Chapter 33
Fun for All: Promoting Engagement and Participation in Community Programming Projects

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Author's Note, Funology 2

When we wrote this chapter in 2003, we were in the midst of a long-term engagement with residents of Blacksburg, Virginia, USA, as research participants in the Blacksburg Electronic Village project, the first Web-based community networking project in the U.S. (Carroll and Rosson 1996). During the ten years we lived in Blacksburg we continuously worked with a variety of community groups on various projects around the theme of integrating information and technology infrastructures into community life. Since that time, community informatics (the design and appropriation of computational systems in support of geo-located communities) has expanded and gained more prominence in HCI and CSCW research (Carroll and Rosson 2013). Through that same period, research on tools and methods for end-user programming and development has continued, though there has still been relatively little attention to community applications of novice programming (Paternò 2013).

Our current research in community informatics is situated in another small university town (State College, PA, USA). Our design palette has moved from more accessible desktop systems to 24 × 7 mobile computing devices and their apps as new infrastructures for community activity (Carroll et al. 2015). We decided not to revise this chapter, as it still reflects our enduring interest in motivating and elevating technology-mediated activities by residents to enhance participation, engagement and well-being of their communities. Instead we comment briefly on several themes in the chapter with illustrations from ongoing work.

With the emergence and pervasive adoption of smartphones, access to information and computation has become omnipresent for many individuals. At the same time, the footprint of the devices and the activities they can host has shrunk enormously—especially for younger community residents, there are strong expectations that all applications will be usable on a smartphone. This has shifted

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the focus from activities that could involve significant "construction" effort (e.g., programming a visual simulation) to ones that leverage information that is collected automatically (e.g., from sensors and logs) or incidentally as a side effect of other activities (e.g., interactions via social media). As a result, many of the future opportunities for community applications will have a data-centric orientation. The concept of "supra-thresholding" (Carroll et al. 2015) is an example: it refers to computational methods for collecting and aggregating community information that on its own would be too sparse and distributed to grasp, but that can raise awareness and promote evidence-based decision making.

A central proposition in our original chapter is that by making programming fun we can attract and engage a more diverse constituency of community members in programming-related activities (e.g., senior citizens, youth). Fun continues to be an important user experience design goal for many situations and we always consider ways to enhance pleasure or enjoyment when we build community apps. But our approach to "fun" has become more nuanced and embedded in the particular apps we create. Examples include remembering and contributing to the history of a community location (Han et al. 2014a), contrasting and appreciating different views of community events (Han et al. 2014b), sharing a locale-specific image or thought that makes you happy in the moment (Carroll et al. 2015), and helping groups of elders coordinate everyday projects and events together (Wirth et al. 2016).

Another theme in the original chapter was the potential attractiveness of intergenerational activities, in particular collaboration across age groups who bring differing sources of motivation or expertise and thereby take on complementary roles. Intergenerational collaboration seems a highly significant community resource today in a context of shrinking and threatened social services, and a rapidly growing demographic of healthy aging people. We have investigated the concept of "developmental learning community": collectives comprised of individuals with different knowledge and skill, and with a commitment to helping one another develop skills and knowledge (Rosson and Carroll 2006, 2013). In this broader view, including multiple generations in a new community activity is one step toward creating a fruitful context for shared learning and growth.

2003 Chapter

1 Introduction

1.1 Programming as a Community Activity

The increasing pervasiveness of community networks has opened new channels for community interaction (Carroll and Rosson 2001). Residents may email questions or suggestions to town officials or leaders of other organizations (Cohill and Kavanaugh 1997); parents may contact public school teachers online, and track their children's weekly activities through regular email bulletins; community elders may share their memories and wisdom with community youth (Carroll et al. 1999; Ellis and Bruckman 2001). However, such activities are discretionary: residents must first believe that the new opportunities will be rewarding, if they are to take the time to investigate and participate (Rosson et al. 2002a).

We are exploring the motivational characteristics of community-oriented collaboration in the CommunitySims project, where diverse members of our local community cooperatively design and build visual simulations that raise or illustrate community issues (Rosson et al. 2002a). Participants plan, share, and discuss their projects via a Web site [communitySims.cs.vt.edu]. Our initial studies have centred on interactions between middle school children and community elders. Prior work has shown that children of this age are able and motivated to work with visual simulations (Rader et al. 1997); elders may be less likely to become simulation programmers, but several studies have demonstrated their willingness and availability for youth-mentoring activities (Ellis and Bruckman 2001; Oneill and Gomez 1998; Wissman 2002).

Our earlier papers have described the problems experienced by students and elderly residents learning to use Stagecast Creator (Seals et al. 2002; Wissman 2002), the participatory design of community simulations (Rosson et al. 2002a), and the nature of cross-generational collaboration (Rosson et al. 2002b). In this brief case study, we focus more specifically on participants' subjective reactions to the community-oriented simulations and to the process of simulation programming.

2 The CommunitySims Project

2.1 The Stagecast Creator Environment

CommunitySims projects are constructed with Stagecast Creator, a visual programming environment designed to allow children and other nonprogrammers to build simulations by example (Smith and Cypher 1999). Users construct simulations by creating a "stage" (a rectangular grid) of animated characters. Each character is given one or more visual appearances, along with a set of rules enabling them to move, change appearance, create or delete other characters, and so on.

Figure 1 shows a CommunitySims project—a schoolyard fight. The students and the teacher are characters, as is the door. The visual *before-after rule* in the lower part of the figure illustrates the visual programming paradigm: if the "before" condition for a rule is met (the visual state of the world and the conditions specified on the left of the rule), the "after" actions are performed (in this case, each of the actions changes the character's appearance). The starting condition always specifies a visual context (here, the two boys next to each other, facing forward), though it may also specify values for variables defined globally or for each character. A key

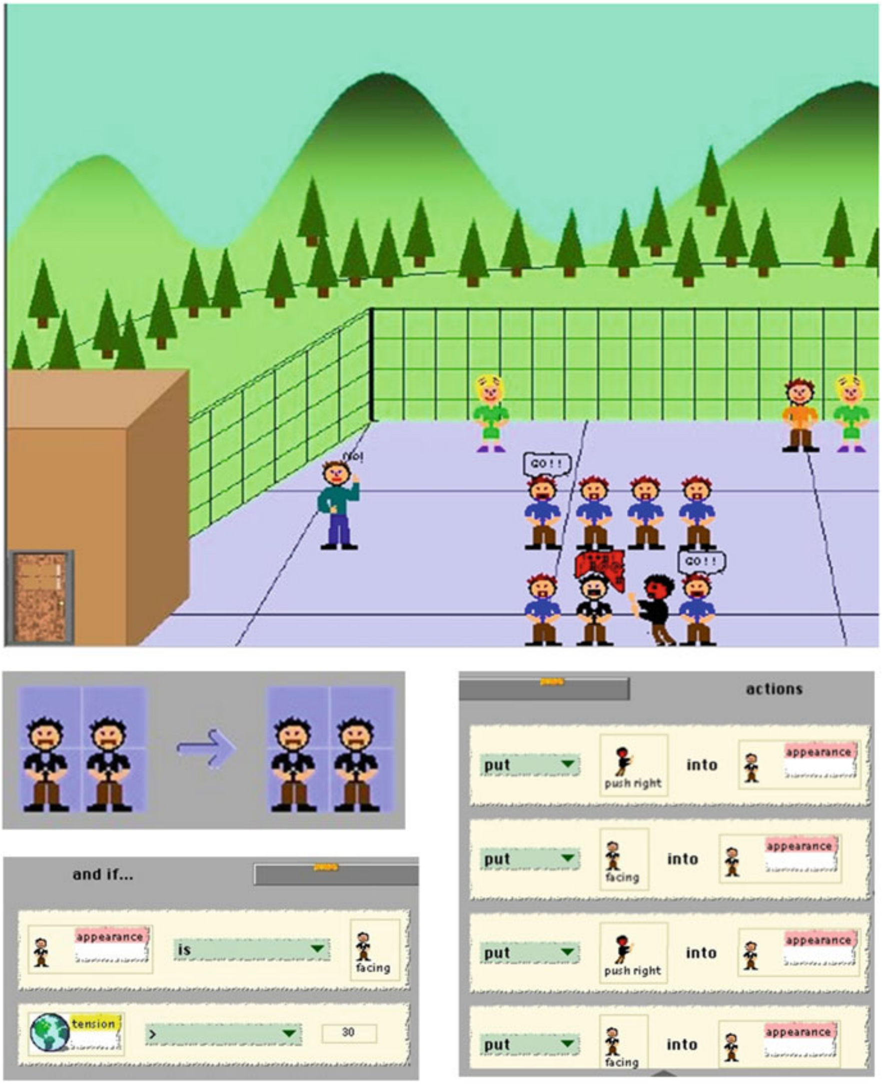

Fig. 1 Stagecast Creator sample simulation and code

challenge in Creator programming is to map simulation objects and behaviours onto visual effects (Rosson et al. 2002a; Seals et al. 2002). For instance, in the schoolyard fight, changes in "tension" cause the boys to begin pushing and hitting each other.

2.2 Cross-Generational Programming Workshops

To study the collaborations between students and adult residents, we organized two community simulation programming workshops: three women and four boys came to the first workshop; one woman and three girls to the second.[1] Attendees were recruited through email messages or phone calls; each individual was offered a small stipend ($30) as a thank-you for participating in the one-day event.

We wanted the workshops to be a friendly and supportive environment in which middle school students and elderly women could meet and learn about one another, and collaborate on programming projects. Although most of the students knew each other in advance from school, and several of the women knew one another from other community activities, the students and women had never met; an important side goal of the workshop was to introduce them to each other.

Our research team was available to coach and answer questions as needed, so that participants did not feel that they were being "tested"; instead we encouraged them to try out the visual programming examples and tools, and to explore their own ideas for community simulations. Although we planned to characterize the workshop activities for research purposes, we also hoped to initiate and facilitate a small set of informed and motivated community members who could participate in future CommunitySims activities.

All of the participants had previously been introduced to the Creator programming. The women received their training as part of an experiment comparing the efficacy of two different tutorials (Wissman 2002); the students were trained during a study of collaborative learning with a minimalist tutorial (Seals et al. 2002). We limited the adult participation to women because our earlier work had suggested that elderly women have more intrinsic interest in the visual programming supported by Stagecast Creator than their male counterparts (Wissman 2002).

The students (ranging in age from 12 to 14) reported greater experience with computing than the women (all over 70 years of age). For example, students have had more years of computer use and describe a greater variety of computer-based activities, than the women. An important specific difference is the relative experience with "programming" activities, such as the creation of spreadsheets and Web pages. The students also reported experience with graphics or drawing tools; none of the women had used such tools.

Both workshops followed the same schedule and provided participants with the same materials and activities:

- Introduction to CommunitySims; brief statements of personal interests and background with computing.
- Use of CommunitySims Web site; logging on, opening, running, and commenting on the example simulations. The example simulations were:

[1]Two additional elderly women were scheduled to participate in the second workshop, but last-minute personal problems prevented them from attending.

  - *Smoking Kids* (two kids smoke, get sick, collapse); *Schoolyard Fight* (kids argue, yell, fight until teacher arrives); *Flirting or Hurting* (cute guy harasses girls in hallway); *Noise Pollution* (noisy neighbourhood party); *Smart Road* (weather affects road conditions); *Cliques* (groups form on playground); and *Classroom Bully* (a boy beats up on other kids).

- Survey of subjective reactions to the example simulations, as well as on a larger set of hypothetical simulation features.
- Refresher tutorial on Creator; review of basic skills as well as more advanced techniques.
- Group formation, with each woman joining one or more students; due to absent participants, two girls were paired with researchers.
- Collaborative work extending 1–2 example simulations.
- Collaborative work generating and elaborating ideas for 1–2 new simulations.
- Collaborative work building a new simulation.
- Survey of general reflections and project goals.

Throughout the day, research team members assisted attendees and took notes. We used two digital recorders to capture the discussion among participants. In the following section, we discuss participants' general reactions to the workshop activities, along with more specific reactions to the example simulations and to a set of hypothetical simulation features. A more extensive analysis of the collaboration episodes between the students and women can be found in Rosson et al. (2002b).

3 Participant Reactions

3.1 General Reactions to Workshop Activities

At the end of each workshop, participants completed a survey that included questions about how easy it had been to extend or build new simulations, and what might be done to facilitate their shared programming with partners. The group was moderately positive about the overall collaboration experience (averaging 3.73 on a 5-point scale). During the workshop, we noted many cases in which students were advising one another, observing each other's progress, and in general promoting a sense of activity and excitement in the projects underway. However, several participants voiced concerns about the difference in ages:

W2: "I was overwhelmed and could not keep up with teenagers."

W3: "The young folks are so aggressive with the computer."

G1: "Just make sure that your partner is someone of around the same age so you will agree on more things."

These comments caused us to speculate that real-time collaborative programming may not be the most effective way to establish cross-generational interaction.

Our future research will focus on asynchronous collaboration where community elders suggest topics and guide students toward community issues; pair or small-group synchronous collaboration on programming projects will be limited to same-age participants.

Participants also rated their interest in future work with CommunitySims activities. Figure 2 graphs responses to four questions: the extent to which Creator simulations help to build community; whether participants want to build, or to refine simulations; and how well they know the Creator tool.[2] Whereas the students were moderately positive in these final ratings, the women's ratings suggest more uncertainty about future activities. Notably, the average student rating of Creator understanding was 4.0 whereas the women's average was 2.5. However, the women seem to have accepted our community education goals more than the students; the women's agreement that Creator simulations can help to build community was 3.25, compared to a rating of 2.71 for the students.

Participants' open-ended comments reinforced the patterns seen in the rating data. All 11 participants answered "yes" to a question asking if they wanted to continue in the CommunitySims project. But the nature of participants' future plans varied: three of the four boys tied their interest to game development (B1: "I'd like to make games out of existing sims"), whereas all four of the girls conveyed more general positive reactions (G3: "Yeah, I though it was really fun when we got to make our own world and that kinda stuff"). Although the women also answered affirmatively, each was careful to qualify her future involvement (W4: "Yes, but I need to have more knowledge about creating a CommunitySims project").

3.2 Reactions to the Example Simulations

A specific research goal of the CommunitySims workshops was to study the features of simulations that make them more or less appealing to the middle school students and the women. One source of relevant data comes from participants' use of and reactions to the seven example simulations. These simulations were explored during the initial use of the CommunitySims Web site, and were also used during the "refresher" training provided in the first few hours of the workshop.

During exploration of the example simulations, participants were encouraged to leave comments; across all seven examples, 22 comments were made by students, 4 by women. When we examined these comments, we found that the women commented on the community issue the simulation had been built to raise. For instance, W2 reacted to Noise Pollution: "I agree that courtesy demands speaking to the neighbours first before calling police. Also, where is a responsible adult?" In

[2]We provide average ratings and associated graphs as a way to point out interesting patterns, but have refrained from statistical tests or more conclusive inferences due to the very small sample size.

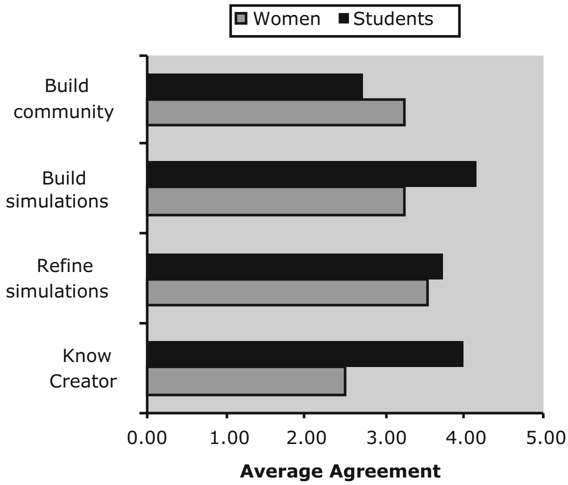

Fig. 2 Final ratings women ($N = 4$) and students ($N = 7$) regarding future work with CommunitySims

contrast, the students focused on simulation usability or realism problems (e.g., "OK…I don't see what is happening here. This one is too short to understand."). We speculate that the women took the topics of our example simulations more seriously, and that they were more motivated to initiate community-oriented discussion. This is consistent with their somewhat stronger agreement that Creator simulations can help to promote community discussion (recall Fig. 2).

After exploring the CommunitySims Web site, participants were asked to choose the example simulation that they thought was most *fun* to use, most *educational*, and *least useful*. There was considerable agreement about what was most educational (Smoking Kids, 7/11) and least useful (Smart Road, 8/11). There was less agreement about what was most fun, although 4/7 students chose Classroom Bully because "it was funny". In general, participants reported that they preferred simulations that had a clear message, or that "did" something. It is difficult to visualize the impact of a smart road (it measures changes in a car's movements) or a noisy neighbourhood party, whereas it is very obvious that a bully has hit someone, or that a kid has collapsed after smoking for a while.

3.3 Ratings of Hypothetical Simulation Characteristics

Also after exploring the sample simulations, participants completed 21 scales rating the extent to which a hypothetical simulation characteristic would make it more "fun". We created the list of possible characteristics by reviewing the simulations we had built or viewed, and by brainstorming characteristics we felt might be attractive. We included concepts we expected to be appealing to middle school students (e.g., cute, silly), but also "serious" characteristics that we thought might increase enjoyment by adults (e.g., educational, matching the real world).

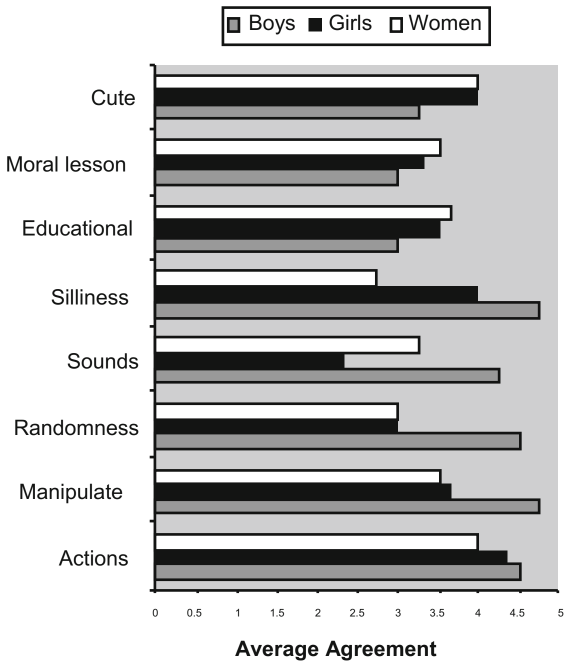

Fig. 3 Ratings of hypothetical simulation characteristics, for boys ($N = 4$), girls ($N = 3$), and women ($N = 4$). The scales rated agreement (1 = Strongly Disagree; 5 = Strongly Agree) that the given feature would make a simulation more fun

Many of the features produced fairly neutral responses, and did not evoke different responses from the boys, girls, and women. However, a few features produced more interesting patterns (Fig. 3). For example, the highest "fun" rating overall (4.27) was given to "The different actions and movements of the characters"; this rating also produced considerable agreement across the boys, girls, and women. This finding has a simple interpretation—the participants complained that several of the example simulations were boring or had too little action, so it is possible that frustration with these simulations caused action to be highly valued.

At the same time, Fig. 3 suggests that not all of the characteristics evoked the same ratings from the different subgroups. For instance, the boys were more positive than the women or girls about simulations that could be manipulated, or that included random behaviour or sounds. Although both the boys and girls gave "silliness" a relatively high rating, the boys tended to have less favourable reactions to educational themes, moral lessons, or "cuteness" in a simulation. Surprisingly, across all 21 ratings, the girls' reactions were more similar to those of the women ($r = 0.37$) than to the boys' ($r = 0.03$). This leads us to speculate that gender-related concerns or biases may better predict enjoyment of different simulations than age.

A simple interpretation of the boys' ratings is that they believe they will have more fun with simulations that appear and behave like computer games (randomness, manipulation, sounds). This interpretation is consistent with the general observation that all of the boys attempted to add game-like features to the example simulations (e.g., a flying bird that "bombs" other birds). In general, our results suggest a new requirement for the ongoing work of generating and refining community-related simulations—namely how to raise or provoke a real world community issue while also making the simulation interactive and game-like.

4 Discussion and Future Work

4.1 Summary of Workshops and Reactions

We conducted two workshops to investigate community residents' reactions to cross-generational programming, and to explore features of community-oriented simulations that might make them more or less intrinsically interesting to different user groups. Despite the small group size, we identified several interesting patterns in reactions to the community-oriented simulations.

All of the users agreed that the best simulations are those where the characters "do" something. However, the boys clearly viewed Creator programming as more of a computer game than did the girls or women. We observed that the boys spent considerable time making the example simulations more game-like. With respect to hypothetical features, the boys felt that features such as character manipulation, silliness, sounds, and randomness would make simulations more fun—the same features that would cause the simulations to be more like computer games. At the end of the day, several of the boys expressed an interest in converting CommunitySims projects into games.

4.2 Promoting Engagement and Participation in Community Programming

Our long-term goal is to promote the development and discussion of community simulations that are intrinsically interesting to all segments of the population. Given the findings of these workshops, we are beginning to explore techniques for making a simulation seem more like a game, but still express community issues. For example, the Noise Pollution simulation has been enhanced to include greater variety in the sounds it uses, to enable viewers to "summon" the police, and to send off the party-goers when the police arrive. Our design challenge is to find a way to make the programming fun without trivializing the underlying community issues.

As expected, the women seemed to take our vision of community interaction and education more seriously than the students. During their work with the students, they helped to ensure that projects contained community-specific content. They also contributed issue-oriented comments to the example simulations, and at the end of the day were more likely to agree that simulations could provoke community discussion. Student contributions tended to be more individualistic and game-oriented, emphasizing the importance of modelling by adult community members.

The differing expectations and reactions of our workshop participants has led to a more refined view of community participation in the CommunitySims project. We plan to recruit adult participants by emphasizing the importance of community discussion, pointing to the programming projects as a way of attracting youth to the topics. Where possible, we will join older residents with students willing to take an idea for a project and build it. At the same time, we will recruit students by trying to give the projects more of a game-like character, or perhaps challenging the students to make the projects game-like but still related to community concerns.

Community networks leverage and develop local resources through online collective endeavour. One of the most precious resources any community has is its elders. This has always been true, but today it may be more true. Our elders have been called the civic generation because of their lifelong commitment to community issues and institutions (Putnam 2000). CommunitySims is only a first step, but its goal is to leverage and develop this precious resource through mutually-engaging, cross-generational, collaborative learning.

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References

Carroll JM, Rosson MB (1996) Developing the blacksburg electronic village. Communications of the ACM 39(12):69–74

Carroll JM, Rosson MB (2001) Better home shopping or new democracy? Evaluating community network outcomes. In: Proceedings of CHI 2001. ACM, New York, pp. 372–379

Carroll JM, Rosson MB (2013) Wild at home: the neighborhood as a living laboratory for HCI. ACM Trans Comput Hum Interact 20(3), Article 16

Carroll JM, Rosson MB, VanMetre CA, Kengeri R, Darshani M (1999) Blacksburg Nostalgia: a community history archive. In: Sasse MA, Johnson C (eds) Proceedings of INTERACT 99. IFIP, Amsterdam, pp 637–647

Carroll JM, Hoffman B, Han K, Rosson MB (2015) Reviving community networks: hyperlocality and suprathresholding in Web 2.0 designs. Pers Ubiquit Comput 19(2):477–491

Cohill AM, Kavanaugh AL (1997) Community networks: lessons from Blacksburg, Virginia. Artech House, Norwood

Ellis JB, Bruckman AS (2001) Designing Palaver Tree online: supporting social roles in a community of oral history. In: Proceedings of CHI'01. ACM, New York, pp 474–481

Han K, Shih PC, Rosson MB, Carroll JM (2014a, February) Enhancing community awareness of and participation in local heritage with a mobile application. In: Proceedings of the 17th ACM conference on computer supported cooperative work & social computing. ACM, New York, pp 1144–1155

Han K, Shih PC, Carroll JM (2014b) Local news chatter: augmenting community news by aggregating hyperlocal microblog content in a tag cloud. Int J Hum Comput Interact 30 (12):1003–1014

Oneill DK, Gomez LM (1998) Sustaining mentoring relationships online. In: Proceedings of CSCW'98. ACM, New York, pp 325–334

Paternò F (2013) End user development: Survey of an emerging field for empowering people. ISRN Software Engineering, 2013

Putnam R (2000) Bowling alone: the collapse and revival of American community. Simon & Schuster, New York

Rader C, Brand C, Lewis C (1997) Degree of comprehension: children understanding visual programming environment. In: Proceedings of CHI 97. ACM, New York, pp 351–358

Rosson MB, Carroll JM (2006) Developmental learning communities. J Community Inf 2(2)

Rosson MB, Carroll JM (2013) Developing an online community for women in computer and information sciences: a design rationale analysis. AIS Trans Hum Comput Interact 5(1):6–27

Rosson MB, Carroll JM, Seals CD, Lewis TL (2002a) Community design of community simulations. In: Proceedings of DIS 2002. ACM, New York, pp 74–83

Rosson MB, Seals CD, Carroll JM, Gortner J (2002b) Cross-generational learning and collaboration in simulation programming. Unpublished manuscript, Center for Human-Computer Interaction, Virginia Tech, Blacksburg, VA, 24061

Seals C, Rosson MB, Carroll JM, Lewis TL (2002) Fun learning Stagecast Creator: an exercise in minimalism and collaboration. In: Proceedings of HCC '02. IEEE, New York, pp 177–186

Smith DC, Cypher A (1999) Making programming easier for children. In: Druin A (ed) The design of children's technology. Morgan Kaufmann, San Francisco, pp 201–222

Wirth RJ, Yuan CW, Hanrahan BV, Carroll JM, Rosson MB, Bindá J (2016, November) Exploring interactive surface designs for eliciting social activity from elderly adults. In: Proceedings of the 2016 ACM on interactive surfaces and spaces. ACM, New York, pp 403–408

Wissman J (2002) Examining minimalism in training older adults in a software environment. Unpublished masters thesis, Department of Industrial and Systems Engineering. Virginia Tech, Blacksburg, VA