GENDER AND SCRATCH: EXPLORING SUPPORT FOR ONLINE GENDERED SETTINGS

A Thesis in
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by
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ABSTRACT

Researchers who have investigated gender differences within STEM fields have produced a significant body of literature, primarily focused on assessing and understanding the inequalities that women face when entering these fields. The computer information science (CIS) field is a subfield within STEM that has seen a continuous decrease in participation and retention of women (Wang, Hong, Ravitz, & Ivory, 2015). Some of the influential factors behind this continuous decline include gender differences in self-efficacy, social encouragement, the CS environment, stereotypes and academic exposure (Beyer, Rynes, Perrault, Hay, & Haller, 2003; Cheryan, Plaut, Davies, & Steele, 2009; Rosson, Carroll, & Sinha, 2011). With respect to CIS introductory education, middle school children are commonly identified as a desirable age group, because early introduction to the CIS ideas might help to combat some of the problematic factors (i.e., before the impacts become too entrenched; Armoni, Meerbaum-Salant, & Ben-Ari, 2015; Carter, 2006). However, while many researchers have explored gender differences in CIS education among middle school students, little has been done to understand the nature of such factors as part of an online environment. In this study, I present a qualitative analysis of student discussions within the Scratch programming community. The analysis examines comments that are posted in forums that are marked with varying gender cues. The research objective was to determine whether factors such as self-efficacy, social encouragement and stereotyped references are apparent in boys’ and girls’ discussions about their Scratch projects, and if so what implications they may have for the children’s online learning experiences.
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Chapter 1. INTRODUCTION

Throughout the history of computing, women have been given a societal image that excludes them from participating in the computer information science (CIS) fields, with their participation going from 37% in the mid-1980’s to 18% in 2011 (National Center of Education Statistics, 2012). As a result, many researchers have sought to identify the underlying reasons for women’s low participation and retention rates in CIS (Cheryan, Master, & Meltzoff, 2015; Gürer & Camp, 2002; Meelissen & Drent, 2008; Nesiba et al., 2015). Currently, these research efforts have identified a number of factors that seem to inhibit women’s engagement in CIS-related education and work; low self-efficacy, negative stereotypes, the male-dominated culture of CIS environments; relatively sparse support by friends, family and teachers, poor attitudes about the nature of computing; and a lack of role models (Cheryan et al., 2009; Denner, 2011; Meelissen & Drent, 2008; Robinson & Pérez-quiñones, 2014; Rosson et al., 2011; Varma, 2007).

When battling negative attitudes and stereotypes, educators and researchers have focused on girls and boys of middle school age (11-13 years old). Studies have shown that young people begin to form misconceptions of CIS at this stage of development when they are transitioning from child to teenager (Armoni et al., 2015; Carter, 2006). One implication is that if educators introduce CIS topics to middle school students in an effective way, the learners might enjoy a positive experience that can combat societal stereotypes before they are encountered, thereby promoting a positive attitude toward continuing engagement in CIS activities. Common examples of this approach are research projects that host after school programs (for boys and girls, or sometimes for one gender only; Denner, Werner, & Ortiz, 2012; Gürer & Camp, 2002; Robinson & Pérez-quiñones, 2014), or that inject computing concepts into other major subjects (e.g., introducing multimedia animation tools as part of English or other language courses; Carbonaro, Szafron, Cutumisu, & Schaeffer, 2010).

A less explored approach to introducing young people to CIS involves the more self-directed learning that a middle schooler might engage in using accessible online resources. The Scratch language and community (http://scratch.mit.edu) is a popular example of such a resource. A few studies have begun to explore what and how boys and girls learn computing concepts using Scratch, but the study of gender differences within this or other online contexts (e.g., AgentSheets, http://www.agentsheets.com) is still relatively unexplored.
The current thesis project begins with the observation that the Scratch online community contains a rich body of content that may reveal differences in how programming novices (both boys and girls) interact with, react to, and potentially support one another online. The study will explore this opportunity by analyzing the level and nature of support, as well as other factors that may influence the experiences that boys and girls receive towards their computing goals in an online environment. Because Scratch tends to attract “programmers” at the middle school age, it should be a particularly useful source of insight about the gender-related attitudes and social behavior that this age group brings to their early programming experiences.
Chapter 2. LITERATURE REVIEW

Science, technology, engineering and mathematics (STEM) professions constituted 6.2% of U.S. employment in 2015 (Adams, Hill, Fayer, Lacey, & Watson, 2006); that percentage implies close to 8.6 million STEM jobs. Computer occupations are the largest portion of these STEM jobs with an overall percentage of 45%. With such a high demand for computer-related jobs, school districts and even states have begun to create computer-related education programs for young people that may act as a pipeline for creating computer professionals (Guzdial, 2008). In response to such efforts, executives from companies such as Facebook, Microsoft and Google have expressed their approval for these programs by stating their need for such talent, and emphasizing that there is currently not enough computer-savvy young professionals.

The push for more and younger education programs from these executives reflects their concern over the constant increase in the number of IT jobs, but a generally decreasing number of students majoring in computing (Rodger et al., 2008). Worse, within the group of young people majoring in IT topics or seeking IT jobs, the involvement of women is remarkably low. Although there is a demand for STEM jobs and in particular computer-related ones, women only make 24% of STEM employment (Beede et al., 2011). With women being 48% of the U.S. workforce, this level of participation raises serious concerns. In the IT field, this underrepresentation of women has a negative impact on the individual through loss of opportunity; and on the U.S. workforce through loss of talent (Cuny & Aspray, 2002).

Current Status of Women in Computing

As a subset of investigations of the women in STEM, a substantial number of studies have been conducted to understand women’s low rates of participation and retention in CIS fields. Participation of women pursuing a degree in computing has been in a steady decline from 37% in the mid-1980’s to 18% in 2011 (National Center of Education Statistics, 2012; Wang et al., 2015). This trend is replicated in the IT professional workforce where women comprise only 25% of the computer-related professionals (Trauth, Quesenberry, & Huang, 2009). And it is not just whether women are seeking such jobs: even for the 25% of women filling computer-related occupations, studies have shown that these female CIS professionals are two and a half times
more likely to leave their jobs than their male counterparts, primarily due to a hostile and male-dominated working environment (Ahuja, 2002; Panko, 2008; Trauth et al., 2009).

Factors Inhibiting Women from Computing Education and Professions

Considering the relatively low representation of women in CIS fields, many researchers have attempted to identify what might be the factors that are related to or perhaps have even caused the gender disparity in CIS. In these investigations, studies typically compare the differences between women and men in different levels of education such as in high school or while undergraduate college students. Some of the variables that seem to be influential include self-efficacy, academic exposure, stereotype threat and environment in which CIS was exposed, and external and internal support (Beyer et al., 2003; Cheryan et al., 2009; Rosson et al., 2011; Taylor & Mounfield, 1994).

*Self-efficacy* has been defined as the “beliefs and characteristics of performance specific to particular domains of achievement” (Rosson et al., 2011). Most research that refers to self-efficacy in CIS has found that men have higher perceptions of self-efficacy than women (Coleman, 2009; Meelissen & Drent, 2008). On occasion however, researcher have reported perceptions in the opposite direction. For example, Rosson, Sinha and Edor conducted a study where college women reported greater feelings of success than their male counterparts after creating a database-centered web application through the use of a specialized end-user web development tool (Rosson, Sinha, & Edor, 2010). This result might have been observed for many reasons such as the amount of societal changes throughout the decades that have passed since these studies were conducted and the greater accessibility to computers for both genders (Busch, 1995; Rosson et al., 2011, 2010). The researchers also reported participants’ comments which suggested that the females began the project with much lower expectations of success, and when the specialized tool allowed them to build a “real application”, they were more enthusiastic about the future success likelihood.

Another study by Macphee, Farro and Canetto (2013) had similar results in regards to computer self-efficacy differences between men and women who were pursuing computer-related degrees in college. Within their longitudinal study they analyzed self-perception of academic skills at college admission and college graduation. They found that at admission women had lower computer self-efficacy than men (as expected), but that by graduation, self-
perceptions were equivalent across gender (Macphee, Farro, & Canetto, 2013). This study could possibly explain the difference in the results for studies that report about self-efficacy. That is, the grade level of the participants might have an influence in self-efficacy reports (i.e. undergraduate freshmen vs. seniors’ self-efficacy reports). It may also be that the women who persist in learning computing skills are able to decrease the gap in self-efficacy.

Another factor that may help to explain gender differences in CIS is academic exposure. Any and all previous computing experiences are seen as being significant by women; and being exposed to CIS in high school has been recorded to have a significant effect on women’s interest and success in CIS-related programs in college (Taylor & Mounfield, 1994). Although early exposure in high school has a positive effect, the demographics of students taking AP exams show that the CS exam is the least popular AP exam for women (Pivkina, Pontelli, Jensen, & Haebe, 2009). This same study reveals that by the time most girls enter high school, they have already decided that they are not interested in CIS; this suggests that even earlier academic exposure should be pursued. Targeting middle school students seems to be particularly ideal because it is at this time that personal identities are built (Denner, Werner, Bean, & Campe, 2005; Grover, Pea, & Cooper, 2014). Introductions of CIS at this level have shown to change perceptions of students to that comparable of an undergraduate college student. Similar early exposure studies have seen similar results where misconceptions of CIS being “boring and nerdy” are changed to “fun and exciting” (Robinson & Pérez-quiñones, 2014).

**CIS stereotypes** can also act as gatekeepers to the field in a way that discourages females from participating (Cheryan et al., 2015). Common stereotypes of CIS view it as a “geek” culture where those involved are constantly sitting in front of a computer, have little human interaction and are “nerds” (Beyer et al., 2003; Varma, 2007). These stereotypes may be quite influential towards women’s decisions to avoid a CIS career because that identity seems to conflict more with typical women’s gender roles than it does with men’s (Beyer et al., 2003). When a woman is introduced to CIS, in many cases the environment in which it take place is filled with stereotypes and representatives of these stereotypes that gave them a false perception and lack of interest in the field (Cheryan et al., 2009). This is reflected when women in the field cite “a feeling that they do not belong in the department because they do not have the same deep fascination and focus on computers as many of their male counter parts” (Coleman, 2009). In a comparative study where male and female participants were introduced to either an environment
reflecting stereotypes, or an environment carefully designed to avoid these stereotypes, researchers found the presences of the stereotype markers had a significant negative effect on woman’s identification with computer science (Cheryan et al., 2009). The implications is that if educators and other guides can change the introductory environment such that it does not reinforce a geek stereotype, the generally masculine image of the CIS field can be reduced, and the programs may attract those who otherwise would show little to no interest (Cheryan et al., 2009, 2015; Master, Cheryan, & Meltzoff, 2015).

One more factor that seems to influence women’s interest in computer-related education is the external and internal resources that are available for support. Women who have such resources tend to have a more comprehensive and accurate understanding of CIS as well as being more willing to pursue a degree in the field (Denner, 2011). Internal resources include parents, other family members and close friends. External resources include teachers, mentors, afterschool programs, summer programs or any sort of support that does not stem from a personal relationship. Although parents and friends should be seen as the more influential and supportive group, even though they are personally connected, family members tend to be less encouraging towards girls as opposed to boys (Busch, 1995; Taylor & Mounfield, 1994). When women have a rich set of external resources to act as role models, their recruiting rates as well as retention rates increase for computer science (Gürer & Camp, 2002).

Approaches to Attracting Young Women into Computing

Attempts to close the gender gap in CIS share a number of similarities, with the major differences coming in the methods used. These similar approaches include afterschool programs, summer camps, elective courses, competitions, roadshows and conferences (Denner et al., 2005; Grover et al., 2014; Nesiba et al., 2015). Two common distinctions among these outreach studies is the education level of the participants and the pedagogical approach. Some instances of these outreach programs are aimed at quite different levels, including elementary, middle school, high school and college level (Nesiba et al., 2015). Some of the pedagogical approaches included interactive presentation methods, Eccles’ expectancy value model, scalable game design, storytelling and a HCI approach (Basawapatna & Repenning, 2010; Denner, 2011; Denner et al., 2005; Kelleher, Pausch, & Kiesler, 2007; Robinson & Pérez-quiñones, 2014; Ross & Zhou, 2016).
Outreach programs with the intent of increasing CIS interest in women have had some success. One of the most reported positive effects of these outreach programs is students who entirely change their perspective about CIS. For example, misconceptions of CIS being a masculine field are replaced with positive experiences that promote an inclusive social image of the field (Alvarado & Dodds, 2010; Grover et al., 2014; Nesiba et al., 2015; Robinson & Pérez-quiñones, 2014). Engagement of students is another factor that is widely expressed across studies that used storytelling, games or a combination of both (Kelleher et al., 2007; Maloney, Peppler, Kafai, Resnick, & Rusk, 2008; Rodger et al., 2008). A common trend in these studies is providing program practices that led to their success. For example, Denner (2011) conducted a study that ran an IT-intensive afterschool program for middle school girls. After analyzing the data collected, the following three promising practices for CIS education were recommended; offering hands-on activities, creating opportunities to work in small groups and allowing time for exploration (Denner, 2011).

Some empirical studies have had success in using visual programming tools such as Scratch (scratch.org) and Alice (alice.org) as part of clearing misconceptions of CIS and creating an engaging experience for students to learn the basics of programming. An example of this is reported by Maloney and his colleagues, who offered an afterschool program that used Scratch as a tool for teaching programming to middle and high school students (Maloney et al., 2008). The researchers found that the diversity of Scratch media improved the engagement of students in programming. Although tools like Scratch have been found to be successful at teaching programming, for the most part these empirical studies have been limited to a controlled environment that does not explore all of the features in Scratch. For example, the community support that is built into Scratch (where users interact with each other through comments) has in particular not been explored, because the focus has been on the actual programming activities. Further exploration of the naturally forming groups and interactions within the Scratch community are worthy of investigation as part of the general effort of gender differences in CIS. The novel angle in doing this is that it will consider online communication and discussion about projects, rather than focusing on the programming per se, enabling better understanding of how the social context of this introductory programming experience might vary across genders.
Scratch as a Place to Learn about Computing

When it comes to introducing programming to children, Scratch has been shown to be a very effective tool. Scratch is a visual programming language that uses blocks of code with specific shapes meant to inform users of the possible combinations (see figure 1). This allows youngsters who are new to programming to learn without the frustration of syntax errors; they simply drag “pre-fabricated” operations into a larger piece of code or script. Without having to worry about syntax, Scratch sets up a low floor for learning while the number of media components and combinations allows for a high ceiling of complexity (Resnick et al., 2009).

![Figure 1: Scratch block coding.](image)

The projects that are shared and discussed within the Scratch community are created through the block programming (see figure 2). These projects can be quite varied, for example including games, animations and puzzles. Users are also capable of starting from other authors’ projects and altering them through Scratch’s “remix” function. As their work expands and starts to have thematic aspects, a Scratch user can create an informal group called a studio (Vlieg, 2016). The purpose of a studio is to group together related projects created by different Scratch
users into one location. The theme behind a studio is totally open-ended, left to the organizing users’ creativity. For example figure 2 shows a group interested in Beanie Babies!

![Figure 2: Example Scratch project.](image)

The ability to create studios reflects one of the most important characteristics of Scratch, which is that the projects are created and shared in a social context. Scratch has three main locations for users to interact with one another. These three locations are: the comments section in individual profiles, projects and studios. By reviewing these comments, one can see the online community aspect of Scratch come to life. Users can request actions of one another, provide feedback on projects or studios and have casual conversations. Additional social features offered by Scratch are having a “follow” feature for both users and studios. This feature makes it easier for users to keep up-to-date with new content posted by those who they follow. Studios contribute to the social context by enabling users to invite other Scratch users into the group.

The examples in figures 3 and 4 show a comments section within a girls-only studio and a boys-only studio. These two contrasting studios reveal how a pervasive feature that has the intent of bringing users together (studios) can also be used to be exclusive. Both of these studios have been created to convey exclusivity to one gender. Within figure 3 this can be seen across the studios’ title, image and description where it proclaims itself as a girls-only group. Similarly,
in figure 4 the studio states that it is exclusive to boys through its description. A brief review of each studios’ comments shows that their gendered characteristic evokes a reaction in users. In this particular instance although the girls-only studio had fewer comments, the majority were supportive with respect to its gendered status. At first glance the boys-only studio received more resistance with users questioning their gendered status.

Figure 3: Girls only studio.
Scratch has had great success in introducing children to programming because of its low floor ease of use and high ceiling capability to be complex. However, what truly makes Scratch an interesting tool for my research concerns is its online community. Because Scratch encourages the creation of groups, and within that allows users to proclaim specialized missions or characteristics, it sets up a unique dynamic for Scratch community interactions. With gendered differences being of great current concern within CIS, gender-exclusive Scratch studios such as these may be producing conflicts among users in the community. As a result, the online Scratch community is an ideal context in which to explore socially-mediated gender differences in an online programming context. Thus my study contributes to the literature of gender differences in CIS, but specifically within an online environment; it is guided by the following research questions.

**RQ1:** *What is the observed nature of difference in the types of support provided through text-based commentary within online gendered settings, as part of a visual programming environment used primarily by boys and girls of middle school age?*
RQ2: To what extent do these same text-based commentary reflect other factors shown to be influential in girls’ lack of participation in CIS education?
Chapter 3. METHODS

Data Collection

As mentioned previously, the platform for data collection was the Scratch programming community. The demographic data for age distribution display on Scratch’s statistic page (https://scratch.mit.edu/statistics/) indicate that the majority of Scratch users fall within the age range targeted by the thesis project (i.e., 11-13 years old). Scratch was created with the intent to offer kids a medium to program that removed barriers such as syntax (Resnick et al., 2009). Members create and share content, modify other members’ content, create groups for shared work, and post comments about different community entities (projects, profiles and groups). Scratch makes it clear that everyone is welcome to join the community and tries to foster an inclusive environment.

Although the intent of Scratch is to be inclusive of everyone, its capability to create groups has enabled the creation of gendered settings. Within this study, a gendered setting is defined as an environment that is exclusive to a specific gender. Because any Scratch member has the ability to leave comments on any group, individuals have the option to leave a comment on a gendered group regardless of whether they are a part of the group or not. Comments that were posted at the group level within these gendered settings became the unit of analysis for this study.

Sampling Gendered Studios in Scratch

In this study, the source of data to be analyzed were Scratch groups called studios; a studio is a group within Scratch with the purpose of grouping projects from multiple users into one place. For example, a Scratch user can create a “Harry Potter” studio, where members of it can upload projects based on Harry Potter. More specifically I sampled studios that were self-advertised as being a gendered setting. In order to qualify, the studio had to clearly identify that it was exclusive to one gender; to be included it also had to have at least one comment under the “Comments” tab. Three features of a studio were used to determine whether it was a gendered setting or not: the studio title, its image, and its description (see figure 5). Within at least one of these three features the studio had to indicate that it was a gendered setting. For example, a title...
might be “Girls Only,” an image be the word “boys” in a prohibited sign and a description stating “No boys allowed.”

Figure 5: Example Scratch studio with qualifying components.

To retrieve a pool of possible gendered studios, I searched the studios in the Scratch community using a number of defining search terms. For girl-gendered studios, the search terms used were “girls only,” “girls rule,” and “no boys allowed.” For boy-gendered studios the search terms mirrored the girls, i.e., they were “boys only,” “boys rule” and “no girls allowed.” Each query returned a set of matching studios, presenting only the studio’s image and title. For further information about the studios, such as their description, comments and number of followers, I clicked on each returned studio to gather more details. The search results from each of these queries were manually recorded into an Excel spreadsheet. Table 1 displays a summary of the gendered studies sampled in this fashion. In the Table, projects refers to the number of unique Scratch projects associated with the studio; comments refers to the remarks posted by community members (whether members of the studio or not); followers refers to users who stay up-to-date with the studios activities. Just being a follower of a studio does not give users the administrative rights to conduct actions such as adding and removing projects.
Using the complete set of studios as a starting point, an initial batch of 15 studios for each gender (30 total) were chosen through random selection. After the initial 30 studios were analyzed, a second batch of five studios per gender (10 total) were randomly selected using the same random method. Extra sampling was done to make sure theoretical saturation was reached and no new themes would surface. Collectively, I analyzed 40 studios; with 20 of them being a girl-gendered settings and 20 boy-gendered (see appendix B).

<table>
<thead>
<tr>
<th></th>
<th>Number of Studios</th>
<th>Projects (Avg.)</th>
<th>Comments (Avg.)</th>
<th>Followers (Avg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>611</td>
<td>11,907 (19.27)</td>
<td>15,907 (25.99)</td>
<td>2,866 (4.68)</td>
</tr>
<tr>
<td>Boys</td>
<td>141</td>
<td>2,922 (20.72)</td>
<td>6,374 (44.89)</td>
<td>523 (3.68)</td>
</tr>
<tr>
<td>Total</td>
<td>752</td>
<td>14,829 (19.54)</td>
<td>22,281 (29.55)</td>
<td>3,389 (4.5)</td>
</tr>
</tbody>
</table>

Table 1: Data pool totals and averages.

Once a studio was selected, all the comments posted under the studio were collected for analysis and coding (see figure 6). This was done at a single point in time, with no subsequent “visits” to collect any additional comments; thus each studio should be seen as a snapshot of the posts made up to that point in time. All of the resulting comments were manually recorded into an Excel spreadsheet along with the username of the Scratch member who had posted the comment; these usernames were helpful in establishing context, as they sometimes suggested the gender of the person commenting, and allowed me to recognize posts from the same member.

Figure 6: Overall comments section for Scratch studios.
Data Analysis

The unit of analysis for this study was an individual comment made by a member within a gendered studio. I used three methods to analyze comments and place them in categories. The highest level of analysis was determining whether comments were supportive, unsupportive or undisclosed. Supportive comments were those that agreed with the characteristics of a studio while unsupportive were those that did not. Comments that were categorized as undisclosed did not reveal whether they agreed with the studios characteristics. Following this level of analysis was a set of established coding categories that I extended for this gendered studio context. There were two of these categories: socioemotional and task-oriented (Finn, 1999). A socioemotional comment as defined by Finn (1999) was one that “relate to interpersonal relationships, social disclosure, and personal feelings.” For task-oriented, Finn (1999) defines it as “specific information and problem solving with respect to issues not related to interpersonal relationships.” These codes were used because they differentiate comments as actionable and nonactionable. Meaning that task-oriented comments result in the operation of something like adding a user to a studio, while socioemotional comments result in no action.

A second method for analysis was open coding of new themes that were identified (Klein & Myers, 1999). In this method a hermeneutics approach was taken by using a comments surrounding information to establish context. Once the context has been established, an informed interpretation of a comments underlying meaning was created. Further details of this method are provided in the following section.

The final method used was to adopt a set of influential factors from literature to determine if some of the comments reflected them. In particular, I directed attention to the attitudes and resources that have been shown to either facilitate or inhibit girls’ tendency to explore CIS activities and education.

Using these three methods successively, I began by considering each comment as either supportive, unsupportive or undisclosed. A comment that was categorized as either supportive or unsupportive was next labeled as socioemotional or task-oriented. After being labeled as socioemotional or task-oriented, comments were then coded according to categories developed through a hermeneutics approach to open-coding. Comments initially categorized as undisclosed were also further labeled through open-coding. As new codes emerged through open coding, I revisited earlier comments to determine if there were other comments exhibiting the same
tendency. Studios and comments were analyzed until theoretical saturation was reached (i.e., no new codes were found and no further coding was possible).

Coding Process

The initial phase of coding comments was to determine if they were either supportive, unsupportive or undisclosed towards the gendered studio. Once all comments were grouped in this way, the comments were next categorized as either socioemotional or task-oriented or both (Finn, 1999). To further elaborate on the distinction between these two categories, socioemotional is any commentary that contains no explicit goals. An example of this type of comment might be two individuals asking each other about their day. Task-oriented refers to comments that have some sort of goal associated with them. These goals might be anything from community administration to educational. An example within this context is someone asking to join a Scratch studio (community administration) or asking for help on a project (educational).

New categories were then identified under the higher-level categories of socioemotional and task-oriented, using a hermeneutics approach to open coding. When a category was recognized, a description was written to define the types of comments that it covered. After a new subcategory was documented, comments that has already been analyzed and categorized were revisited. More specifically, comments that were labeled under categories that seemed related to the newly developed one were studied carefully. For example, one of the initial categories developed was “conversation starters,” which was later broken into two separate categories, idle conversation and check-in. All comments that were previously categorized as conversation starters were revisited and re-categorized.

Throughout the comment analysis, a hermeneutics approach was taken to establish context (Klein & Myers, 1999). This was accomplished by looking at usernames and at the recent past and immediately following commentary. By considering the surrounding information to a comment, I was able to produce a richer and higher quality interpretation. To view the entire set of codes that were developed through open coding after breaking the comments into the higher level codes, see appendix A for their descriptions and appendix C for examples of each subcategory.

Independently from determining if the comments were supportive, unsupportive or undisclosed (and the lower-level codes of socioemotional, task-oriented, etc.). Each comment was also analyzed to determine if it reflected any of the influential factors identified within
literature. These influential factors included self-efficacy, stereotypes, internal support, external support, and role models (Cheryan et al., 2009; Denner, 2011; Robinson & Pérez-quiñones, 2014; Rosson et al., 2011; Varma, 2007). The following is a table with the description used to define each influential factor as it might appear in a comment.

<table>
<thead>
<tr>
<th>Influential Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>Individuals own belief that they are capable of accomplishing a specific task or goal.</td>
</tr>
<tr>
<td>Stereotypes</td>
<td>Misconceptions of CIS fields (i.e. a man’s field, anti-social individuals, stuck to a computer school all day).</td>
</tr>
<tr>
<td>Internal Support</td>
<td>Encouragement from friends and family members (i.e. financial, spoken)</td>
</tr>
<tr>
<td>External Support</td>
<td>Encouragement from teachers, tutors, programs or any outside entity that is not a close friend or family member.</td>
</tr>
<tr>
<td>Role Models</td>
<td>Some to look up to and strive to follow in their footsteps.</td>
</tr>
</tbody>
</table>

Table 2: Influential factors and their descriptions.

Interpretive Lens

A focus on women as the underrepresented group was adopted throughout this study because it falls within my personal experience, and that is what fueled my research interest. With the lack of exposure to the computing field throughout the K-12 educational system, I was deprived of an early start to learning about computing. This sparked an interest in the challenges of injecting computing education into K-12 school experiences, which led to stumbling upon the gender and social inclusion body of literature. This literature forced me to reflect on my own experience, and allowed me to empathize with the difficulties that women face with respect to entry into STEM-related fields. In my experience, I struggled because of my late exposure to computing, but I did not have a difficult time staying within the field of study. In comparison, women often also lack this early exposure; however, their struggle goes beyond entering STEM fields, continuing on to be an obstacle for remaining in them. Reflecting on my own difficulties to enter the computing field and understanding that women in my position struggle beyond this point, has influenced the focus of this study on differences in support between men and women in an online environment.
Chapter 4. RESULTS

In this section, I report the results from this study, which come from my analysis of the comments in a total of 40 studios (20 boy-gendered and 20 girl-gendered); in total these 40 studios contained 1,215 comments. 477 comments were from the boy-gendered studios and 738 were from the girl-gendered studios. The average number of comments for boy-gendered studios was 23.85 while for the girl-gendered studios it was 36. A paired samples t-test was conducted to compare the number of comments the girl-gendered studios and boy-gendered studios. Results indicate that there is no significant difference between the number of comments and the type of gendered studio (t=0.23).

Supportive, Unsupportive and Undisclosed Comments

At the highest level, comments were coded as either supportive, unsupportive or undisclosed. As introduced in Chapter 3, supportive was defined as comments that agreed with the studios characteristics; unsupportive was defined as comments that disagree with the studios characteristics; and undisclosed were comments that could not be classified in either of the two major groups. In the boy-gendered studios, there were 341 supportive comments, 125 unsupportive comments, and 11 undisclosed; the corresponding percentages for the girl-gendered studies was 597, 105 and 36. For the remainder of the analysis, undisclosed comments were disregarded because of their small quantity and lack of interest in regards to this study. A chi-square test of independence was performed to determine if there was a statistically significant relationship between the type of gendered setting (boy or girl) and the supportive versus unsupportive tone of the comments posted in a studio (comparing just supportive or unsupportive, as undisclosed was such a minor category). The results showed a statistically significant relationship ($\chi^2 (1, N=1168) = 24.94$, p<0.05) between the type of gendered setting and the supportive versus unsupportive tone of comments that the studio received.

Comments that were coded as either supportive or unsupportive were subsequently classified as socioemotional, task-oriented or both. For the boy-gendered studio comments that were coded as supportive, 62.6% (214) were socioemotional while 37.4% (128) were task-oriented. In contrast, the supportive girl-gendered studio comments, 43.8% (267) were coded as
socioemotional while 56.2% (342) were coded as task-oriented (see left hand side of figure 7). After performing a Chi-square test, a significant relationship was found between the type of gendered setting and type (socioemotional or task-oriented) of comments left in a studio ($\chi^2$ (1, N=951) = 30.74, p<0.05). There were also instances where comments would be double coded into both socioemotional and task-oriented. In the boys studios there was 1 double coded comments under supportive categories and 2 under unsupportive. Within the girls studios, there were 12 instances of double coding for supportive categories and 3 for unsupportive categories.

![Figure 7: Comparing proportions of socioemotional and task-oriented comments for boy- and girl-gendered studios, for both supportive and unsupportive comment types.](image)

Comments that were coded as unsupportive were also categorized as socioemotional, task-oriented, or both (right hand side of figure 7). The unsupportive comments from the boy-gendered studios were categorized as 52.8% (67) socioemotional and 47.2% (60) as task-oriented. The corresponding percentages in the girl-gendered studios were 66.1% (72) and 33.9% (37) task-oriented. When performing a chi-square test for these results, a significant relationship was also found between the type of gendered setting and type (socioemotional or task-oriented) of comments left in a studio ($\chi^2$ (1, N=236) = 4.29, p<0.05). Although these differences are not large, it is interesting to see the reversal in socioemotional versus task-oriented comments for the two settings: for supportive comments, the girl-gendered studios attracted a greater proportion of
task-oriented content than the boy-gendered studios; while for the unsupportive comments, the inverse pattern was seen.

To interpret this possible interaction between task-oriented and socioemotional content with the overall tone of the comment, I examined the sets of comments in more detail, from a qualitative perspective. I found that when receiving support, girl-gendered studios had more users requesting to become a part of the studio, which would require its current members to perform the administrative task of adding them. In the boy-gendered studios, the supportive comments that were received would usually come from the same group of users. These users conversations gave the impression that they were already members of the studio. This distinction between girl-gendered studios receiving supportive comments from outside group members and boy-gendered studios from studio members is likely what created this inverse pattern. For the unsupportive comments, it was more frequent to see users ask boy-gendered studios to remove their studios or request others not to join. On the other hand, girl-gendered studios seemed to receive comments where users did not ask them to conduct any task that would be negative towards the studio such as removing it. Instead, users were more likely to try and make the supporters of the studio understand that being gender exclusive was wrong. Differences in how boy and girl-gendered studios were approached with unsupportive comments was one of the interesting qualitative impressions that should be further explored in another study.

The final “undisclosed” category had only a few instances in the data set. Collectively, there were 47 of these comments, with 11 in the boy-gendered studios and 36 in the girl-gendered studios (recall that the girl-gendered studies had considerably more comments). Using open coding methods, two novel subcategories were created: mutual agreement and seeking understanding. Mutual agreement comments were instances where two or more Scratch users who did not agree with one another put their differences aside and agreed on something. Their agreement was not exclusive to the gendered status of the studio and might be something as simple as users agreeing that they were both unpleasant and apologizing. Seeking understanding were comments where users asked a question regarding the studio, but did not reveal whether they were supportive or not with the studio’s mission or other characteristics. Distribution of these comments for boy-gendered studios were as follows, 81.8% (9) mutual agreement and 18.2% (2) seeking understanding. For girl gendered studios there was 97.2% (35) for mutual
agreement and 2.8% (1) for seeking understanding. Because so few comments fell into the undisclosed category, no further analysis was conducted of these data.

**Supportive Sub-categories**

Comments that were interpreted as agreeing with a studio’s mission and other characteristics were classified as supportive and either sociotechnical or task-oriented; open coding was used to discover and apply a third level of codes. Within the category of supportive socioemotional comments, the emergent coding resulted in four new codes: appraisal, defensive, condescending and idle conversation. The two pie-chart graphics in figure 8 show the relative distribution of each type of supportive comment for the boy- versus the girl-gendered studios. For the boy-gendered case, the codes were distributed as appraisal 5.1% (11); defensive 17.8% (38); condescending 4.2% (9); and idle conversation 72.9% (156). For the girl-gendered case, the distribution was appraisal 14.6% (39), defensive 20.6% (55), condescending 3% (8) and idle conversation 61.8% (165; see figure 8).

Visual inspection of these pie-charts results suggested that there were relatively more comments in the appraisal category for girl- versus boy studios, and this was confirmed through a chi-square test of these frequency results ($X^2$ (1, N=938) 4.70, p<0.05). In contrast, the percentage of idle conversation appears to be higher for the boy-gendered studios than the girls; again this was confirmed by a chi-square test ($X^2$ (1, N=938) =31.62 , p<0.05). This suggests that more Scratch users left more comments expressing positive reactions towards the girl-gendered studios characteristics than they did boy-gendered studios. Willingness of users to do this more often for girl-gendered studios is probably the cause for their smaller proportion of idle conversation. None of the other categories seemed to distinguish between the two genders.
Open coding of the supportive task-oriented subcategories produced a total of five codes: desire to belong, educational, promotional, administrative, and check-in (see Figure 9). Comparing across genders, the boy-gendered studio comments fell into desire to belong 12.5% (16), educational 30.5% (39), promotional 2.3% (3), administrative 32.8% (42) and check-in 21.9% (28). For the girl-gendered comments, the corresponding percentages were desire to belong 31% (106), educational 14% (48), promotional 3.5% (12), administrative 47.4% (162) and check-in 4.1% (14).

Again, visual inspection suggests several points of contrast. For example, the task-oriented subcategory “desire to belong” was proportionally more than doubled in the girl-gendered studios. The corresponding chi-square test of independence again found a statistical
relationship (p<0.05) between the gender of a studio and the number of comments reflecting a desire to be part of it. A similar contrast was observed for the “education” in the task-oriented supportive comments, but in this case, it was the boy-gendered studios that contained proportionally more comments relating to education, with the chi-square test documenting a significant relationship (p<0.05). Finally, the “check-in” subcategory appears to hold substantially more comments for the boy-gendered than girl-gendered studios; the corresponding chi-square test confirmed a significant relationship ($X^2 (1, N=938) = 17.46, p<0.05$).

**Unsupportive Sub-categories**

Comments that were negative towards a studio were classified as unsupportive. The socioemotional category under unsupportive had a total of four subcategories: discriminatory accusations, argumentation, condescending and disapproving. Task-oriented had three categories; intrusive, administrative and educational. For boy-gendered studios the distribution of comments were as follows; discriminatory accusation 32.8% (22), 26.9% (18) argumentation, 19.4% (13) condescending and 20.9% (14) disapproving (see figure 10 left-side). Girl gendered studios had the following distribution; discriminatory accusation 26.4% (19), 19.4% (14) argumentation, 20.8% (15) condescending and 33.3% (24) disapproving (see figure 10 right-side). Looking at unsupportive task-oriented comments for boy gendered studios, these were the results; 48.3% (29) intrusive, 40% (24) administrative and 11.7% (7) educational (see figure 11 left-side). Girl gendered studios had the following distribution; 51.4% (19) intrusive, 35.1% (13) administrative and 13.5% (5) educational (see figure 11 right-side).

From the themes that surfaced and had categories created for them, discriminatory accusations and disapproving were of most interest. An individual chi-square test was performed for both categories to determine if there were any significant relationships. Both test showed that the number of discriminatory accusation and disapproving comments did not have a statistically significant (p>0.05) relationship with the type of gendered studio. No tests were performed on the unsupportive task-oriented subcategories because no large differences were observed between them.
Figure 10: Comparison of unsupportive socioemotional comments for boy- and girl-gendered studios.

Figure 11: Comparison of unsupportive task-oriented comments for boy- and girl-gendered studios.

**Other Influential Factors**

Throughout the studio comments the frequency of influential factors surfacing was low. There were fifteen instances all together with thirteen in the girl gendered studios and two in the boy gendered studios. From the five influential factors used in this study, all but internal support was observed within the girl gendered studios while internal support and stereotypes were the only ones in boy gendered studios. Collectively, the most popular factor was stereotypes, which was observed six times. The least occurring factor was a tie between both internal support and role models with each having one instance. For descriptions of each factor, see appendix A and for examples, see appendix C.
Chapter 5. DISCUSSION

I have presented an analysis of comments posted in studios that were sampled as representatives of the gender-exclusive project studios that are enabled by the Scratch online environment. In the following sections, I first discuss what my analysis revealed about the nature of support that was apparent for the boys-only versus girls-only studios. Next, I discuss what I learned in response to my secondary research question concerning the possible connections to factors identified in other literature as influential in girls’ tendency not to pursue CIS education and careers. After presenting my primary findings, I discuss the implications that the designers of Scratch or similar environments might consider; I conclude with a brief discussion of methodological reflections and a consideration of future directions for research.

Supportive and Unsupportive Comments in Gendered Scratch Studios

Both types of gendered studios received more supportive comments than unsupportive comments. If we were to answer this research question solely by considering this pattern, then I would simply report the contribution of supportive commentary was similar for both boy- and girl-gendered studios. However, one important difference between the studios was the amount of comments that had been contributed (recall that these were chosen though random sampling). Girl-gendered studios had a higher number of comments with a total of 738 (average 36.9) while the boy-gendered studios contained 477 comments (average 23.85). One interpretation of this overall higher level of commenting is that there is more tendency to contribute comments at all to girl-gendered studios, and that in terms of absolute numbers of supportive comments, the girl-gendered studios are attracting significantly more support (but more unsupportive comments as well). This may indicate that being “girls-only” in a programming environment like Scratch is more worthy of attention and comment.

A related finding was the statistically significant relationship between the gender of a studio and a user’s desire to become a part of the studio. The subcategory of “desire to belong” reflects users who are “passing by” but express an interest to join the studio. In other words, there were likely more users who searched for girls-exclusive studios, found them, and became engaged by their gendered status than there were users who did the same thing looking for boys-exclusive activities. This subcategory is important because unlike others, all of its comments are
reflective of a Scratch user who is just discovering the studio. Other supportive subcategories can
be from either studio members or non-members, but given the limitation of individual comments
as the unit of analysis, it is not always possible to make this distinction.

Beyond expressing a desire to belong, I was able to explore other types of support that
users would leave. For both types of gendered studios, the most numerous type of support was
“idle conversations.” This particular type of content was not of particular interest for my research
goals; it basically consisted of group members who were greeting one another or talking about
day-to-day activities. These types of comments were categorized as support because if a user is
willing to have a normal conversation within the studio, then they are implicitly supporting the
characteristics of the studio. The supportive subcategories of “defensive” and “condescending”
were another pair that has similar proportions across both genders. A consistent example within
comments coded as defensive was studio members who reacted to the existence of the one
gender (boys or girls) by proposing to create their own exclusive studio as well.

Unsupportive comments were more uniform across subcategories for the two genders. Comments that fell in the socioemotional subcategories of discriminatory accusations,
disapproving and condescending were mirrored between genders. For example, a comment
calling a girl-gendered studio sexist might have a similar comment in a boy-gendered studio (i.e.
you are sexist because you do not include all genders). A subcategory that held more noticeable
differences across genders was “argumentation.” One example was users leaving comments on a
boy-gendered studio expressing the argument that all people come from women and therefore
any exclusion of girls is wrong. This type of argument is not one that users could leave on a girl-
gendered studio because it would not appropriately support their standpoint on including boys.
There were few analogous arguments on the boy-gendered side.

There were no other significant distinctions that were recognized from the unsupportive
comments that were found across both types of gendered studios. Unsupportive comments were
rarely about one gender being better than the other. Instead, they were primarily about everyone
being equal and deserving to share the same space, which could be why the bulk of unsupportive
comments had a uniform feeling.
Other Influential Factors

I found very few instances of the factors identified in the literature as influential on girls’ attraction to CIS. This reinforces what has been said throughout the body of literature. With Scratch being used primarily by young people in the middle school age range (11-13 years old), it is likely that they have not been exposed to the negative stereotypes of CIS that creates negative attitudes and drives many individuals away from the field.

Although Scratch users may not have directly mentioned these influential factors within their comments, their actions do seem to be reflective of some of these issues. For example, it was common for girls to defend their gendered studios by stating that it was a space for them to talk about “girl stuff.” Why could they not talk about that stuff in any studio? I can speculate that the greater quantity of commenting and general activity in girl-gendered studios may reflect a sense of discomfort that they may feel within studios where gender exclusion is not a characteristic. This discomfort could be an early warning that stereotypes of women in CIS are being introduced to these users.

Design Implications

As part of my analysis, I found one studio that the Scratch Team had addressed directly because of its gendered status. When doing so, they left behind this comment for all users to see:

"Hello, as several Scratchers have pointed out, exclusionary studios are generally considered to be against the Community Guidelines, since Scratch is welcoming for all. That's why the parts of the studio title & description that seemed to limit participation in the studio to girls only have been removed by the Scratch Team. I hope this studio can continue to be used, but that no groups of Scratchers will be excluded going forward. If anyone has any questions, please feel free to ask me. Thanks!"

This appears to be the official approach that Scratch administrators have decided to use in handling studios that are created with a gendered setting. The Scratch community policies state that all studios should be welcoming to everyone and thus the administrators are following this
guideline when they remove content that is exclusionary. However, taking this somewhat simplistic approach misses the opportunity to guide and educate the young users of Scratch in the importance of inclusion and encouragement. Instead of simply restating the rules of the community, the Scratch Team might offer guidelines for how to create or alter a studio to focus on the encouragement of girls while not excluding boys’ involvement. In other words, creating a studio that instead of being gendered, focuses on a specific gender with the purpose of celebrating and encouraging those who identify with it. One of the studios I found, “Girls Who Code,” is an example of a studio that achieves the inclusion of everyone, but also focuses on a specific gender. Scratch might use studios like this as an example when they write their guidelines, and as a reference for those looking to create studios with a similar purpose.

More generally, I would argue that deleting content in gendered studios should be avoided. By deleting content, the Scratch Team may be eliminating a safe space where girls are being supported in their goals related to CIS, goals that may not be supported in other realms. In fact is a possibility that users may either never notice or even deliberately disregard the “be inclusive” suggestions made by the Scratch team, which would then require the administrators to delete the exclusionary content themselves. Instead, I would suggest that a warning system is implemented to provide a chance for users to re-vamp their gendered studios, with the last resort of explicit editing of content used only for users who ignore these warnings. Combining the ideas of guidelines and a warning system could look similar to how Scratch is currently approaching to contact users about their gendered studios. Leaving a comment on studios that links users to the set of guidelines and lets them know that they have a certain amount of time to make the necessary changes before the Scratch Team steps in. This approach provides a better solution to what Scratch is currently doing. It educates users in the importance to be inclusive and encouragement while having a system in place that still allows the forceful removal of content when users do not comply.

Scratch users are primarily pre-teen and teenage boys and girls, which is why personal and social safety was prioritized in its design. For example, there is no private messaging and comments at all levels are public for everyone to see and participate. Although this transparency in Scratch promotes safety for its users, it does allow for unsupportive comments. These unsupportive comments are not necessarily inappropriate or wrong, however, they may be upsetting to the users they target. To reduce the number of these negative interactions, the studio
comment sections should be kept public for everyone to view, but participation restricted to only those who are members of the studio. This would allow those who do not agree with the studio to simply report the studio or comments and avoid spreading their unsupportive outlook to those who are members of the studio. In other words, if the studio is violating Scratch rules, then it can be addressed by the Scratch Team in an appropriate manner that does not create disincentives for anyone who wants to continue their participation in these engaging programming activities.

Methodological Reflections

The highly interpretive approach that I chose to use had important consequences for how I organized and conducted this study. Interpretive methods rely on rich data, and because I did not have access to the users leaving the comments, I adopted the hermeneutics intensives text-interpretation approach for analysis. I recognize that my interpretation of usernames and pre and post comments to establish context for any given comment is a function of my own perspective, and might yield rather different results for different analysts working on the data. This interpretive frame is an inescapable element of such methods.

The impact of my interpretative frame is something that I considered and accepted early on in the research planning. I followed best practices to maintain consistency in analysis and coding (being well rested, fed, good mood, etc.). Although I could have integrated even more context into my efforts at understanding, I did not have the time or other resources to expand my methods to include other elements in the Scratch environment, such as users’ profile pictures or the dates on which the comments were left. The injection of these data into my analysis might have established even better context for interpretation, leading to a richer and more accurate understanding. However, that will remain a task for future research.

Another methodological issue is the manual methods that I developed for studio retrieval and sampling. Although I followed the search, retrieval and sampling method as carefully as possible, this process was completed by a human and is therefore prone to human error. Automated methods for data collection were explored (e.g., “crawling” the studios to create a more easily analyzed digital text record); however, I found that to do this I would need Scratch APIs that were deprecated in 2015 and currently unavailable. Reaching out to Scratch for a possible solution was not an option because of the timeframe for completing the thesis project.
Similar future studies should take the time to try different data collection methods so that they have sufficient time to refine or alter it.

Future Directions

In response to gendered studios, I noted a few instances where users would create an “all gender studio.” This was a way that users showed that they did not support the concept of a gendered studio. Those who supported gendered studios, but also wanted to justify its gendered status would sometimes create both a girl- and boy-gendered studio. In both cases, they would promote the existence of these studios within the comments of the other gendered studio. Exploring these studios that were created as a reaction to gendered studios might be an interesting topic for future study. With their primary purpose being to defy or support gendered settings, it would be interesting to analyze their forums to understand what kinds of discussions users are having and to measure how successful they are in terms of activity.

Throughout my analysis, an interesting observation was the role that a studio’s primary purpose had on the comments section. Studios that used their title and profile picture for a purpose other than their gendered status saw less resistance towards this status. For example, a role-playing game (RPG) studio might be for girls only, but seemed to promote little push-back. These types of studios would state their gendered status within their description, but it would be surrounded by other content related to their primary purpose. A possible reason for the lower amount of resistance is that when users browse through Scratch, they only see the titles and images of studios. They need to click on the studio and read its description to find that it is gendered. Further analysis of these studios with a gendered status as a secondary characteristic would also be of interest. Such a study might shed light on why there seems to be less argumentation about gendered status in these cases. Is it because Scratch users are just not seeing these studios’ claim to being a gendered setting? Or is it that the primary purpose of the studio does not appeal to the opposing gender and therefore they do not mind it being gendered?
Chapter 6. CONCLUSION

Curricula addressing computing and programming skills is not a requirement in K-12, which may result in missed opportunities for both male and female students. Although introduction to the CIS field is a problem for everyone, once enrolled in the field, women continue to struggle with problems exclusive to their gender. Facing stereotypes and not having the necessary support system has led to a low retention rate of women in CIS. These negative CIS stereotypes have been reported to manifest sometime around the middle school age range, which means that this may be the best timeframe to intervene. With a significant amount of empirical studies taking the approach of after school programs and curriculum injection, the online context has received little attention, leading me to conduct the study reported here.

With online spaces such as that associated with Scratch programming, the opportunity for people to learn about CIS has become more pervasive and more attainable, even outside standard K12 learning activities. Whether these online spaces are supportive of females participating in CIS is something that needs to be further explored. Throughout this study, I found that girls in Scratch seem to be more likely to create gendered groups and that these groups attract more attention and activity than their boy-gendered counterparts. The larger number of groups and activity can be interpreted in two ways. First, the much larger number of girl-gendered studios could be an outcry by girls looking for a safe space to be themselves and identify with others like them. Second, it may simply be that girl-gendered groups will always receive more support than boy-gendered groups in an online CIS environment (e.g., perhaps on average girls are more tuned to providing support for one another). Regardless of the reason, an opportunity is being lost to debunk stereotypes and educate children in a crucial age about the importance of inclusion and encouragement in CIS.
Bibliography


Coleman, H. L. (2009). THE PERSONALITY TRAITS OF INSTRUMENTALITY AND EXPRESSIVENESS IN RELATION TO MICROCOMPUTER.


# Appendix A

## Coding Scheme Descriptions

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supportive</strong></td>
<td></td>
</tr>
<tr>
<td>Socioemotional</td>
<td></td>
</tr>
<tr>
<td>Appraisal</td>
<td>Admiring the group’s purpose such as their gendered status, overall message or popularity.</td>
</tr>
<tr>
<td>Defensive</td>
<td>Justifying characteristics of a group through logical, biological, political or religious statements.</td>
</tr>
<tr>
<td>Condescending</td>
<td>Comments that reflect sarcasm and are patronizing with the intent of making the opposing members seem wrong in their way of thinking.</td>
</tr>
<tr>
<td>Idle Conversation</td>
<td>Any discussion between users that has no significant purpose (i.e. how are you, how's your day, etc.)</td>
</tr>
<tr>
<td><strong>Task-oriented</strong></td>
<td></td>
</tr>
<tr>
<td>Desire to belong</td>
<td>Users who express a want to become a part of the Studio. This includes asking to join the studio, filing an application for the studio or providing your own work to show worthiness of becoming a part of the studio.</td>
</tr>
<tr>
<td>Educational</td>
<td>Providing or asking for any form of information or knowledge. This can include asking or answering any who, what, when, where and how questions. This can relate to any Scratch or non-Scratch questions, answers or information.</td>
</tr>
<tr>
<td>Promotional</td>
<td>Advertising projects, other studios or users.</td>
</tr>
<tr>
<td>Administrative</td>
<td>Anything that refers to maintenance of the Studio. This includes things like adding new curators, removing inactive users, adding new projects into the studio and other such tasks.</td>
</tr>
<tr>
<td>Check-in</td>
<td>Users looking for a response from others, but not receiving one.</td>
</tr>
<tr>
<td><strong>Unsupportive</strong></td>
<td></td>
</tr>
<tr>
<td>Socioemotional</td>
<td></td>
</tr>
<tr>
<td>Discriminatory Accusations</td>
<td>Calling a group out on their gendered status.</td>
</tr>
<tr>
<td><strong>Argumentation</strong></td>
<td>Comments that are creating an argument through logical, biological, political, or religious standpoints with the intent to oppose the group’s beliefs or characteristics.</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Condescending</strong></td>
<td>Comments that reflect sarcasm and are patronizing with the intent of making the opposing members seem wrong in their way of thinking.</td>
</tr>
<tr>
<td><strong>Disapproving</strong></td>
<td>Stating your opposition to the studio by either stating so or rejecting to conduct a requested action(s).</td>
</tr>
<tr>
<td><strong>Task-oriented</strong></td>
<td></td>
</tr>
<tr>
<td>Intrusive</td>
<td>Breaking the rules of a studio on purpose (e.g. a boy joining a girl only studio) or conducting any actions to disrupt the studio such as spamming random text throughout the comments.</td>
</tr>
<tr>
<td>Administrative</td>
<td>Comments that are in reference to the elimination or change of a studio. This can include reporting the studio or demanding it to change part of its characteristics.</td>
</tr>
<tr>
<td>Educational</td>
<td>Providing or asking for any form of knowledge. This can include asking or answering any who, what, when, where and how questions. This can relate to any Scratch or non-Scratch questions, answers or information.</td>
</tr>
<tr>
<td><strong>Undisclosed</strong></td>
<td></td>
</tr>
<tr>
<td>Mutual agreement</td>
<td>When two or more parties who based on context were either supportive or non-supportive, come to a mutual agreement (i.e. we were both mean to each other, I am sorry).</td>
</tr>
<tr>
<td>Seeking understanding</td>
<td>Someone who does not take sides and just asks questions in regards to the studio’s characteristics.</td>
</tr>
</tbody>
</table>

Table 3: Coding scheme descriptions
# Appendix B

Analogous Table for Sampled Studios

<table>
<thead>
<tr>
<th>Studio</th>
<th>Projects</th>
<th>Comments</th>
<th>Followers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dragon Slayers</td>
<td>22</td>
<td>98</td>
<td>8</td>
</tr>
<tr>
<td>Westminster Under</td>
<td>7</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Boys Only</td>
<td>15</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>The DUDE Zone</td>
<td>9</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Boys only!!!</td>
<td>16</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Boys only studio</td>
<td>9</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>COOL BOYS ONLY</td>
<td>2</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>YISS BOYS ONLY</td>
<td>21</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>BOYS CLUB</td>
<td>29</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Markyjay and Jakeyjude’s studio</td>
<td>75</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Beastie boys</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>The Cool Boys club</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>THE PACK (NO GIRLS)</td>
<td>1</td>
<td>75</td>
<td>9</td>
</tr>
<tr>
<td>Boys Rules! (Hangout)</td>
<td>49</td>
<td>111</td>
<td>10</td>
</tr>
<tr>
<td>Boys rule!</td>
<td>5</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Boy Studio</td>
<td>0</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>boys rule!</td>
<td>1</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Flirt with me! (Boys only)</td>
<td>0</td>
<td>28</td>
<td>0</td>
</tr>
<tr>
<td>Maze Runner Studio</td>
<td>1</td>
<td>47</td>
<td>3</td>
</tr>
<tr>
<td>Boys only club</td>
<td>0</td>
<td>27</td>
<td>3</td>
</tr>
<tr>
<td>GIRLS ONLY STUDIO!</td>
<td>52</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Girls Only: /</td>
<td>8</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Studio Name</td>
<td>Girls Only</td>
<td>Girls Only (except for my brother)</td>
<td>Girls Power!!!</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>------------</td>
<td>------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Seaside House RPG</td>
<td>4</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>FOR GIRLS ONLY! SOLO PARA CHICAS! MENINAS SOMENTE!</td>
<td>86</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>[Removed by ST – please be welcoming to all]</td>
<td>178</td>
<td></td>
<td>259</td>
</tr>
<tr>
<td>Girls Only ♀</td>
<td>4</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>GIRLS POWER!!!</td>
<td>18</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>GIRLS ONLY!!!!!!!!!!!!</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Girls Only Studio!</td>
<td>4</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>GIRLS ONLY (except for my brother)</td>
<td>0</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>It’s a Girl Studio!</td>
<td>23</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>Gothic Girls</td>
<td>4</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>girls rule</td>
<td>33</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Girls rule</td>
<td>9</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>GIRLS RULE</td>
<td>9</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Cute girls projects you think I would like &lt;3</td>
<td>17</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>girls rule!</td>
<td>12</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>No Boys Allowed</td>
<td>29</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Girls Rule!</td>
<td>3</td>
<td></td>
<td>34</td>
</tr>
</tbody>
</table>

Table 4: Analogous table for sampled studios.
Appendix C

Coding Scheme Subcategory Examples

Supportive

Socioemotional

Appraisal

![Example of appraisal category.](image1)

Defensive

![Example for defensive category.](image2)

Idle Conversation

![Example of idle conversation category.](image3)
Condescending

![Example of supportive condescending category.](image1)

**Task-oriented**

**Desire to Belong**

![Example of desire to belong category.](image2)

Educational

![Example of supportive educational category.](image3)
Promotional

Figure 18: Example of promotional category.

Administrative

Figure 19: Example for supportive administrative category.

Check-in

Figure 20: Example for check-in category.
Unsupportive

Socioemotional

Discriminatory Accusations

Figure 21: Example of discriminatory accusation category.

Argumentation

Figure 22: Example of argumentation category.

Condescending

Figure 23: Example of unsupportive condescending category.
Disapproving

Figure 24: Example of disapproving category.

Task-oriented

Intrusive

Figure 25: Example for intrusive category.

Administrative

Figure 26: Example for unsupportive administrative category.

Educational

Figure 27: Example for unsupportive educational category.
Undisclosed

Mutual Agreement

Figure 28: Mutual agreement example.

Seeking understanding

Figure 29: Seeking understanding example.