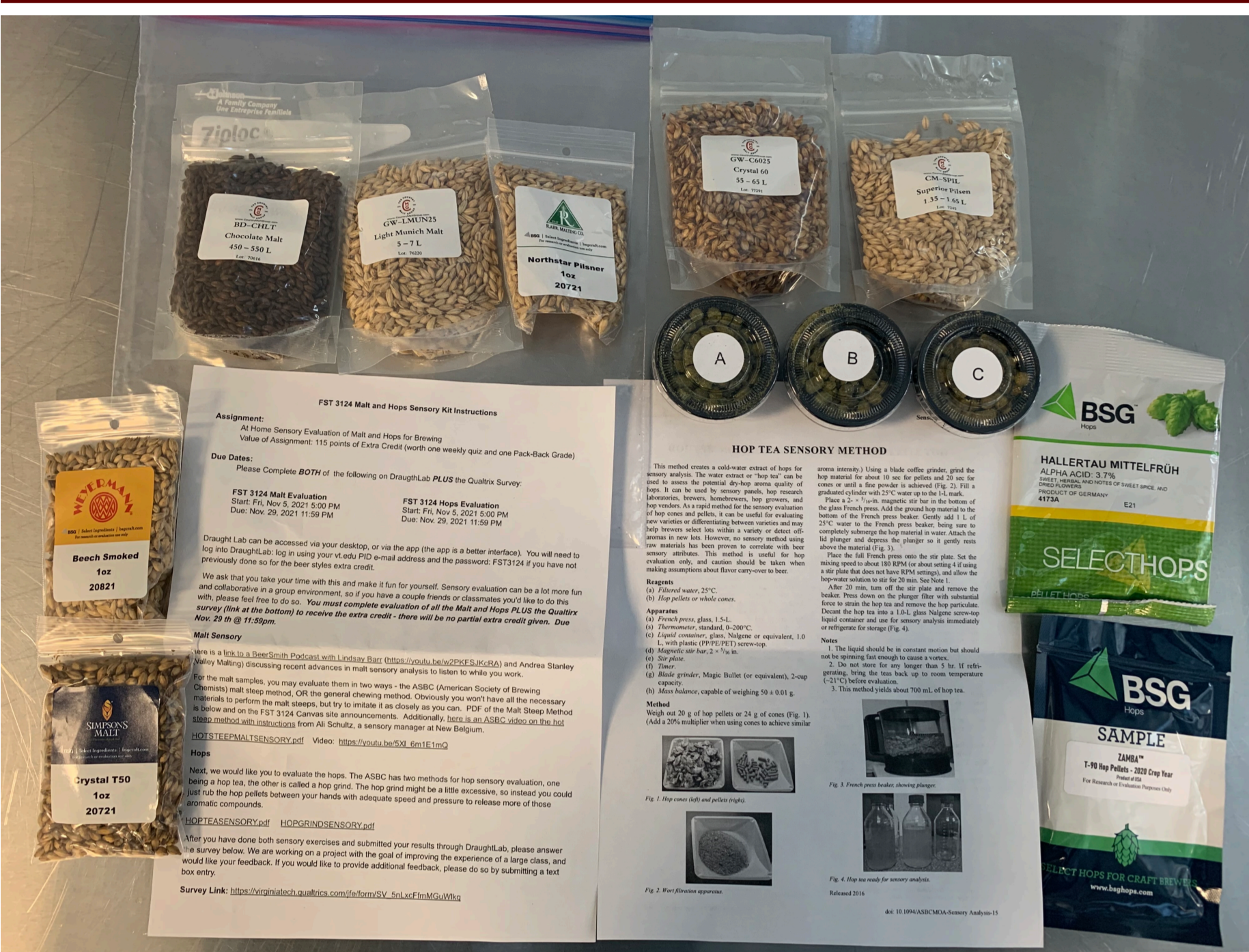
Malt Samples	Hop Samples
Superior Pilsen	Hallertau Mittelfrüh
Light Munich	Zamba
Chocolate	Sabro
Crystal 60	Mosaic
Northstar Pilsner	Citra
Crystal T-50	
Beech Smoked	

Table 1. Malt and hop samples provided in the kits.

DraughtLab qualtrics XM
Software used for data collection.

Figure 1. Take-home kits included 7 malts and 5 hop varieties. Assignment instructions and ASBC methods of analysis for hop tea and malt hot steep were included as well.

Students were given take-home experiment kits consisting of multiple malt and hop samples for evaluation purposes. They were also provided with official sensory methods developed by the American Society of Brewing Chemists (ASBC Sensory Analysis - 14, 15, 16)[1,2,3], as well as access to DraughtLab - a sensory software developed for the food and beverage industry.

Students were asked to evaluate the malt and hop samples based on the directions provided, and enter their observations into DraughtLab. Afterwards, they were asked to respond to a Qualtrics survey to answer general demographic questions and other questions relating to their experience with this assignment.

Completion of the assignment was optional, due to the fact that it was not included in the original syllabus. The take-home kits were distributed on Nov. 5 and the assignment was due Nov. 29.

The DraughtLab assignment used a description test, and asked students to rate visual, taste, and mouthfeel characteristics on a 4 point ordinal scale. It also asked for aroma descriptors of both malt and hop samples using a CATA design.

Results & Discussion

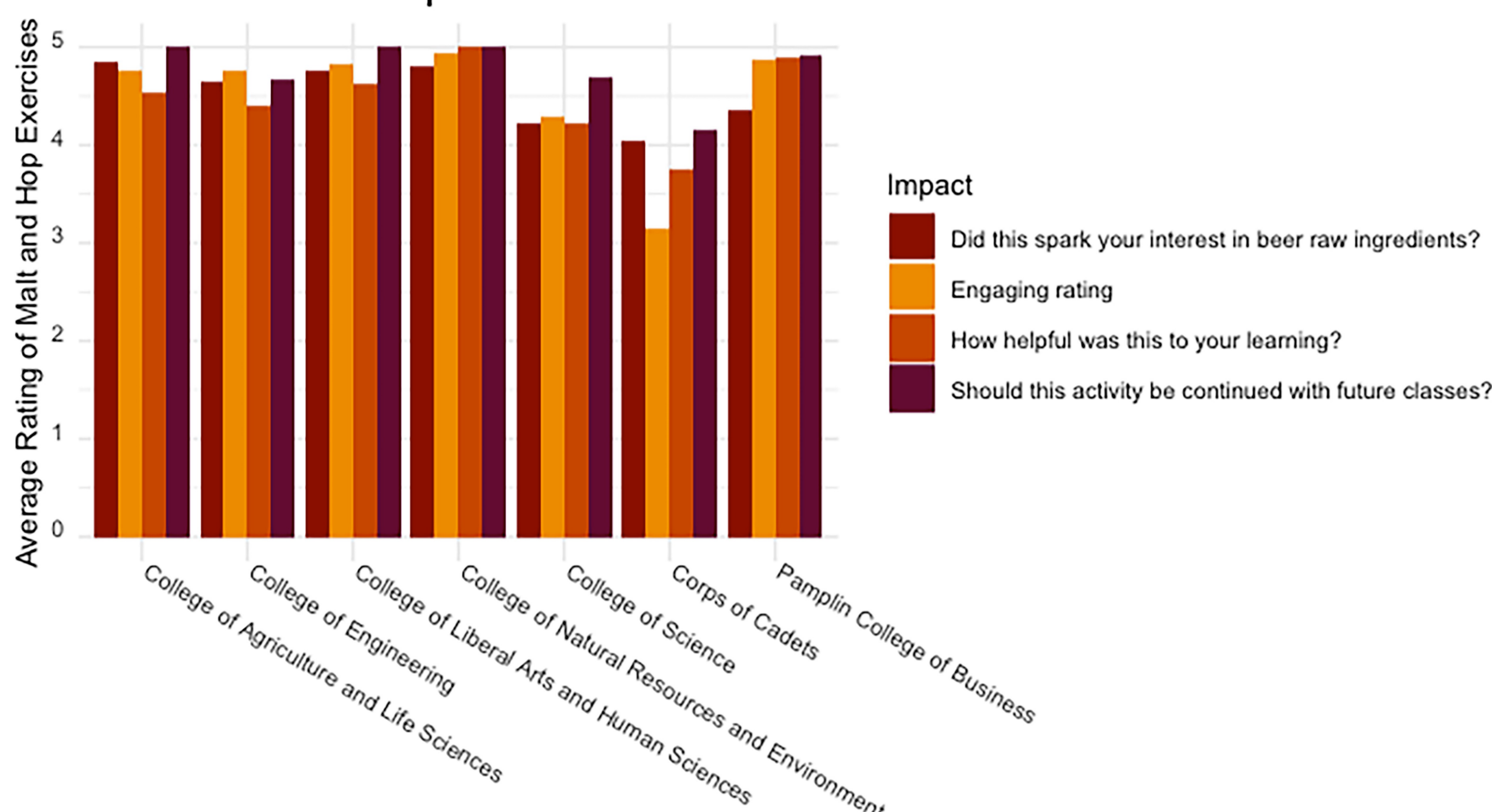### Educational Impact of Take-Home Kits

Figure 2. Educational impact of take-home ingredient kits. Values shown are an average of student's response to independent survey questions on impact of malt and hop samples. Scale ranges from 1 ("Not Very"), to 5 ("Very") – 3 being neutral. Responses show an inclusive learning environment to those from different educational backgrounds.

Objectives

❖ Promote an engaging and inclusive online learning environment that will allow students from different backgrounds to better understand the science of brewing.

❖ Expose students to the use of sensory lexicons associated with the evaluation of raw materials used in brewing.

❖ Increase student's ability to recognize and describe both desired and undesired flavors, and discuss the importance and contribution of raw materials to beer's flavor

Results & Discussion Cont.

Figure 3. Summary of distribution for the number of descriptors generated per student from hops samples. All samples had a lower limit of 1 descriptor, with the maximum number of descriptors being selected for Zamba at a value of 15. The mean between all hop varieties was 3.74 descriptors.
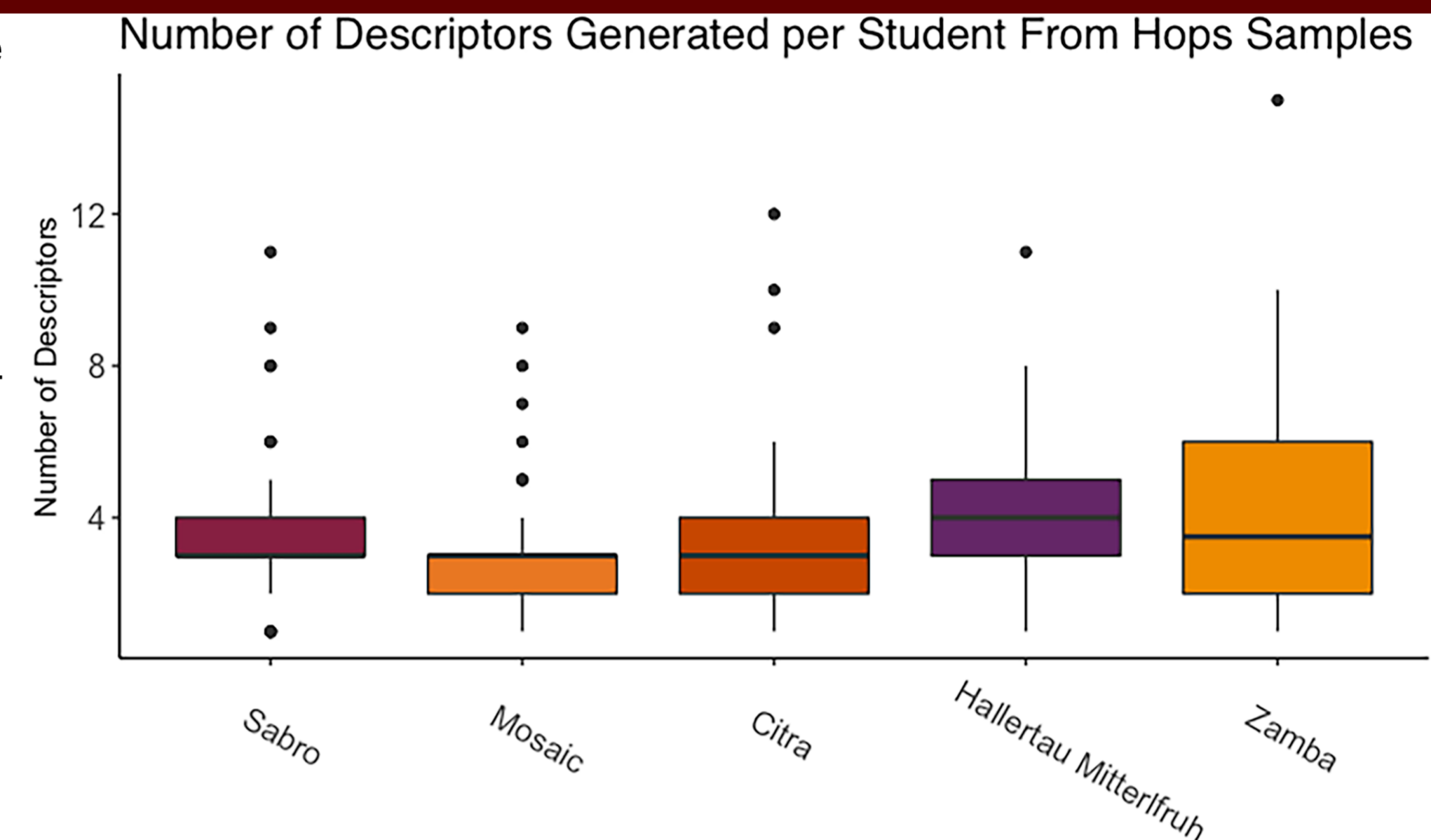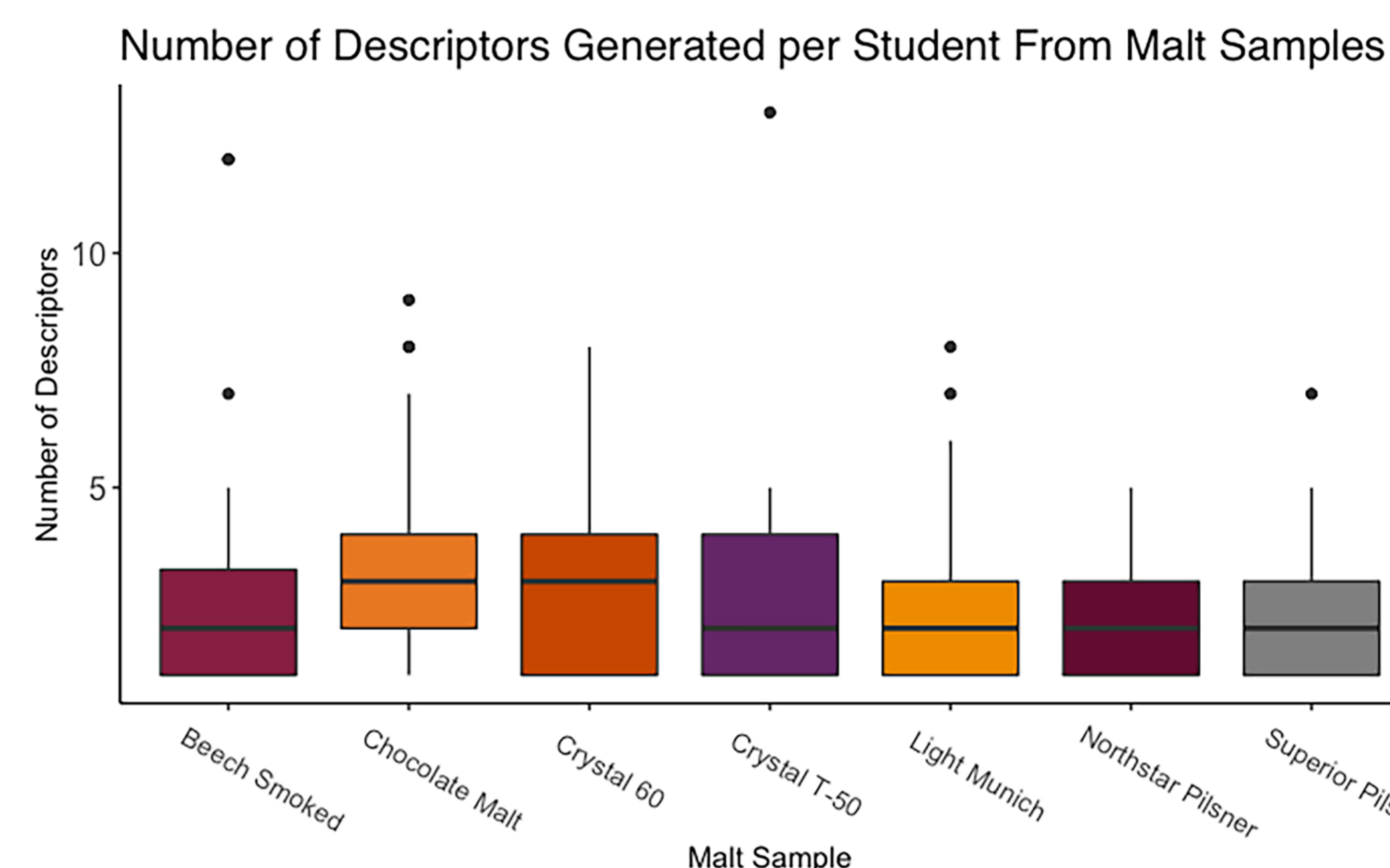
Figure 4. Summary of distribution for the number of descriptors generated per student from malt samples. All samples had a lower limit of 1 descriptor, with the maximum number of descriptors being selected for Crystal T-50 at a value of 13. The means were 2.72 descriptors for specialty malts, and 2.39 for base malts.

Method Followed	Student Participation
Malt Chew Only	26
Malt Hot Steep (and/or Chew)	9
Hop Rub Only	31
Hop Tea (and/or Rub)	3

Table 2. Approximate number of students that performed each ASBC method.

Overall, students had very positive responses to the use of a take-home kit for sensory evaluation. Students found that this was engaging, interesting, helpful to their learning, and almost across the board felt strongly that this was an activity that should be continued in the future.

On average, students only selected 3.74 descriptors for hop samples, and 2.75 for malt samples. Out of all responses, there were a total of 115 unique descriptors used for both specialty malts and hop samples; and only 50 unique descriptors for base malts. The DraughtLab software had a total number of 141 descriptor choices for specialty malts, 120 for hops, and 103 for base malts. The relatively low number of descriptors used per student may be due to the fact that less students participated in the malt steep and hop tea exercises than those who participated in just the chew or rub. Of the students who performed neither method, 75% of them claimed equipment constraints. These methods do require special equipment, such as coffee grinders, insulated water bottles, and a French press – which some students did not have access to at home.

Significance & Conclusions

Despite this exercise being well received by students, their wide variation in descriptor choice may indicate that there is still a learning barrier. Only 3 of 35 students who participated responded that they had any prior malt or hop sensory experience. Due to students being untrained in sensory evaluation, one could conclude that the DraughtLab software, originally designed for industry – presents too many options for them, resulting in an over selection of descriptors[4]. Student's also had what appeared to be a significant positivity bias to survey questions. This, and the low number of students that participated likely led to a negative effect on the accuracy of results.

Acknowledgements