Generalist Designers, Specialist Projects: 
Forming Multidisciplinary Teams That Work

Katja Fleischmann
James Cook University
Townsville, Australia

Abstract. Designing interactive media is a highly dynamic activity with many projects involving extensive use of technology and collaborating with information technology experts. Digital media design students therefore need to be prepared for a volatile technological future and need to learn to work with others. However, few educators provide a rationale for managing multidisciplinary teams in undergraduate design education in terms of size, team building processes or, determination of skills, abilities and knowledge of students. Multidisciplinary teamwork can be messy when undergraduate students are thrown into the deep end of teamwork. It is suggested that collaborations between students from different disciplines need to be managed not only during the collaborative design process but also during the formation of teams. Being satisfied with the placement in a multidisciplinary team would allow students to focus on the acquisition of new and specialised skills and apply those skills as part of a functional team to a project. This research therefore explores what team building strategies will build effective multidisciplinary teams in undergraduate design education. Two team building strategies (structured educator-led and semi structured Speed Dating) were developed and trialled in two digital media design subjects over a period of three years. Design students have provided feedback via an online survey. Quantitative and qualitative data were analysed to explore the degree to which students were satisfied with team placement and the effectiveness of activities that were developed to support the team forming process.

Keywords: undergraduate design education; T-shaped graduate; multidisciplinary collaboration; teamwork, team building

Introduction
Designing interactive media is a highly dynamic activity with the majority of digital media design projects involving extensive use of technology and information technology (IT) expertise. Designers must confront an increasingly complex technological environment. Emerging technologies create a variety of new opportunities for designers, but often require designers to collaborate with other
discipline experts to fully explore their potential. Digital media design students therefore need to be prepared for a volatile technological future and need to learn to work with others. Some institutions deal with this situation by teaching design students computer programming or offering double degrees that cover design and IT. The author’s institution facilitates flexible multidisciplinary collaboration for undergraduate digital media design students whilst promoting the simultaneous acquisition of discipline-specific skills (Fleischmann, 2010). That means students have more time and can specialise in design and build an understanding of other disciplines (e.g. IT) to be able to communicate and collaborate effectively. This approach has evolved in a context that increasingly requires design graduates to be ‘both solidly specialised and flexibly generalised’ (Hunt, 2011, p. 87) (Longbottom et al., 2007; Friedman, 2012). Graduates need to be prepared to approach the increasing complexity of digital media design projects and the changing technological future as part of multidisciplinary teams.

The Future Digital Design Graduate: Generalists Collaborating on Specialist Projects?
Design educators, organisations and employers have articulated the demand for T-shaped design graduates who possess specialist knowledge in one or two areas, a broad understanding of other areas and who have the ability to collaborate with others from diverse disciplines (Fleischmann, 2014). The stem of the ‘T’ represents specialist knowledge of one or two areas and the horizontal bar stands for a broad understanding and curiosity about other areas and an ability to collaborate across the disciplines (Design Council, 2006; Harris, 2009; Hansen, 2010). Some see the T-shaped graduate as having the ‘capacity to respond to changing conditions, anticipate future technologies and re-define their practice’ (Triggs & John, 2004, p. 427) and in particular when working in multidisciplinary teams (Bennett, 2009; Ligon & Fong, 2009; Davis, 2011; Hunt, 2011).

How is Multidisciplinary Teamwork Managed in Design Education?
Multidisciplinary collaboration occurs when people from different professions or disciplines with varied skills and experiences complement each other when working toward achieving a common objective. Within the context of design education, a multidisciplinary design project can give students a new way of thinking and the opportunity to create innovative outcomes. For instance, the collaboration between design and IT provides a very diverse environment that forces students to explore the nature of their own practice and that of other disciplines, and to understand their own role and value in collaborative projects (Fleischmann & Daniel, 2013). Such collaborations are often complex, and management of multidisciplinary teamwork in practical terms, particularly in undergraduate education, leads educators in to the unknown.

Few educators provide a rationale for managing teams in terms of size, team building processes or, determination of skills, abilities and knowledge of students who are collaborating. The method of grouping students in teams is frequently unclear. In some cases student selection for participation in a project
appears to be done at random with only the different expertise or geographical locations (mixing students from schools in different locations in case of online collaboration) driving the process (DiPaola, Dorosh & Brandt, 2004; Brown, Lee & Alejar, 2009; Nicole & Kreidler, 2013). In some cases, students had considerable responsibility and autonomy for building and managing their teams on the multidisciplinary collaboration journey (Abu-Mulaweh, Oloomi & Voland, 2004). Students often experience a certain ‘messiness’ when thrown into the deep end of multidisciplinary teamwork in this way (Rothstein, 2002). At times educators downplay this outcome as being similar to real life experience.

Some educators engage students in team exercises for the purpose of team bonding and communication. This allows team members to share values, thought processes and motivations. For example, Nicole and Kreidler (2013) note that the students found the session entertaining and a great boost to their team morale. Such high levels of motivation made it easy for the educators to manage the teams. Other educators report unequal contributions by some team members (Dong & Spiliotopoulou, 2010) or the devaluation of a particular discipline’s tasks and input within the team (Brown, Lee & Alejandre, 2009). This suggests that students lacked understanding of the importance of each disciplinary contribution in the collaborative process.

Overall there is no clear strategy for educators to follow when facing the task to form multidisciplinary teams in undergraduate design education. Getting multidisciplinary teams to work effectively and building an understanding of other disciplines in students can be a challenging. This is in particular the case when students from disciplines with different subject cultures work together. They have a diverse ‘community of practice’ (Wenger, 2006) that lacks a common language. For example Design and IT have different work methods, different learning approaches and different ways of completing projects. Specific team forming processes and team activities might help building such understanding and placing students satisfactorily in multidisciplinary teams. This research therefore explores what team building strategies can help building effective multidisciplinary teams in undergraduate design education.

Building and Managing Multidisciplinary Teams: An Australian Case Study

The Bachelor of New Media Arts is a three-year programme for students majoring in Digital Visual Arts, Digital Sound, Digital Imaging or Digital Media Design. Students also select a minor from these areas to support the education of a T-shaped graduate. A study year consists of two 13-week semesters with four subjects studied in each semester. Each subject consists of 13 hours of lectures, 26 hours of tutorial or practical work in the computer lab, and requires students to engage in self-directed learning outside class.

Digital media design students are educated for employment in the highly dynamic, interactive media design industry. The degree program aims to prepare students for the changing environment they will encounter in the workplace. In order to foster students as confident, self-directed learners who
are able to stay abreast of new technological and industry developments, it is necessary to equip students with skills that will allow them to connect and work with others, in particular, with people from disciplines with a different subject culture (e.g., information technology). This will enable digital media design students to initiate, direct or be part of the development of interactive media projects regardless of the expertise required to produce them in the future.

During the three years of study, students progress from introductory subjects such as graphic design and information design to advanced subjects such as web design and interactive media design. The latter subjects have more complex production needs requiring depth in more than one discipline, hence are particularly suited to the introduction of multidisciplinary collaboration. This paper describes team forming strategies and supporting team activities in two subjects which are *Introduction to Web Design* and *Interactive Media Design*. Students study the subjects in semesters three and five of the degree.

**Factors Influencing the Development of Team Building Strategies**

Both subjects, *Introduction to Web Design* (referred to as Web Design) and *Interactive Media Design* (referred to as Interactive Design), require students in the media design major to acquire new knowledge and skills in an area in which they have no prior experience (e.g., learn how to design and develop a website) and simultaneously apply this knowledge within a multidisciplinary team situation. This is demanding for students. Leaving at the same time the forming of teams in the hands of students (hence throwing them in the deep end of multidisciplinary teamwork) is most likely to create additional stress and team problems. It is argued that in such situations a structured approach to team building is essential for students—and educators.

Additional factors influencing the selection of a specific team building strategy are class size, number of participating disciplines, degree of prior multidisciplinary teamwork experience and how well student know their collaborators. For example, challenging can be the number of students participating in these subjects in regards to discipline variations and managing large student numbers. Variations in enrolment numbers, with either insufficient or excess student numbers in a particular discipline, might cause difficulties in building balanced and authentic teams. *Introduction to Web Design* (Web Design) saw 134 students participating in one of the trials with students being from the disciplines design, multimedia journalism and IT. *Interactive Media Design* (Interactive Design) had around 50 students during the trials with students from ‘only’ two disciplines participating—design and IT (see Appendix A for student numbers). It is suggested that subjects with large student numbers and several disciplines involved require the application of a more structured approach to team building to help avoid chaos.

The degree of experience students have with multidisciplinary collaboration when participating in these subjects is another important factor that can influence which team building strategy to use. The sequential order of the subjects provides digital media design students with the opportunity to build up
and build on multidisciplinary teamwork experience. It is suggested that students with prior multidisciplinary teamwork experience and who have experienced their peers in team situations can build their team based on such experience. Students from other disciplines (e.g. Bachelor of Information Technology) may have no prior multidisciplinary teamwork experience or have not worked with these particular students before and may be less confident in team selection and interactions. In such case a more structured hence educator-led approach to team building is suggested.

Team Building Strategies: Forming Multidisciplinary Teams
The aim is to create team dynamics that work. A chaotic approach to teamwork is often promoted as a valuable learning experience, reflecting real world experiences. Nevertheless, the strategy to throw students into the deep end of multidisciplinary teamwork might not always be effective for either students or educators, particularly when students need to acquire new knowledge first and have no or limited multidisciplinary teamwork experience. For students, being part of a dysfunctional team can be a frustrating experience and applying new knowledge and skills can be difficult with projects might not be completed in some cases. For educators, resolving conflicts in teams can be time consuming leaving less time to advise teams on discipline-specific questions.

Considering factors that can influence team building, it becomes apparent that a ‘one-size fits all’ approach cannot be applied for the two subjects under investigation. In the following two different team building strategies are described which take these influencing factors into account.

Introduction to Web Design (Web Design, 3rd semester) has large student numbers collaborating (above 120 in two trials) involving at least three disciplines collaborating (digital media design, multimedia journalism, IT). Students entering the subject have no prior multidisciplinary teamwork experience. The subject area (learning how to design and develop websites) is new to all students regardless of their disciplinary background. While the subject is a mandatory subject for digital media design students, it can be taken as an elective subject university wide creating additional challenges. Considering these factors, it was decided to develop and use an educator-led, highly structured approach to team building.

Team Building Strategy 1: Highly Structured - Educator Selected Teams.
Disciplines involved: digital media design, multimedia journalism, IT
Applied in subject: Introduction to Web Design (Web Design, Trial 1-3)

Team-building process. Educators selected team members according to the following criteria:
- study area
- motivation to develop expertise in an area (e.g. more design, concept or technology driven)
- existing expertise (e.g. software)
- work style and availability.

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Students of all disciplines submitted answers to a set of questions a week before the teamwork started to help creating teams that have suitable team members (see Appendix B for question catalogue). Each team should have strength in design, IT and organisation/management.

Web Design consisted of the following teams for the three-year study: 12 teams in Trial 1, 20 teams in Trial 2, and 26 teams in Trial 3. Each team typically included two design students, one multimedia journalism student and two or three IT students.

*Interactive Media Design* (Interactive Design, 5th semester) has a smaller cohort of around 50 students from two disciplines (digital media design, IT) participating in each trial. The subject is mandatory for both student groups. Digital media design students have participated in Web Design a year earlier and therefore have prior multidisciplinary teamwork experience and know their design peers. Some of the IT students have also participated in Web Design a year earlier but the majority of students have not. Hence the majority of IT students do not have experience in collaborating with students from a creative discipline. Considering these factors, it was decided to develop and use an educator-facilitated, semi-structured approach to team building.

**Team Building Strategy 2: Semi Structured – Self-Selected Design Group and Speed Dating.**

Disciplines involved: digital media design, IT

Applied in subject: *Interactive Media Design* (Interactive Design, Trial 1-3)

**Team-building process.** Digital media design students took partial responsibility and control for the team selection. They were encouraged to form their own group within their discipline based on the understanding they had developed in Web Design about how to create a good team dynamic. The IT educator placed IT students in IT groups because most students did not have multidisciplinary teamwork experience. Design groups and IT groups then engaged in a Speed Dating process to explore ideas on work ethics, motivation and personalities. Each group had 2 minutes to ask questions they had developed beforehand. Examples of questions included Are you a morning, afternoon or night-time worker?, Are you happy to collaborate online?, and What do you want to get out of this project? (see Appendix C for topics to explore during Speed Dating and further sample questions). Based on the answers, each group nominated three groups from the other disciplines that they would prefer to work with and one group that they would not like to work with. The educators (Design and IT) facilitated the final matching of design and IT groups trying to meet all preference requirements.

Interactive Design consisted of the following teams for the three-year study: 8 teams in Trail 1, 8 teams in Trail 2, and 9 teams in Trail 3. Each team typically included two to three design students and two to three IT students depending on enrollment numbers each year.
Activities to Support Effective Team Building and Management of Teams

In both subjects, activities that support the team building and help to build an understanding for the collaborating disciplines were conducted. These included the following:

1. Students attended a lecture on teamwork essentials, which focused on understanding each member’s role, discipline, the importance of frequent communication, and steps to resolve team dysfunction. In the advanced subject: Students attended a lecture on advanced teamwork ethics, which included reflection on common factors for success or failure of multidisciplinary teams, focusing in particular on problems that had occur the previous year (in Web Design) and problems that can occur due to different discipline cultures.

2. The students engaged in an icebreaker exercise to get to know their team members. This included the “game”, ‘tell three things about yourself, one of which one is a lie’. Team members guess which statement is the lie, and learn something about their peers. In the advanced subject the icebreaker exercise asked teams to quickly ‘design’ a fictional interactive media application (e.g. Weather Forecast App) with each disciplinary group explaining the steps required for its design, and the kind of interactions between the disciplines required to successfully develop the application.

3. A guided session that required teams to discuss and agree on methods of communication (e.g. email, mobile phone), exchange contact details, procedures to deal with low motivated team members, and time and place for weekly meetings (Team Agreement Form).

4. Throughout the project, educators met weekly with project teams to advise on project development, monitor team dynamics and intervene when problems emerged.

Research Methods

This study set out to explore the management of multidisciplinary teamwork in undergraduate digital media design education and, in particular, it asked to what extent the developed team building strategies support the building of effective teams. Multidisciplinary team building strategies were trialled in two sequentially advancing subjects over three years. An online survey was conducted after the team building and supporting activities had finished in each trial. The questions in the survey were designed to produce quantitative data for a general evaluation and overview (e.g., Did you like selecting your own team members? Yes/No). Open-ended questions explored the rationales for the previous answer (e.g., Why?), providing deeper understanding of the student’s motivation and learning experience. The data analysis was conducted as follows:

- For quantitative data obtained using online questionnaires, the survey platform (Survey Monkey) automatically provided basic statistical data, such as the tally of response totals, percentages and response counts.
- For qualitative data, the software programme NVivo 10 was used to code and theme the responses from open-ended questions. A reflexive qualitative thematic analysis combined codes where applicable. An independent researcher coded the data.
The focus of this study is on digital media design students (DMDesign). See Appendix A for participant numbers from each discipline per trial, and response rates.

Findings
Effectiveness of Multidisciplinary Team Building Strategies and Supporting Activities
The effectiveness of learning activities often depends on students’ understanding of their purpose and relevance to their future careers. Therefore, students were questioned about their attitude towards multidisciplinary collaboration at the beginning of each subject. Table 1 shows student views on the advantage of multidisciplinary teamwork as a 3-year average because percentage values were similar in each trial for both subjects.

Table 1. Student perception on multidisciplinary collaboration.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Trial</th>
<th>Student type</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Design 1-3 avg</td>
<td>DMDesign</td>
<td>98% (n=140)</td>
<td>2% (n=3)</td>
<td>n=143</td>
<td></td>
</tr>
<tr>
<td>Interactive Design</td>
<td>DMDesign</td>
<td>98% (n=56)</td>
<td>2% (n=1)</td>
<td>n=57</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 shows the students have a highly positive attitude for completing interactive media design projects as a multidisciplinary team. Importantly, students with no prior multidisciplinary teamwork experience (Web Design) also report a positive attitude towards the concept.

Feedback from students on their first impressions of their team or team building strategy allowed evaluating the effectiveness of the team building strategies and supporting activities. Feedback from each subject is as follows:

Web Design – Highly structured team building strategy. After the teams were formed and members had completed the supporting activities (e.g. icebreaker) students were asked to provide feedback on their first impressions of their team. Table 2 summarises the feedback.

Table 2. Student satisfaction with outcome of highly structured team building process.

<table>
<thead>
<tr>
<th>Are you satisfied with your team makeup?</th>
<th>Subject</th>
<th>Trial</th>
<th>Student type</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Design 1</td>
<td>DMDesign</td>
<td>93%</td>
<td>(n=27)</td>
<td>7% (n=2)</td>
<td>n=29</td>
<td></td>
</tr>
<tr>
<td>Web Design 2</td>
<td>DMDesign</td>
<td>100%</td>
<td>(n=49)</td>
<td>0% (n=0)</td>
<td>n=49</td>
<td></td>
</tr>
<tr>
<td>Web Design 3</td>
<td>DMDesign</td>
<td>98%</td>
<td>(n=64)</td>
<td>2% (n=1)</td>
<td>n=65</td>
<td></td>
</tr>
</tbody>
</table>

The majority of digital media design students who participated in the highly structured approach to team building were satisfied with their team makeup at this early stage of the project. The qualitative feedback revealed that the majority of the responses were positive in regards to team building and conducted
supporting activities. Students mentioning positive social, knowledge, skills and motivation benefits. The ‘social’ theme related to positive group or individual interactions, including words such as ‘friendly’ or ‘good people’. A typical comment was, “My team members seem motivated, committed and friendly” (DMDesign Student 9, Trial 1). Students also commented positively on communication and early team interaction: “We seem to be able to discuss things freely and reach agreements” (DMDesign Student 2, Trial 2) and another student stated: “The team constellation is good; we are different but we are ready for compromise” (DMDesign Student 29, Trial 3).

Interactive Design – Semi structured team building strategy (Speed Dating).

Table 3 summarises the feedback from students on first impressions of their team after the Speed Dating and supporting activities were concluded (e.g. icebreaker).

<table>
<thead>
<tr>
<th>Subject</th>
<th>Trial</th>
<th>Student type</th>
<th>Yes (%) (n)</th>
<th>No (%) (n)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive Design</td>
<td>1</td>
<td>DMDesign</td>
<td>83% (n=15)</td>
<td>17% (n=3)</td>
<td>18</td>
</tr>
<tr>
<td>Interactive Design</td>
<td>2</td>
<td>DMDesign</td>
<td>63% (n=12)</td>
<td>37% (n=7)</td>
<td>19</td>
</tr>
<tr>
<td>Interactive Design</td>
<td>3</td>
<td>DMDesign</td>
<td>100% (n=20)</td>
<td>0% (n=0)</td>
<td>20</td>
</tr>
</tbody>
</table>

Although the majority of the students who participated in the semi structured team building process were satisfied with their teams at this early stage (47 out of 57 students), the feedback across the three trials ranges from only 63% of students being satisfied with their team makeup in Trial 2 to 100% of students being satisfied in Trial 3. A possible rationale may be that students would have preferred to be placed in a team by the educators as they had experienced the previous year. This notion was explored and an overview of results is presented in Table 4.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Trial</th>
<th>Student type</th>
<th>Yes (%) (n)</th>
<th>No (%) (n)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive Design</td>
<td>1</td>
<td>DMDesign</td>
<td>89% (n=16)</td>
<td>11% (n=2)</td>
<td>18</td>
</tr>
<tr>
<td>Interactive Design</td>
<td>2</td>
<td>DMDesign</td>
<td>90% (n=17)</td>
<td>10% (n=2)</td>
<td>19</td>
</tr>
<tr>
<td>Interactive Design</td>
<td>3</td>
<td>DMDesign</td>
<td>90% (n=17)</td>
<td>10% (n=2)</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 4 shows that the majority of students liked to select their own team members within their discipline. Only two students per trial did not like selecting their own group members. When asked to reflect on the Speed Dating experience, the qualitative feedback revealed that the majority of responses across the three trials were positive: most students enjoyed the Speed Dating process. They felt it was a good way of learning about other students. A student stated, “Originally I wasn't overly impressed with the speed dating idea, however after completing the activity I found it to be quite helpful in gaining an
understanding of the expectations and abilities of the other students” (DMDesign Student 7, Trial 1).

Some negative issues with the Speed Dating included not enough time, overly complicated, pointless and social problems. While several students described it as “good fun”, others noted that they found it “weird, awkward, uncomfortable” (DMDesign Student 2, Trial 1). A student commented, “I was nervous at first, but it was a good idea because it forced us to meet everyone and see what everyone is like” (DMDesign Student 11, Trial 2). In Trial 1 and Trial 2 a few students (belonging to the same team) referred to the Speed Dating as ‘pointless’ or stated that “it was semi-pointless as we didn't end up with the teams we initially picked” (DMDesign Student 3, Trial 2).

The feedback from digital media design students on the applied team building strategies shows a good outcome for the two strategies and also on supporting activities. Positive reflections from students in Web Design on first interaction with team members, and good communication and exchange within the team at the start of the process, suggest that engaging teams in icebreaker exercises and discussions around the Team Agreement Form works well. The design of both exercises encouraged students to get to know each other, feel comfortable with one another and discuss concepts of compromise.

The majority of students in Interactive Media also provided positive feedback, however, one group in Trial 1 and 2 were not matched according to their three preferences leading to negative comments. Although the educators tried to match all groups with one of their Speed Dating preferences, groups that came across as motivated and skilled in the Speed Dating process were nominated more frequently making it difficult to satisfy every team.

**Enhancing Team Building Strategies**

Enhancements suggested by students to the team selection process in Web Design (highly structured team building strategy) included having smaller groups and better group selection. Reducing the team from five students (three design and two IT students) to three students (two design students and one IT student) is a recommendation educators would have liked to introduce. Ideally, educators would build teams consisting of two digital media design and two IT students. However, team sizes are to some extent influenced by university realities such as student enrolment numbers and the numbers of students to be taught within a practical class. After the first trial in Web Design, the educators considered introducing teams of three students (two design students working and one IT student). However, due to the subject being also offered as an elective subject there is a risk of students dropping out after the team building has concluded, with the possibility that a team would be left with no IT expertise. Thus, this solution was unworkable.

The following comments from Web Design students suggest grouping higher motivated students in a team would improve group selection. “When compiling teams use members who have a history of attending all the lectures or know will

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be committed‖ (DMDesign Student 10, Web Design, Trial 3). Another student commented: “The team selection could be improved by being aware of students’ abilities past the survey results” (DMDesign Student 17, Web Design, Trial 2).

It is understandable that high achieving students would prefer to work with like-minded students in a team. However, it is difficult to implement in practice since all students need to have an equal opportunity to learn and develop in a team.

For the semi structured team building strategy applied in Interactive Design, students who participated in Trial 2 suggested a ‘mix of culture and language’ as the following comment illustrates: “In our case we had two [international students] who couldn’t speak good English and couldn’t understand the project or their tasks. Each student should have been paired with someone else who is more adept at speaking English to balance it out and not make it unfair for the team” (DMDesign Student 4, Interactive Design, Trial 2).

Educators implemented this advice in Trial 3. IT students were placed in groups in which national and international students were equally distributed across IT groups.

**Conclusion**

This study set out to explore the effectiveness of team building strategies in managing multidisciplinary teams in undergraduate digital media design education. In the context of educating a T-shaped design graduate, the goal was to enable students to approach the increasing complexity of interactive media projects and the changing technological future in collaboration with others as part of multidisciplinary teams. The team building strategies were developed to help students concentrate on acquiring specialised knowledge and skills in new areas and simultaneously apply the newly acquired knowledge and skills within a multidisciplinary team context to a project. Teams need to be functional right from the start and hence team building strategies can help placing students in teams that work. The two developed and trialled team building strategies, which included also supporting activities, were sensitive to the different stages and characteristics of learners.

Although some students experienced challenges, the team building strategies and supporting activities were generally successful in facilitating the makeup of functional multidisciplinary teams. From the educators’ perspective, a considerable time investment is required to prepare and implement these team building strategies and supporting activities in order to manage multidisciplinary teamwork effectively. However, time was saved in other ways, for example, the chaos and confusion, which often accompanies multidisciplinary teamwork in undergraduate education, was missing in all trials, and only a few students needed particular assistance in sorting out situations of perceived disadvantage or unfair treatment within the team.
Although this case study describes strategies and activities developed according to the particular characteristics of student cohorts at an Australian university, there is certainly the opportunity to select one strategy or to ‘mix and match’ strategies and supporting activities for application in other educational institutions. The characteristics of undergraduate students are common to many design disciplines, therefore team building strategies and supporting activities can be applied in other design areas.

Future research needs to explore perspectives of the other participating disciplines in depth. Furthermore, in context of the growing trend to offer design education online, it will certainly be necessary to explore the management of multidisciplinary collaboration and the incorporation of team building strategies in the online learning environment.
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Appendix A
Student enrolment numbers, survey participant numbers and response rates from the three-year trial.

<table>
<thead>
<tr>
<th></th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Students</td>
<td>Students</td>
<td>Students</td>
</tr>
<tr>
<td></td>
<td>DMDesign</td>
<td>Other Discipline</td>
<td>Total</td>
</tr>
<tr>
<td>Web Design</td>
<td>33</td>
<td>22</td>
<td>55</td>
</tr>
<tr>
<td>Enrolment numbers</td>
<td>33</td>
<td>22</td>
<td>55</td>
</tr>
<tr>
<td>Survey participants</td>
<td>29</td>
<td>-</td>
<td>88%</td>
</tr>
<tr>
<td>Interactive Design</td>
<td>35</td>
<td>18</td>
<td>53</td>
</tr>
<tr>
<td>Enrolment numbers</td>
<td>35</td>
<td>18</td>
<td>53</td>
</tr>
<tr>
<td>Survey participants</td>
<td>18</td>
<td>-</td>
<td>51%</td>
</tr>
</tbody>
</table>

Appendix B
Web Design: Question catalogue to establish suitability of a student to be placed in a team that had strength in design, IT and organisation/management.

Teams need to work together during practical time. Which practical time can you attend?
- 10-12pm
- 1-2pm
- Either would work for me

As a member of a web project team, I would like my role to be in:
- Web design IT
• Web design
• Management and production of web projects

I am competent in
• Photoshop/Illustrator
• CSS/HTML
• Programming
• Writing/researching

I am really keen to learn more about
• Photoshop/Illustrator/Dreamweaver for web design
• CSS/HTML/Dreamweaver for web development
• PHP/MySQL for dynamic websites
• Writing/researching/marketing and conceptual development of web projects

What is your work style?
• I prefer working on assignments right from the beginning in order to avoid the last minute stress when the assignment is due.
• I need the pressure to build up. I often work on assignments during the last couple of days/nights before they are due.

Appendix C
Areas to explore during Speed Dating and question examples from students.

Work style
• Are you a morning, afternoon or night time worker?
• Do you work continuously or in a last minute rush?
• Are you a follower or an organiser?

Communication style
• How quickly do you usually reply to emails?
• Are you happy to collaborate online?
• How often are you online?

Motivation
• What do you want to get out of this project?
• Are you motivated and prepared put in 100%?
• The designers want a particular function that you don't know how to code. Would you give up or research the problem to come up with an answer?

Skills
• What are you skills and with which software programs have you worked before?
• Do you know how to use [software], or are you willing to learn its use?
• What coding languages do you know?
• How long have you been learning [programming language]?

Availability
• What is your uni workload like?
• Are you able to attend group meetings on Mondays 5 - 7pm?
• Do you have a job outside uni?
• Which weekdays are you currently available?
• When suits you best for group work/meetings?
• Are you available to work weekends?

Multidisciplinary teamwork experience
• Have you worked with anyone in your IT group before?
• How would you describe yourself as a team member?

Others such as personality, wit/humour
• What do you think of the term "HTML is poetry"?
• What do you eat for breakfast