



Technology Evaluation Report: Team Formation

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Note: This report summarizes outcomes of a specific UBC pilot. Findings do not reflect broader or official UBC opinions about the learning technology evaluated.

Goal

Team Formation is a homegrown UBC tool that helps instructors create student teams based on students' traits, skills, and preferences. Instructors ask students for this input using a customizable survey run in Canvas. Then instructors set how the survey input is used by the tool. Based on these instructor settings, Team Formation's Artificial Intelligence (AI) algorithm attempts to place the students into the most suitable teams for the course.

Once the teams are formed, instructors can review, visualize, and (if needed) manually adjust the team membership. Additionally, if instructors want to form new teams later, they can gather more input through a student peer assessment process with the current teams (i.e., students review their current teammates). The results of these assessments can then be used by the AI to generate a new set of teams.

Overall, Team Formation is intended to give instructors greater control over how teams are formed, to meet their pedagogical and diversity goals for group work. Team Formation may also help instructors better understand how teams work together—when student peer assessment is included—and improve teamwork in a course over time.

As a new and developing tool at UBC, Team Formation has a functional prototype available that integrates with Canvas and can create Canvas groups from the formed teams. As such, it was selected to pilot in the 2021/22 academic year in a handful of courses. This report will summarize the findings, with the aim of informing next steps for the tool at UBC.

Methodology

Six instructors provided feedback on Team Formation: three from the Faculty of Science, one from the Faculty of Medicine, one from the Faculty of Arts, and one from the Faculty of Education. The feedback was given in one-on-one virtual interviews (see [Appendix A.1](#) for the 17 questions used) with the evaluator, after the tool had been tried for a term or more.

Since students only interact directly with Team Formation if they are asked to do student peer assessments of their teammates, only the courses that used this feature gathered

student feedback. One course in the pilot ended up using it, and 15 students gave feedback through an anonymous, online survey (see [Appendix A.2](#) for the 12 questions used) at the end of that course's term.

Contexts of feedback

Instructor	Course(s) & Students	Team Formation Context
Instructor 1 Faculty of Education	First-year course <hr/> ~120 students	<ul style="list-style-type: none"> In this course's lab components, students work in groups of 3-4. The groups need to be different combinations for each lab (so students are working with new peers as much as possible), while combining students with similar work approaches. The instructor wanted to use Team Formation to create the four sets of lab groups, by using the students' preference of which peers they would want to work with ('friends') or avoid working with ('enemies'), personality traits, and work approaches; ultimately the instructor used only the peer preferences because students were not answering the other questions honestly. The instructor did not intend to use the peer evaluation feature.
Instructor 2 Faculty of Arts	Fourth-year course <hr/> ~17 students	<ul style="list-style-type: none"> In this interdisciplinary course, students work in groups of ~4 on three different assignments. The groups should mix students from different majors as much as possible. The instructor wanted to use Team Formation to create the sets of groups for each assignment, but ultimately used the tool to form the first two groups and only evaluate the third (these groups the students formed themselves). The instructor asked for each student's major / faculty, time availability, gender, and friends/enemies preferences, although it turned out students did not know each other well enough to provide meaningful peer preferences.

		<p>The peer evaluation feature was used and asked students to rate each other on a variety of accountability factors (e.g., did they meet work commitments, communicate, show up to meetings). Depending on the peer feedback received, a student may have gotten a bump up or down in their mark.</p>
<p>Instructor 3 Faculty of Medicine</p>	<p>Master's-level tutorials for two cohorts</p> <hr/> <p>~59 students ~64 students</p>	<ul style="list-style-type: none"> These tutorials are linked with a course and provide the opportunity for additional, self-directed study. Students meet in groups of 6-7 to discuss case studies with a facilitator. The groups are shuffled each term, so students get to work with new peers. The teaching team wanted to use Team Formation to create and later mix the groups to maximize diversity in gender, ethnicity, and undergraduate degree; align similar living locations (on campus or not); and minimize the same students working together in different groups. The teaching team did not intend to use the peer evaluation feature.
<p>Instructor 4 Faculty of Science</p>	<p>First-year course</p> <hr/> <p>~250 students</p>	<ul style="list-style-type: none"> In this course's lab component, students work in pairs, traditionally with whomever they sit next to. Halfway through the course, students have the option to get a new partner. The instructor wanted to use Team Formation to generate both sets of pairs, by using the students' friends/enemies preferences; ultimately, doing so did not work. The instructor did not intend to use the peer evaluation feature.
<p>Instructor 5 Faculty of Science</p>	<p>Fourth-year course</p> <hr/> <p>~90 students</p>	<ul style="list-style-type: none"> In this course, students work in groups of ~4 on a year-long project for an external client; there are multiple projects available and multiple groups may work on the same project. The instructor wanted to use Team Formation to create the groups based on each student's living location,

		skills, Grade Point Average (GPA), friends/enemies preferences, client project preference, and preferred team role. The groupings needed to match location and skills to the project preference, combine students with similar GPAs, account for peer preferences, and not overlap the role preferences in the same team. The instructor intended to use the peer evaluation feature, but ultimately could not figure out how it worked.
Instructor 6 Faculty of Science	First-year course <hr/> ~500 students, split into two sections	<ul style="list-style-type: none"> • In this course, students work in groups of ~5 on a term-long creative project that they come up with. The instructor wanted to use Team Formation to create the groups based on each student's preferred role, academic performance, personality traits (agreeableness, conscientiousness), gender, ethnicity, topics of interest, project type preference, and friends/enemies preferences. The groupings needed to mix the first six data points, match the second two, and take into account the peer preferences; but ultimately, doing so did not work. The instructor intended to use the peer evaluation feature, but was unable to move forward with it after the groupings did not work.

Findings

Instructor overall response to using Team Formation

During this pilot, instructors reported varied experiences: two instructors rated their overall experience as 'very negative', three as 'somewhat positive', and one as 'very positive'.

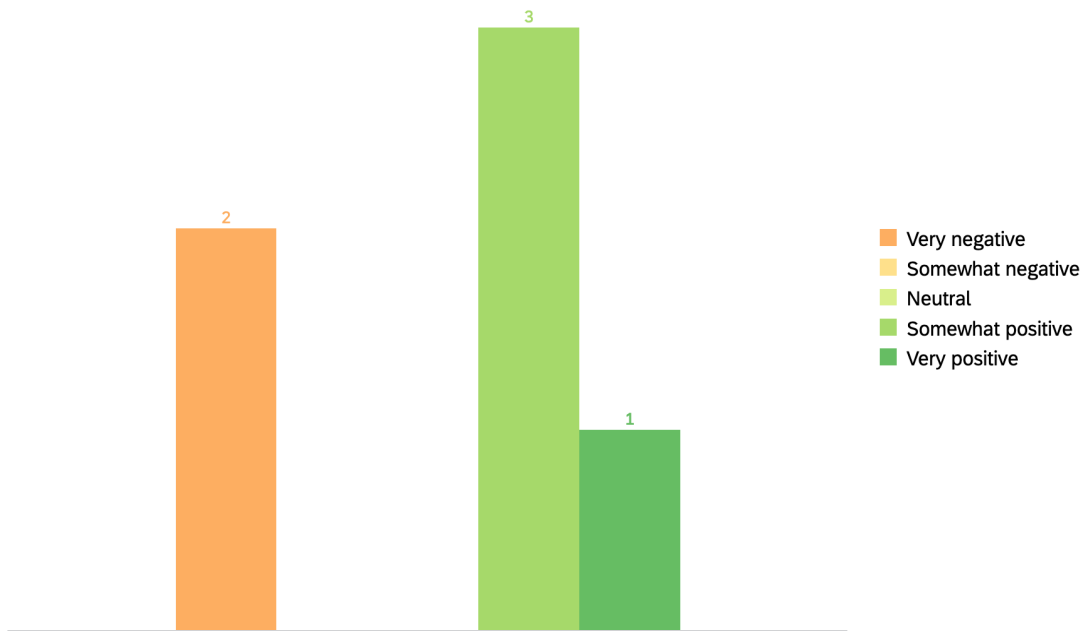


Chart 1: Instructor responses to overall experience with Team Formation (Appendix A.1, Q9)

In terms of ease-of-use, opinions were similarly mixed: one instructor rated Team Formation 'more confusing than easy', one instructor 'neither confusing nor easy', three instructors 'more easy than confusing', and one instructor 'very easy'.

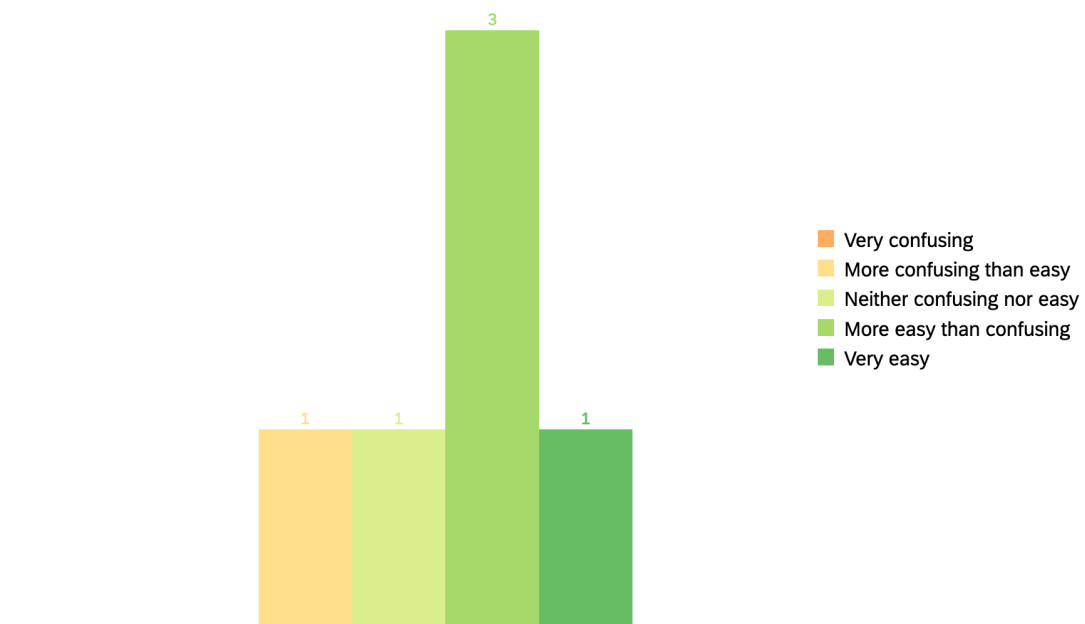


Chart 2: Instructor responses to how easy or confusing Team Formation was (Appendix A.1, Q13)

Instructor motivations for using Team Formation

Streamline the process of forming effective student teams

Forming teams can be a complex process, especially when instructors want to account for multiple student traits, skills, and preferences. Most instructors in this pilot had a manual process for forming teams, typically in spreadsheets—*"I can show you what this looks like, it's a house of horrors"*—and welcomed the idea of a tool facilitating the data collection and sorting for them. Using AI seemed like an efficient way to account for both their goals and the students' opinions, *"finding that middle ground between [students] forming their groups and us forming the groups"*, without as much overhead.

Increase student comfort during team formation

Several instructors also noted that students can experience significant discomfort when teams are being formed in a course. This stress may be caused by a variety of factors, like students wanting to be placed with at least one other of a shared minority status, wanting not to be placed with a specific problematic individual, or needing help finding peers if they *"don't have the social capital to find themselves a group"*. A tool could help alleviate this discomfort and *"not make it immediately awful"* for the students when starting group work.

Benefits instructors saw to Team Formation

Reduced the teaching team's time and effort when forming teams

Most instructors were pleased to see a reduction in administrative effort from using Team Formation—*"once you know how to use it, it really saves a lot of time"*. Teaching teams saved time by not having to solicit student input in one tool (e.g., a Qualtrics survey), sort that input in another tool (e.g., an Excel spreadsheet), and then add the outcomes as groups in Canvas. Importantly, some instructors said that the time-savings from using AI enabled them to add more factors when forming groups at scale—*"it elevated our game a lot"*.

A few instructors also felt they saved themselves significant stress by outsourcing the work to a tool. Manually, *“doing that process is an absolute nightmare”* of tedious and repetitive activity. Especially for those without a teaching assistant and/or with multiple factors to consider, the extra help was a relief. It let instructors feel like *“I didn't waste my time”* on an administrative task, so they could focus back on teaching.

Offered flexibility in how teams can be formed

Several instructors pointed to the flexibility of Team Formation as another benefit. Being allowed to create custom attributes for the student surveys meant *“being able to create the teams according to any characteristic I want”*. Instructors preferred this versatility to having fixed attributes to choose from in the tool.

Helped reduce some complaints with student teams

One instructor noted that, after using the tool, it seemed *“we got fewer complaints”* from students compared to previous years when *“there seemed to be more issues”*. This instructor hoped that Team Formation—and in particular, the ability for students to select friends/enemies preferences—was responsible for the difference, so the improvement could be replicated in subsequent terms.

Drawbacks instructors saw to Team Formation

Presented technical issues that decreased tool use

Most instructors encountered technical issues with Team Formation in varying degrees, which forced them to pivot in how they intended to use the tool.

- One instructor had hoped to use Team Formation in a second course, but at the time of needing to form the groups for that course, the tool was unavailable. Additionally, for the course that this instructor did use Team Formation in, one of

the surveys had to be taken by students twice. The first time, the drop-downs for friends/enemies preferences were not populated with any peer names¹.

- One instructor planned to use the tool three times in the course, but decided not to use it for the last set of groups. Part of the reason was that the tool kept including students who had since dropped the course (and had to be manually removed from the groups each time). And generally, it *"seemed to be kind of buggy"*, which was understandable for a pilot, *"but it did kind of make my work disappear a few times"*.
- One instructor set up the tool as intended, to group students based on peer preferences. However, upon releasing the results to students, the instructor received *"a flurry of messages"* saying that the pairings had put students with the person they specified not to be partnered with or had failed to put them with the one person they wanted to work with (who had requested them too). After checking in the tool, *"it was very clear they were right"*², and the instructor *"had to pull the plug"* on using the tool, feeling *"I had invested enough time to get the tool to just work"*.
- One instructor was able to run the survey but initially *"couldn't see the graphs"* for visualizing the team distributions, which *"I thought was important"* in verifying the teams. By the time this issue was resolved, the teams had already started on their group work. This instructor also planned to use the peer evaluation feature, but *"it was unclear how this was incorporated"* in the tool.
- Finally, one instructor set up the tool as intended and had students take the survey. When it came time to use the data, *"it failed utterly"*, due to a problem between Team Formation and Canvas³. This course was a large one, with a long survey the students had already taken and no time to wait for resolution—*"it was a bad time for things not to work for me"*. The instructor had teaching assistants form random groups and could not use the peer evaluation feature as planned.

¹ This bug has since been resolved by the Team Formation development team.

² The development team has asked for more details from the instructor to investigate this issue further; however, at the time of writing those details were still forthcoming.

³ The resolution to this issue depends on changes to Canvas's end (the data retrieval fails due to the size of the course), complicating the ability of the development team to make a timely fix.

All that said, most instructors also expressed an optimistic view that the tool would improve over time—*“if I used the tool right now, I’d probably have a better experience”*—and that the development team would be responsive to any new issues raised.

Missed some functionality that could have eased instructor use

Another area where most instructors had critical feedback was around functionality that would have eased their use of the tool.

- **Self-evaluation:** Team Formation allows for teammates to evaluate each other, but not themselves. Several instructors wanted to include self-evaluations—*“I always do self-evaluations, that’s standard for me”*. The instructor who used the feature also would have liked to have more standard question formats to choose from, like Likert scales, and to let students *“evaluate the team members in relation to each other”* (i.e., to include a division of labour question).
- **Automatic section creation:** A couple of instructors noted that courses with multiple sections did not create matching multiple sections in Team Formation automatically; all students were instead put into one course. This lack of synchronization added manual overhead to setting up, as *“there’s a lot of fiddly details to try to make sure students are in their own sections”*.
- **Student weighting of attributes:** A couple of instructors said students wanted to weigh their preferences when taking the survey. As a workaround, students emailed the instructor or teaching assistant to stress *“hey please take into account my preferences”* in a specific way. This external messaging added to the workload and processing for the teaching teams.
- **Automatic team shuffling:** A couple of instructors could not determine if there was a way to have each new set of teams take into account the previous sets of teams in the course. One instructor *“ended up doing a lot of manual re-adjustment”* to make shuffling happen and would have preferred *“a function that tries to produce different groups than last time”*, without requiring input from the instructor or the students.

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- **Survey preview:** Finally, one instructor raised an issue with the inability to preview the student survey before making it live in the Canvas course. This instructor *“can't put something up there without students finding it”* right away⁴ and felt uncomfortable without any confirmation beforehand that the survey would look right.

Other, more minor suggestions from instructors included letting them re-use attributes and evaluations across multiple courses, having the drop-downs of student names sorted alphabetically (especially for large courses), and providing a granular view of the peer evaluation outcomes for each student (not just a summary).

Required more time to configure use cases than expected

As noted earlier, most instructors hoped for time-savings from using the tool. While many expressed satisfaction in this area, several also felt the workflow still took longer than necessary—*“the tool just felt like it asked for too much”*, especially for simpler use cases. Feelings here impacted some responses to the tool's ease of use (Chart 2).

This perception of extra steps was partly driven by uncertainty over the required workflow—*“the order of operations was unclear to me”*. Uncertainty arose from not immediately understanding all the terminology in the application interface (e.g., project, project set, survey, attribute) or the relationships of these things to one another. Some instructors *“had to try things out to see what it did”* to get a better understanding.

At the time of the interviews, questions remained:

- Do you always have to make projects to use Team Formation?
- Where do project set names show up? / How should these be labeled?
- How do the projects relate to groups?
 - If multiple groups will be working on the same projects, how should this be reflected in the configuration? / Is there any way not to have duplicated projects?
- Can previous groups in any way be automatically used to form new groups?
- At what point are attributes supposed to be created?

⁴ By default, students are notified by Canvas about new content in the course.

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- Is there any way to create attributes that don't need values?
 - What can be edited or not, after you set it up (e.g., when can attributes be added or updated, can project set names be changed)?
 - How are surveys closed?
 - When and where should the peer evaluations be set up?

Student overall response to using Team Formation

In using Team Formation during this pilot for peer evaluations, student experience⁵ was mixed: one student rated the overall experience as 'somewhat negative', five as 'neutral', one as 'somewhat positive', and eight as 'very positive'.

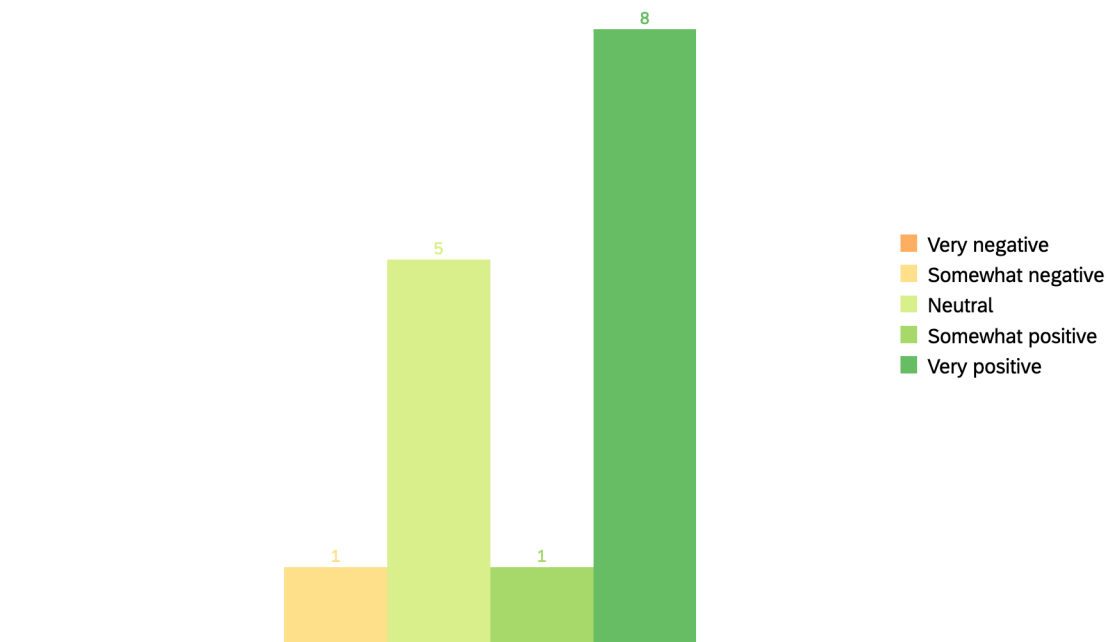


Chart 3: Student responses to overall experience with Team Formation (Appendix A.2, Q3)

Students generally found Team Formation easier to use than not: one student rated it as 'very confusing', three students as 'neither confusing nor easy', and eleven students rated it as 'more easy than confusing' or 'very easy'.

⁵ Based on the comments, some of these ratings likely reflect a judgment of the questions asked rather than the tool itself. It is not specified for students what elements of the Team Formation interface are ones that instructors can customize.

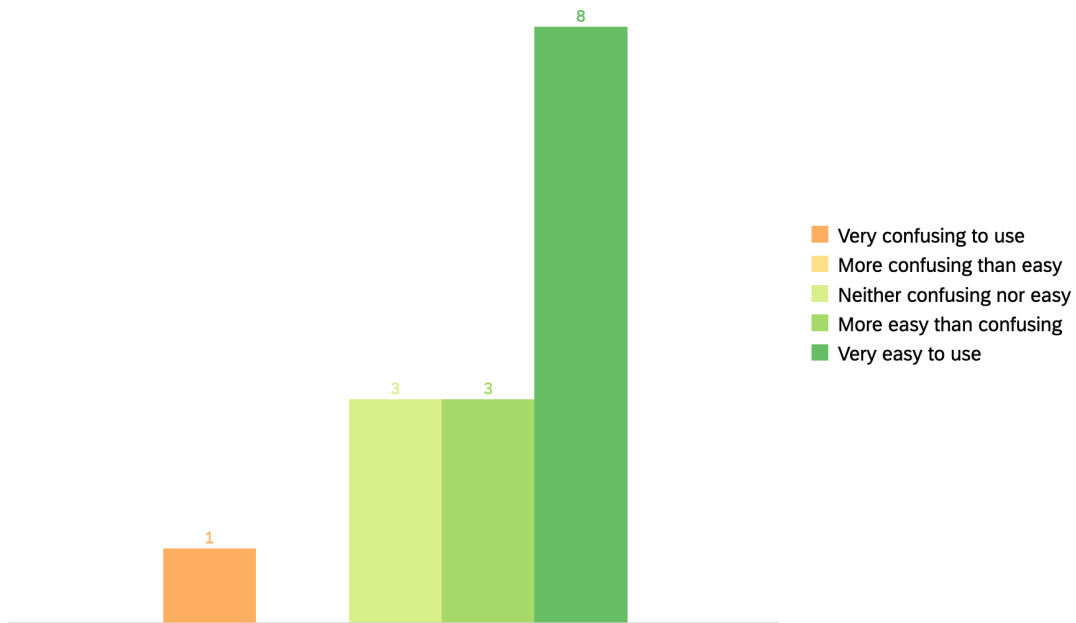


Chart 4: Student responses to how easy or confusing Team Formation was (Appendix A.2, Q2)

Seemed simple to use

Students largely reported that Team Formation was *“simple and straightforward”* to use for peer evaluation. One student could not find where to complete the evaluation, though it was unclear if this was due to a bug or not (*“I clicked into Peer Evaluations and it says that ‘No peer evaluations are found’⁶”).*

May have benefitted from some survey adjustments

Some students suggested changes (e.g., more options, fewer text fields) to the specific survey they were asked to take for the peer evaluation. But since questions in Team Formation are customizable by the instructor, these suggestions do not reflect anything that would need to be changed in the tool itself.

⁶ This student was put in touch with the development team for resolution.

Recommendations

Based on this pilot's outcomes, the following are recommendations for how Team Formation could best be implemented at UBC to maximize its perceived benefits and minimize its perceived shortcomings.

1) Continue to surface and address technical issues in live courses

May address	<ul style="list-style-type: none">• Technical issues that decreased tool use
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Ensuring that Team Formation can work reliably for instructors and students is key to a positive and effective experience for everyone. Having the development team continue to test the tool outside of this formal pilot can help surface issues that need to be resolved—whether by the team or by Canvas. Piloting can also help the team map out clear troubleshooting, testing, and escalation workflows.

2) Solicit more instructor feedback to improve the workflows for all

May address	<ul style="list-style-type: none">• Missing functionality that could ease instructor use• More time to configure use cases than expected
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A couple of instructors thought it would be helpful for the development team to *"watch people go through the process of setting up"* their course in the tool. Observing the process with different use cases could help them *"notice things like the misconceptions or not understanding the relationships"* as well as workflow inefficiencies (e.g., having to manually set up multiple course sections).

One instructor stressed that this consultation should be done *"not just within applied sciences or computer science"*, but with faculty from different disciplines. Including diverse voices could help build the tool (and/or documentation) in a cross-disciplinary way, with language and processes that resonate with everyone.

3) Develop documentation explaining how-to steps and best practices

May address	<ul style="list-style-type: none">• More time to configure use cases than expected
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Another way of assisting instructors with the Team Formation workflow would be to have documentation for reference. Instructors suggested that this documentation cover several aspects of the tool:

- Define core terms.
- Detail the required workflows with step-by-step instructions.
- Share previous use cases as examples (*"I would benefit from knowing other instructors' experiences"*).
- Suggest any best practices for forming teams (e.g., what questions / attributes are best? how do you encourage students to answer questions honestly?).
- Provide a clear contact point for further questions and help.

4) Allow more common student data to be used in development

May address	<ul style="list-style-type: none">• More time to configure use cases than expected
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A final way of improving the workflow for instructors would be to allow more of the commonly desired data (e.g., students' faculty, major, year) to be pulled into the tool from existing data sources. Even if instructors cannot view this data on a student-by-student basis, not requiring them to set up the questions—or requiring students to give answers—would save everyone time.

Allowing use of this data would not mean open access for everyone; access would still require data requests that detail who will see the data, how it will be handled, and how it will be used. The Learning Technology Hub could use this opportunity to work through policies with data governance groups at UBC and figure out how best to operationalize an approach.

5) Discuss an innovation incubator for homegrown learning tools

May address

- Pathway toward non-pilot use

Although instructors are currently able to form teams without a dedicated tool to support them, this pilot highlighted the desire for a better process, one that could potentially be facilitated through a new tool. However, as also demonstrated by this pilot, making such a tool is a complex effort that requires ample time to iterate.

Presently, homegrown tools at UBC can reach the end of their iteration timeline before they are ready for central support and rollout. It would be good to consider what opportunities for funding and resources are available (or could be made available) to take tools through an “incubation” period following their initial development. This period would give tools like Team Formation more time to find their audience, allow development teams to adapt better to feedback, and set up innovative ideas with a stronger chance of success.

Appendices

Appendix A - Instruments

A.1) Instructor interview questions

1. Which course(s) did you use Team Formation in, and what was the final enrollment in each?
2. What was the context of the group work (e.g., what was the work, how big were the groups, were groups consistent over the term or were different groups formed within the term, did groups use peer evaluation)?
3. What student attributes did you use to create the groups?
4. Which, if any, attributes resulted in stronger teams for your course? If you have any evidence or student feedback to support this, please share below.
5. If relevant, what questions did you use to have students evaluate their group?
6. If relevant, what questions did you use to have students evaluate other groups?
7. How did you train students (pedagogically / technically) to use Team Formation?
8. How, if at all, did Team Formation outcomes impact how you graded students?
9. Please rate your overall experience with Team Formation.
 - a. Very negative
 - b. Somewhat negative
 - c. Neutral
 - d. Somewhat positive
 - e. Very positive
10. What, if any, were the benefits you saw to using Team Formation?
11. What, if any, were the drawbacks or limitations you saw to using Team Formation?
12. How did Team Formation compare to ways you've formed groups in the past?
13. How confusing or easy was Team Formation to use?
 - a. Very confusing
 - b. More confusing than easy
 - c. Neither confusing nor easy
 - d. More easy than confusing
 - e. Very easy
14. Why did you choose the rating above?
15. Please rate how much you disagree or agree with the following statements.

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- a. Team Formation's capabilities met my requirements for creating student groups: Strongly disagree / Disagree / Agree / Strongly agree / N/A
 - b. Team Formation enabled me to achieve something not possible with other available technology: Strongly disagree / Disagree / Agree / Strongly agree / N/A
 - c. Team Formation made my group formation process more efficient: Strongly disagree / Disagree / Agree / Strongly agree / N/A
 - d. Team Formation helped me create student groups that were balanced and effective: Strongly disagree / Disagree / Agree / Strongly agree / N/A
 - e. Team Formation helped me improve the student groups during the course: Strongly disagree / Disagree / Agree / Strongly agree / N/A
 - f. I would use Team Formation in my future courses: Strongly disagree / Disagree / Agree / Strongly agree / N/A
 - g. I would recommend Team Formation to my colleagues: Strongly disagree / Disagree / Agree / Strongly agree / N/A
16. What 1-3 things could be changed about Team Formation to help you use it effectively in your course?
17. Is there any other feedback you'd like to provide about using Team Formation? Or anything else you think other instructors or students should know about using it?

A.2) Student survey questions

1. Which course did you use Team Formation in?
2. How confusing or easy was Team Formation to use?
 - a. Very confusing to use
 - b. More confusing than easy
 - c. Neither confusing nor easy
 - d. More easy than confusing
 - e. Very easy to use
3. Please rate your overall experience using Team Formation.
 - a. Very negative
 - b. Somewhat negative
 - c. Neutral
 - d. Somewhat positive
 - e. Very positive
4. What, if anything, did you like the MOST about using Team Formation?

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5. What, if anything, did you like the LEAST about using Team Formation?
 6. How helpful or not did you find Team Formation's setup for the following?
 - a. Completing evaluations of peers in my team: 5-point scale 'Not at all helpful' to 'Very helpful' / N/A
 - b. Receiving the results of my team's evaluation of me: 5-point scale 'Not at all helpful' to 'Very helpful' / N/A
 7. If you have comments about any of your choices, please share below.
 8. Now please rate how much you disagree or agree with the following.
 - a. Team Formation was useful to me in this course: Strongly disagree / Disagree / Agree / Strongly agree
 - b. Team Formation helped me fairly evaluate the peers on my team: Strongly disagree / Disagree / Agree / Strongly agree
 - c. I would recommend that Team Formation be used in this course in the future: Strongly disagree / Disagree / Agree / Strongly agree
 - d. I would recommend that Team Formation be used in other courses at UBC: Strongly disagree / Disagree / Agree / Strongly agree
 9. If you have comments about any of your choices, please share below.
 10. Please rate your satisfaction level with your team(s) in this course.
 - a. Very dissatisfied
 - b. Somewhat dissatisfied
 - c. Neutral
 - d. Somewhat satisfied
 - e. Very satisfied
 11. Why did you choose the rating above?
 12. Is there any other feedback you'd like to provide about Team Formation?

Appendix B - Additional Data

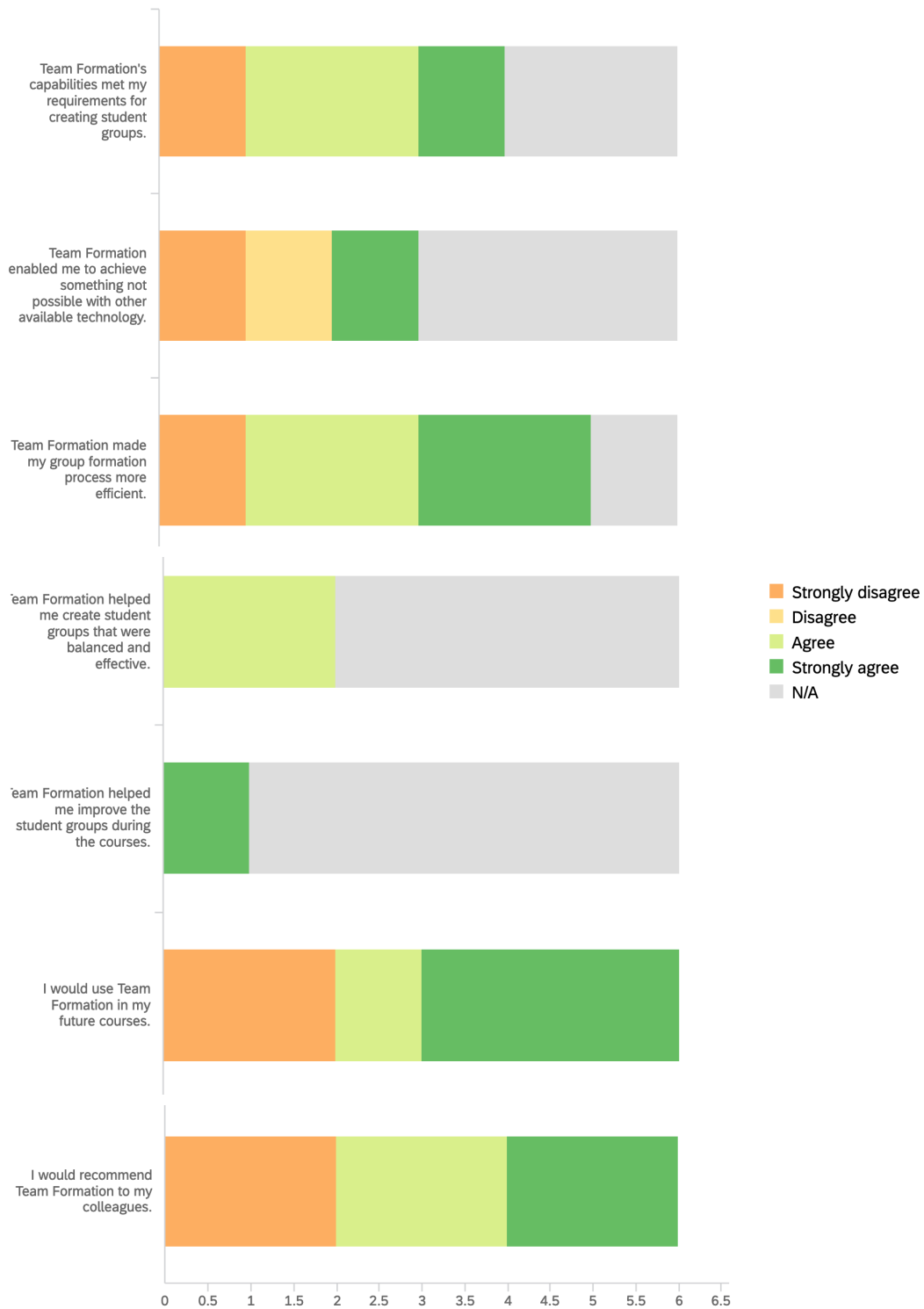


Chart 5: Instructor responses to Team Formation statements (Appendix A.1, Q15)

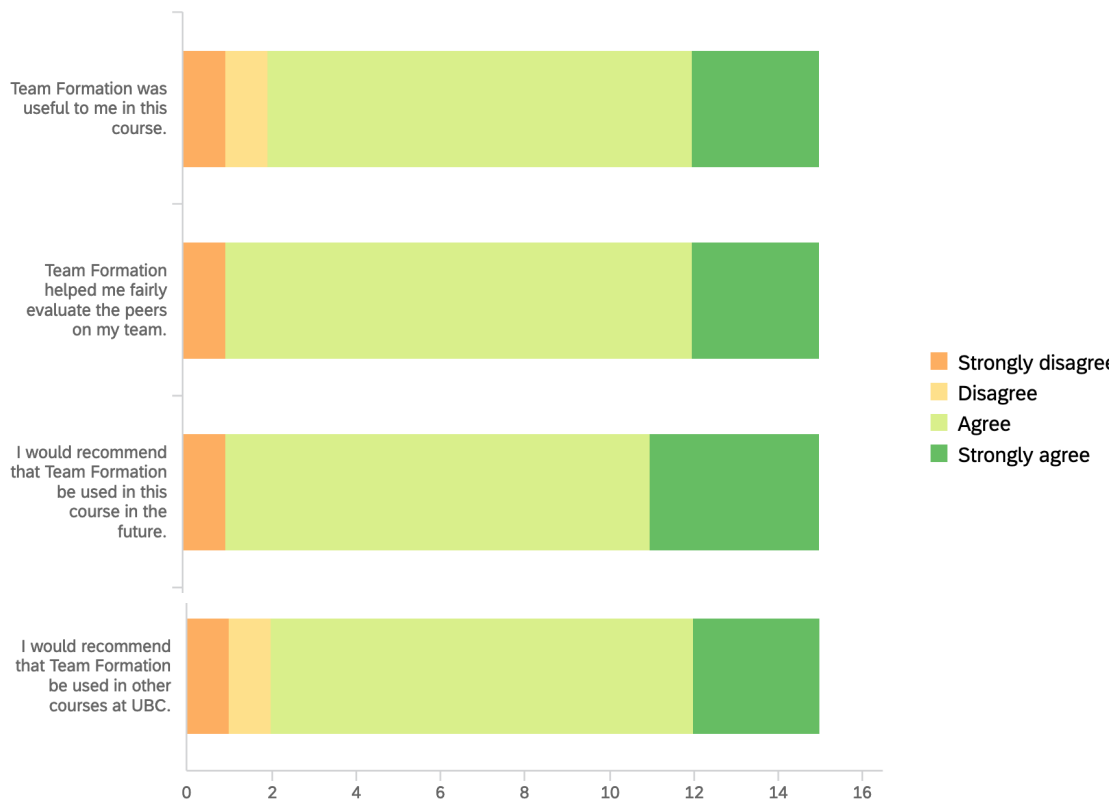


Chart 6: Student responses to Team Formation statements (Appendix A.2, Q8)