

# Designing Social and Emotional Skills Training: The Challenges and Opportunities for Technology Support

Petr Slovák<sup>1,2</sup>, Ran Gilad-Bachrach<sup>2</sup>, Geraldine Fitzpatrick<sup>1</sup>

<sup>1</sup>Human Computer Interaction Group, Vienna University of Technology, Austria

<sup>2</sup>Microsoft Research, Seattle, USA

## ABSTRACT

Social and emotional skills are crucial for all aspects of our everyday life. However, understanding how digital technology can facilitate the development and learning of such skills is yet an under-researched area in HCI. To start addressing this gap, this paper reports on a series of interviews and design workshops with the leading researchers and developers of 'Social and Emotional Learning' (SEL) curricula. SEL is a subfield of educational psychology with a long history of teaching such skills, and a range of evidence based curricula that are widely deployed in primary and secondary schools. We identify the shared challenges across existing curricula that digital technology might help address: the support for out-of-session learning, scaffolding for parental engagement, and feedback for the curricula developers. We argue how this presents an opportunity for mutually beneficial collaborations, with the potential for significant real-world impact of novel HCI systems, and can inform HCI work on supporting social and emotional skills development in other domains.

## AUTHOR KEYWORDS

Social and Emotional Skills, SEL, Education.

## ACM CLASSIFICATION KEYWORDS

H.5.m. Information interfaces and presentation

## INTRODUCTION

The importance of social and emotional skills in our everyday life is widely acknowledged [11, 15]. Such skills predict success at work and academic accomplishments [5, 6], as well as personal well-being and sustained close relationships [7]. Recent HCI work strongly suggests the potential for technology to play a key role in supporting the development of such interpersonal and self-regulation skills (e.g., [8, 12]), and a number of systems have been developed in support of specific disadvantaged populations, such as people with autism spectrum disorders [11], or those in cognitive behavioral therapy [4]. However, understanding how such skills are taught and learned by the general population, and how technology can play a role in this, is yet an under-researched area in HCI.

To start addressing this gap, this paper presents findings from interviews and participatory workshops with key researchers and developers of 'Social and Emotional Learning' (SEL) curricula in educational psychology — a field that has now more than 25 years of history in developing SEL curricula as part of prevention programs for general and at-risk student populations in primary and secondary schools [6, 7]; and a wide range of curricula deployed across US and elsewhere [5, 15]. Through these engagements, we identify what the SEL experts consider to be the key challenges and opportunities where technology could be of use, setting up an initial agenda for future HCI work in this space (cf. also [14]).

In the rest of this paper, we begin with an overview of how technology has been previously used to support emotional and interpersonal skills as part of HCI research, and then outline the goals, methods and real-world impact of existing SEL curricula. Following our recruitment and methodology process, we present the three key challenges identified from the interview and workshop data: the *need to facilitate practice and learning out-of-the-classroom*, *scaffold parental support and engagement with SEL curricula*, and *provide feedback on use for curricula developers*. Each of these challenges is also complemented with an example of a prospective HCI project that was identified and elaborated on together with our workshop participants.

Overall, this paper contributes the first empirical discussion of the challenges and opportunities for technology support of social and emotional learning in the setting of SEL curricula. This highlights the importance of social and emotional skills learning for non-disadvantaged populations, and identifies SEL as an area with complementary interests and challenges to HCI. We also emphasize how the SEL contexts can provide an excellent test-bed for emerging HCI technologies.

## RELATED WORK

### Technology and interpersonal training in other settings

While existing work suggests the potential of technology support for developing social and emotional skills, the research is still in its beginning. A growing body of work has recently focused on technology support for social skills training for disadvantaged populations. Most of this work supported people with autism spectrum disorders (see review [11]), or those undergoing talk-based therapy (e.g., [4]). In contrast, design and research around supporting the development of social and emotional skills for non-challenged populations has so far received only limited attention within HCI. Existing work includes early explorations in a diverse set of topics such as

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [permissions@acm.org](mailto:permissions@acm.org).

CHI 2015, April 18–23, 2015, Seoul, Republic of Korea.

Copyright is held by the owner/author(s). Publication rights licensed to ACM.

ACM 978-1-4503-3145-6/15/04 ...\$15.00.

<http://dx.doi.org/10.1145/2702123.2702385>

using mobile sensing to emotional regulation for parents of ADHD children [12], and exploring the opportunities offered by virtual agents to augment the training of communication skills for medical students [9], US Army soldiers [3], or during work interviews [8]. However, all of these systems embrace only single, isolated aspects rather than the full complexity of social and emotional skills that are needed and developed within the SEL curricula (cf. [14]).

### **SEL curricula - history, goals, and methods**

Social and emotional learning in education is a mature field, with 25+ years' history of peer-reviewed curricula that have already been deployed to millions of pupils. This suggests the potential for considerable real-world impact for any HCI technology deployed in support of a SEL program. Moreover, hundreds of randomized control trial studies find measurable and significant positive effects of SEL curricula, such as the improvements in academic performance [5, 7], or mental health and violence prevention [15].

The skills taught in SEL curricula are those that have been identified by psychologists and educators as crucial not only to development in childhood and teenage years, but more importantly as key skills for adult life, such as self-awareness, self-management, social awareness, relationship skills, and responsible decision making [7]. The core of most curricula is a set of SEL focused, structured classroom lessons [10], usually 25-40 minutes long and administered once a week throughout the whole school year (or multiple years). The lessons use predominantly experiential, active approaches, such as role-play and modeling, to support learning. Such an experiential approach is key as social and emotional skills integrate both cognitive and non-cognitive aspects. The learners thus need extensive examples and opportunities for personal experience and practice, complemented by feedback and opportunities for self-reflection on progress. All curricula aim to develop skills that 'transfer' to situations out of the lesson, i.e., that the learners are able to apply and use the new skills in their everyday life.

As outlined in the Findings section, curricula still face significant challenges (e.g., effectively supporting out-of-classroom learning and reinforcement), and there is no work so far that would explore how incorporating digital technology may address these. Moreover, the sustained reliance on experiential, often non-cognitive learning is what sets SEL apart from learning of traditional academic subjects such as math or literature, and brings unique challenges to supporting learning of social and emotional skills with technology. These issues raise different requirements, needs, and challenges for designing technology in support of SEL training that go beyond the existing work on academic learning within HCI.

### **METHODOLOGY**

The present study builds on a literature review [14] that drew on a wide sample of SEL literature including 5 books, 66 academic articles, and 34 SEL programs. One gap identified in existing work was little or no discussion of the opportunities for technology support of SEL programs. Our aim was thus to identify the areas of SEL training that are challenging and for which HCI technologies are likely to have high impact.

**Participants:** We recruited SEL curricula developers and their key trainer(s) from seven established SEL curricula. This allowed us to tap into their unique overview of the challenges 'on-the-ground', gained from directly supporting and training the school personnel implementing their curricula in real-world settings. Both developers and trainers also possess the analytical skills and experience to identify the areas they perceive as most challenging for teachers or students. Overall, we interviewed 14 SEL experts – 9 developers, 5 trainers, with SEL experience of median 18 and average 20.8 years. Participants were reimbursed \$100 for their time.

**Interview topics and analysis:** The semi-structured interview aimed to identify the participants' understanding of the challenges the learners, parents, teachers and curricula developers face as of now. We also inquired about what they perceive as the key components of the program, and which aspects are most difficult to learn or teach. The recorded interviews (53-75 min long) were conducted in person or over phone. Each interview was audio recorded, annotated in the software package InqScribe, partially transcribed, and thematically analyzed as per the 6 steps process outlined in [2].

**Workshops:** Two groups of SEL experts (2 and 4 people) also took part in a series of two workshops each (four workshops altogether). The first workshop was four hours long. We started by presenting four areas of possible technology support (reminders and data collection on-the-go; sensing and feedback of nonverbal emotional cues; supporting communities; games and augmented reality), selected on the basis of the literature review [14] and the interviews. We followed with an extended discussion on how these or similar systems might be relevant to SEL. We aimed to inspire the SEL experts to think about new possibilities, and open up the design space. We then asked the SEL experts to identify 8-10 challenges they perceive as most important for their curriculum. These challenges served as input into the second workshop conducted several days later, where we discussed technology support for two selected challenges in more detail.

### **IDENTIFIED CHALLENGES AND OPPORTUNITIES**

A number of challenges appeared consistently across different curricula and were prioritized by developers and trainers alike. We highlight three areas that our interviewees perceived as most promising for technology support, and complement each with a short description of a possible HCI project, identified as part of the workshops. We end with a list of the other challenges emphasized by our interviewees.

#### **Facilitate practice and learning beyond SEL lesson**

Generalization of taught skills to situations beyond the SEL lesson is the core objective of all SEL programs, and a key recurring challenge appearing across all interviews. The social and emotional situations in which students are expected to apply the learnt skills cannot be fully replicated in class. The skills are thus practised in situations that progressively resemble real-world setting, but then need to be reinforced in actual, out-of-class situations (on the playground, at home, in other lessons etc.). Curricula however face several challenges in this regard, as the learners generally find it very difficult to practice skills without external support. As such,

out-of-lesson learning is still strongly dependent on coaching by an adult (teacher, school staff or parent), who provides the on-going cues, prompts and reminders needed by learners. This limits the effectiveness of the training, and does not empower the learners to depend on their own resources or to practise/learn independently. Our participants highlighted the potential of wearable and mobile technology to support out-of-lesson learning, both in terms of providing the in-situ, just-in-time coaching support (as per, e.g., [12]), or in facilitating novel training situations that could reinforce and support the generalization of skills.

*Exemplary project:* Emotional regulation, e.g., the ability to calm down when stressed or angry, was highlighted by the majority of developers and trainers as the key skill that is required for any other learning to take place. It is however also one of the most difficult skills for the learners to learn and transfer. As one opportunity, the participants in both workshops envisioned how combining a computer game (which can be used to elicit strong emotions) with bio-feedback of bodily stress (providing the just-in-time cues and prompts to trigger the calming down strategies taught by SEL courses) could provide the learners with valuable novel opportunities for practice. Previous work in other settings, e.g., [1], suggests that such systems could also be effective in SEL. As the strong emotions elicited by a game are naturally felt (as opposed to role-played interactions), the curricula developers hypothesized that such practice would be more likely transfer to other settings.

### **Provide tools to scaffold parents engagement with SEL**

Parents are overwhelmingly understood as the one of the key agents of change by all SEL curricula, especially given the importance that adult modeling of skills plays for young learners. While most curricula have a wealth of content to support the parental role (e.g., in the form of workshops, or paper documents sent home with children), they lack the tools to distribute it effectively and struggle to engage parents to support SEL at home. For example, the workshops are costly for schools, parental turn-out is often low, and the materials sent home are rarely read or acted on. This is a serious problem, especially as many parents could themselves benefit from SEL concepts (e.g., anger management, or emotional self-awareness), and might be reinforcing unhelpful habits otherwise. As exemplified in the project suggestion below, our interviewees were optimistic about the opportunities for mobile technology to support parents' engagement with SEL learning and to scaffold reinforcement of crucial SEL concepts through playful interactions with their children.

*Exemplary project:* The workshop participants discussed how digital technology could help infuse SEL concepts into everyday parent-child interactions, such as bed-time reading for pre-K to K2 learners, effectively scaffolding reinforcement of SEL curricula in engaging and playful ways. Building on the existing HCI research on facilitating parent-child interaction with technology, such as Family Story Play [13], an interesting design challenge for HCI is exploring the potential that digital technology may offer beyond what can be accomplished with a non-digital book. Our participants were particularly excited about the opportunities of infusing

the stories with interactive prompts, cues, and activities that would better scaffold discussions around key SEL concepts for both parent and child. Examples might be a focus on problem solving (e.g., show different story outcomes based on the child's choice), or perspective taking and awareness of emotions (e.g., 'what might Mary feel now?'). Moreover, the curricula developers envisioned that such scaffolded interactions can also be designed to promote the parents coaching abilities around SEL concepts. For example, being able to formulate how one feels is an important aspect of many curricula, but something that parents often struggle to support. The scaffolding designed into the interactive book might make such interaction more accessible even for parents who would otherwise find such topics uncomfortable.

### **Feedback for curricula developers**

While all curricula undergo extensive piloting and rigorous randomized controlled trials to gauge their outcome, they are still mostly distributed in printed form. Once sent out, the curricula developers then do not necessarily get feedback from teachers or parents to provide support for fidelity of deployment, identify aspects of curricula (e.g., specific activities) that are in need of further improvements, or allow for rapid innovation and change (e.g., A/B testing of new activities across schools). Incorporating digital technology could help address all these challenges as well as promote a sense of ownership for the teachers, parents, and learners.

*Exemplary project:* Although most curricula have documents and activities that are sent to support parent involvement, curricula designers receive very little feedback about whether and how these are used by parents. Our participants were excited about providing the family with a physical object that serves as a portal to an underlying digital content, e.g., a QR link on a fridge magnet or a digital frame. Such an object could then be incorporated into homework exercises, serve as an ambient reminder of SEL concepts (e.g., constantly visible on the fridge door), and also facilitate collecting the needed feedback from the parents and children, or even empowering the users to create and share new content. Moreover, curricula designers could work with dynamic content updates (e.g., a machine learning based tailoring), as well as large scale comparisons of effectiveness of different activities across broad populations.

### **Additional challenges**

Our participants mentioned a number of additional challenges that were shared across the curricula. These included support for online, but still experiential training (to lower costs for participating schools' budgets), as well as the lack of tools to create, support and maintain supportive peer networks for parents and staff taking part in SEL programs. A prevalent issue is also the lack of time on the part of the teachers, further encumbered by their wish to, understandably, co-create and own the lessons they teach, despite having little time to do so. Finally, most of the existing curricula focus mainly on elementary and early middle-school, as engaging older students brings different dynamics and developmental challenges. Our interviewees were however optimistic about the potential of mobile technology (widely used in this population) to promote novel curricula design and ways of learning.

## DISCUSSION

The interviews and workshops with SEL experts helped us identify some of the key SEL challenges that digital technology is likely to be well-suited to address, pointing toward plausible agenda for future work. As supporting SEL in education has not been addressed in HCI so far, this study provides the first step into this significant but under-researched area; and orients HCI research to the importance of social and emotional skills learning for non-disadvantaged populations.

We argue that HCI involvement with SEL has the potential to not only address some of the key SEL challenges, but can also advance HCI research beyond the focus on HCI in education (see also [14]). SEL brings the knowledge of techniques and methods to teach and support interpersonal aspects that are then likely to translate to other HCI contexts such as workplace or everyday life. In particular, each of the exemplary projects show-cases such possibility of extending the HCI research, which provides new tools and opportunities for the learners, with the SEL domain knowledge on how the development of skills can be scaffolded.

Moreover, SEL in education provides an excellent context for exploring applications of emerging HCI technologies, such as social signals processing or affective computing systems. In particular, the existing curricular structure provides the detailed content and learning context (e.g., weekly lessons) in which novel HCI systems can be embedded, thus offloading a crucial aspect that can otherwise make or break the system and/or limit the uptake. SEL curricula also provide well motivated challenges for technology that, together with the long history of SEL learning, can guide HCI community to focus on most beneficial social and emotional aspects to detect and support. Finally, designing to support SEL curricula offers the opportunity of large impact and scale, allowing successful technologies to build on such existing distribution channels, as well as the large-scale evaluation practices common in SEL community.

## CONCLUSIONS

This paper points to the complementary interests of SEL and HCI fields, highlighting the potential for mutually beneficial collaborations. As the first step, we draw on interviews and participatory workshops with leading curricula designers, identify the opportunity to address some of the key challenges in SEL curricula with digital technology, and illustrate these with three exemplary projects. We hope this paper can inspire future work in this complex and intriguing research space.

## ACKNOWLEDGEMENTS

We are grateful to the SEL experts for their time and deep engagement with the interviews; and to Mary Czerwinski for her guidance and support in this work.

## REFERENCES

1. S. Bouchard, F. Bernier, E. Boivin, B. Morin, and G. Robillard. Using biofeedback while immersed in a stressful videogame increases the effectiveness of stress management skills in soldiers. *PLoS one*, 7(4):e36169, Jan. 2012.
2. V. Braun and V. Clarke. Using thematic analysis in psychology. *Qualitative research in psychology*, (February 2013):37–41, 2006.
3. M. Core, D. Traum, H. C. Lane, W. Swartout, J. Gratch, M. van Lent, and S. Marsella. Teaching Negotiation Skills through Practice and Reflection with Virtual Humans. *SIMULATION*, 82(11):685–701, Nov. 2006.
4. D. Coyle, G. Doherty, M. Matthews, and J. Sharry. Computers in talk-based mental health interventions. *Interacting with Computers*, 19(4):545–562, July 2007.
5. J. A. Durlak, R. P. Weissberg, A. B. Dymnicki, R. D. Taylor, and K. B. Schellinger. The impact of enhancing students' social and emotional learning: a meta-analysis of school-based universal interventions. *Child development*, 82(1):405–32, 2011.
6. M. J. Elias. *Promoting social and emotional learning: Guidelines for educators*. ASCD, 1997.
7. M. T. Greenberg. Schoolbased prevention: current status and future challenges. *Effective Education*, 2(1):27–52, Mar. 2010.
8. M. E. Hoque, M. Curgeon, J.-C. Martin, B. Mutlu, and R. W. Picard. MACH: My Automatic Conversation Coach. In *UbiComp '13*, page 697, New York, New York, USA, Sept. 2013. ACM Press.
9. K. Johnsen, A. Raij, A. Stevens, D. S. Lind, and B. Lok. The validity of a virtual human experience for interpersonal skills education. In *CHI '07*, page 1049, New York, USA, Apr. 2007. ACM Press.
10. S. M. Jones and S. M. Bouffard. Social and Emotional Learning in Schools: From Programs to Strategies. Social Policy Report. Volume 26, Number 4. *Society for Research in Child Development*, 2012.
11. J. A. Kientz, M. S. Goodwin, G. R. Hayes, and G. D. Abowd. Interactive Technologies for Autism. *Synthesis Lectures on Assistive, Rehabilitative, and Health-Preserving Technologies*, 2(2):1–177, 2013.
12. L. Pina, K. Rowan, A. Roseway, P. Johns, G. R. Hayes, and M. Czerwinski. In Situ Cues for ADHD Parenting Strategies Using Mobile Technology. In *Pervasive Health '14*, 2014.
13. H. Raffle, M. Spasojevic, R. Ballagas, G. Revelle, H. Horii, S. Follmer, J. Go, E. Reardon, K. Mori, and J. Kaye. Family story play: reading with young children (and elmo) over a distance. In *CHI '10*, page 1583, New York, New York, USA, 2010. ACM Press.
14. P. Slovak and G. Fitzpatrick. Teaching and developing social and emotional skills with technology. *TOCHI (in minor revision)*.
15. K. Weare and M. Nind. Mental health promotion and problem prevention in schools: what does the evidence say? *Health Promotion International*, 26(S1):i29–i69, Nov. 2011.