**Revision log: Teaching and Developing Social and Emotional Skills with Technology**

We thank the reviewers and the editor for their thoughtful and constructive feedback. We made several considerable changes both to the structure and to the content of the paper, in order to address the lack of specificity identified by the reviewers and the editor – an issue that has been rightfully raised and, we believe, made the paper much better and useful for the HCI community, as well as readership from SEL and related topics.

We outline the core changes to structure and argumentation below, and then explain how we addressed the more localised reviewers’ suggestions inline in their reviews.

One of the main changes is that we *re-framed and combined the content of the original sections 4-6*, with the aim to consider *SEL in education as the major focus* of the paper (as also suggested by R2). This allowed us to be more specific both in challenges to SEL in this contexts, and offer more relevant examples for technology support. In particular, Sections 1-5 now focus on SEL in education only. We bring in the other domains as part of broader implications and pointers for future work only at the very end of the paper, in Section 6.

The second key change is in *how we present the identified challenges to learning*. The previous version first drew out four broader learning principles in one section, and then used these to outline the related HCI literature in another section. In the revision, we combine these two steps into a single section (Section 3). Taking advantage of scoping the focus on SEL in education only, we reframed the broad four learning principles into three explicit challenges---i.e., embedding of learned skills, promoting reflective abilities, and facilitating mixed spaces for practice---that are directly motivated by the SEL literature (and selected curricula examples) and immediately complemented these with pointers to relevant HCI work. This allowed us to structure the links between SEL and HCI based on the challenges to learning, rather than HCI fields of work. We hope this will ground the opportunities of technology in supporting SEL for both HCI readers and readers from other disciplines, as well as provide improved ‘evidence’ that future HCI work could well bring benefits in this space.

We also *added two new sections*, based mostly on *new content and/or markedly reframed ideas* from the originally submitted version, which were made more specific to SEL in education.

* Section 4 addresses the ‘Opportunities for HCI’, which outline the research opportunities that a focus on SEL will likely open for HCI. We particularly highlight the possibility to use SEL settings as a test-bed in which to develop cutting-edge technology: SEL curricula in education offer a wide range of well-defined skills to be supported, controlled real-life context to deploy in, various levels of pre-existing scaffolding to drive learning, and well-established evaluations methods to assess the effects of interventions – all aspects that HCI designers can benefit from when developing, deploying, and evaluating novel technology. We also draw out how the existing knowledge-base of SEL curricula can help guide research in this area, orienting HCI researchers towards what skills, and in which order, we should aim to support through technology in the first place; as well as how best to do so.
* Section 5 then identifies the ‘immediate next steps’ the HCI community could take if it aims to start engaging with SEL in education. We particularly highlight the ­surprising lack of detailed information in SEL academic literature around the needs and specific challenges that learners, teachers and parents face when taking part in SEL curricula (as also emphasised by R1). As this knowledge however must exist within the SEL practitioners’ community, we point to the need of participatory and user-centered studies to help HCI researchers better understand the challenges. We also suggest several (tentative) design considerations for SEL support systems to inspire initial work: looking to empower learners to explore their behaviours, designing systems to ‘teach and disappear’, and aiming to support engagement, with particular focus on engaging parents to support their child’s learning.

Overall, we also tried to cut down the length of the paper through more careful and succinct descriptions and argumentation. Despite adding new tables in Section 2, more grounding and examples in Section 3, as well as arguments in Sections 4 and 5, the paper is now still 5 pages shorter than the original submission.  
(34 pages altogether, with 7 pages of references).

Dear Mr. Petr Slovak:

I have reviewed your submission "Teaching and Developing Social and Emotional Skills with Technology" and have returned it to you for major revisions. This means that upon the submission of your revised document, I will review the changes and then most likely send it out for review by some or all of the same people that reviewed your submission this round.

I had been waiting on additional reviews, but given the two detailed reviews in hand and their consistency, I am moving forward with the "Major Revisions" decision now. The clear theme emerging from the two reviews is that there is potential here. The reviewers agree that the review of existing SEL practices, especially in school-based settings, is strong, but that the paper is too generic when it engages with how technology can help.

A revision along the lines suggested by the reviewers would be a significant undertaking, with no guarantee of success. An agenda setting article can be valuable but only when it defines an agenda that is non-obvious, yet likely to work. As in this paper, having a framework based on detailed analysis of the application needs as a way to generate the agenda is a good approach. Thus far, however, the referees are not convinced that the agenda is specific enough to be non-obvious. Referee 1 also raises concerns about there being enough evidence that it is likely to succeed. I agree with the referees, however, that there is promise in this paper and a revision along these lines, if you are able to find good ideas for solutions that are more specific, would be publishable.

If at any point you decide that you will not submit a revision to TOCHI, perhaps because you intend to submit the paper to another journal or conference, we require you to contact me and the Information Director (jeff@jeffreynichols.com) so that TOCHI can terminate the paper's revise-and-resubmit status to prevent any confusion regarding double submission.

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Referee: 1

Recommendation: Needs Major Revision

The Review:

This paper argues that Social and Emotional Skills with Technology is an area where HCI can make a significant impact. It is certainly a domain with increasing need and where HCI is beginning to explore, so this paper is timely.

The argument for the importance of social and emotional skills is well made. This paper covers a lot of ground in both SEL and HCI research, and does a good job of providing an overview, particularly of previous SEL work. It is clearly structured and well written throughout.

The central argument the paper sets out is that SEL is an area where HCI can provide valuable contribution and could in turn benefit from work in this area (challenges). This hinges on the fact that very little technology is currently used in SEL and the claim that technology has potential to meet some of the challenges faced.

However, there are several outstanding issues that I feel need to be addressed to help HCI researchers more specifically understand how to engage with SEL. These are:

1) a need for more justification for the SEL principles and challenges that provide the structure for sections 5 and 6,

Each of the three challenges is now explicitly grounded by pointers to SEL literature specific to education, as well as direct quotes where relevant. See, for example, the beginning of section 3.1 (p11), section 3.2 (p15), and section 3.3 (p17).

2) there is much focus on the challenges curricula and curriculum designers face, but less is made of the challenges learners face – this is significant, needs to be addressed, and

This is a very relevant point that was omitted in the original submission. As we now describe in section 5.1 (p21), detailed descriptions in SEL literature about what challenges are faced by both learners and teachers is scarce – we found little such material despite searching through additional SEL sources (e.g., the five SEL books[[1]](#footnote-1) referenced on page 4). Section 5.1. makes this shortcoming explicit, and highlights the need for ethnographically informed and/or participatory studies as one of the first steps needed to understand this issue better.

3) provide more specific examples of related HCI work which at times reads like a very broad general list of HCI research, and

We reframed the HCI examples to be closely tied to a specific SEL process or a challenge – see Section 3 throughout. Moreover, the current framing around the three concrete challenges in SEL for education (rather than the more general learning principles) also supports greater specificity of connection between HCI work and SEL challenges.

4) the use of more specific examples of SEL tasks and methods throughout the entire paper (the authors make good use of examples in Section 2) would help ground the paper for the reader.

Similarly to point (3) above, grounding the section 3 in specific challenges allowed us to provide the SEL examples more readily, and keep these tightly linked to the HCI work.

This paper does a good job of introducing SEL to the HCI researcher, and as such makes a valuable contribution. The authors’ decision to ground this work in an existing corpus of expertise (SEL) via the existing curricula is well chosen. This is a similar approach, as noted by the authors, to that taken in HCI work in therapy. I am curious whether there are existing practical or theoretical frameworks within SEL, beyond procedural learning, that HCI might adopt or that could serve a strong starting point (similar to CBT in therapy for example)? Or is there a model, for example in therapeutic work related to social phobia or progressive exposure in exposure therapy that seems to address similar issues (e.g., building up confidence, safe practice etc.)?

We added section 2.3.1 to address this point (p5-p6). To the best of our knowledge, there is no one commonly agreed on theoretical framework or underlying model that we could recommend as a strong starting point for the HCI researchers, and which would be independent to direct cooperation with a chosen SEL curricula.

In contrast, SEL literature however agrees on a set of core competencies that should be promoted, which we added as section 2.4 (p6).

The authors claim early on that technology has the potential to support SEL, but I feel more evidence needs to be given to convince (i.e. that the challenges being faced might be addressed through the intervention of technology and perhaps point to other areas like autism where technology addressing problems similar in nature). This may in part be due to the broad scope of the paper that covers several distinct domains. I would find it extremely helpful if the authors could provide more specific examples of how technology might help, beyond the challenges or learning principles which I feel are too general on their own to be readily meaningful to the reader.

The complete revision of earlier sections 4-6 has aimed to address this point. We hope that particularly the change of focus from the broad learning principles to specific challenges of SEL in education has helped to ground the paper, and to provide more convincing arguments that technology has the potential to be beneficial in this space – see Section 3 (p10-p18).

For example, the paper mentions the existing body of HCI research around autism and technology making a general point about how technology might help improve social skills and so on. A little more analysis describing the similarities between SEL and autism, if there are any would be very helpful. This would make many of the sections more practically applicable for HCI researchers.

We made the similarities and differences between support autism learning and broader SEL skills more explicit for each occasion when HCI autism literature is used as a core example (first paragraph of p13).

This review provides a very useful overview of SEL but spans a considerable amount of ground and domains. Given this scope, I feel more needs to be done to specifically ground how HCI could compliment and extend existing SEL efforts. At present I feel that this broad scope means that sections 5 & 6 feel too general to provide significant insights.

Sections 5 & 6 have been fully restructured. As mentioned above, we believe that the revised Section 3 now provides a much tighter and more grounded argument around HCI support of SEL challenges. In addition, the newly added Section 4 is now more specific in how SEL could benefit HCI.

One suggestion to improve the specificity of SEL approaches for the reader could be to include a figure describing the full range of SEL skills (e.g., mindfulness, assertiveness etc.) alongside the central methods used to teach them (e.g., role-play, video monitoring, etc. ).

We added Figure 1 and Figure 2 (p5 and p7) that list the skills and methods.

The SEL challenges and SEL learning principles are central to the thrust of this paper, but it is not clear to me from where they emerge. Furthermore, they are so broad as to be hard to gain to insights as to where HCI could make an impact. As a HCI researcher, I am left feeling yes this is an area of real and growing need but unsure where our discipline could get involved. More specificity and examples throughout would greatly improve this work and make a very valuable contribution to the field.

As mentioned above, we believe that the restructuring of the text, restricted focus on SEL education for Sections 1-5, and the choice of explicit challenges directly grounded in literature of SEL in education as part of Section 3 (instead of the broad four learning principles) provide the needed specificity.

Overall, this is a very well written piece of work than ambitiously spans a considerable amount of research across many domains. Given this scope, there is a risk of making connections that are too general to be insightful or of immediate use to HCI researchers. I believe the authors can address these concerns by providing more specific examples of SEL methods and research throughout, include a review of skills, methods and challenges across all SEL domains and consider the challenges SEL learners face.

**Areas for Improvement**

*Identify aspects of the paper's presentation that need improvement including: \*organization of the manuscript*

*\*statements or passages that could be expressed more clearly and concisely*

*\*figures that are redundant, difficult to understand, or missing*

*\*incomplete or missing references, or citations that lack references*

*\*changes that could make the paper more understandable to an international readership.*

*You can also make any other recommendations that you think might be of use to the author(s). Please indicate which of your recommendations you consider to be conditions for acceptance, as opposed to optional suggestions.*

*Note that it is not necessary to comment on issues with formatting and layout, because these problems will be addressed by the copy editor and typesetter during final production.:*

**General**

The paper is clearly structured throughout and there is a strong narrative hold of the content providing signposts and summaries to each section. At times there may be too much signposting, at the beginning of sections and then again in sub-sections which can lead the reader to feel they’ve encountered the content already. Addressing these instances of repetition will make the paper more compact and allow the reader to remain oriented.

We reduced signposting to a necessary minimum, making the flow of the paper much more narrative. The consistent focus on SEL in education only for sections 1-5 has also supported this effort.

In particular, Sections 5 & 6 are not as distinct to me – this perhaps rests on the distinction between addressing SEL principles and challenges which feels not as meaningful and might suffer from being too general a focus, or in need of specific examples, similar to those given in Sections 2 (e.g., Turtle program) which may help ground the section.

We hope the combination of new focus on education, specific SEL challenges, and reframing/addition of examples throughout section 3 has improved the paper in this regard.

A minor point, but at times throughout it was unclear to me whether the author is referring to SES as taught in schools or across all domains.

New flow of sections 1-5 together with the reframed text makes this much clearer.

**Abstract**

This should be more specific about how HCI could complement SEL. For example, rather than “We argue how technology could fundamentally extend and enhance the possibilities available…”, it would be nice to say “We argue that technology could extend…by X, Y, Z”.

Revised abstract lists the three key challenges outlined in Section 3 (see below).

“*We argue how such technology could fundamentally extend and enhance the possibilities available to social skills learning, such as supporting the embedding of skills in class into everyday situations, promoting reflection, and providing additional environments for practice*.”

We are also much clearer about the mutual contributions of SEL to HCI and vice versa in the introduction (2nd full paragraph, p2).

**Section 2**

The overview of SEL curricula is very interesting. I am curious are there common stages of learning across SEL? (an example would suffice).

We reframed initial paragraphs of Section 2.5 (p6) to emphasise that the four sets of skills explicated there are one form of common stages of skills progression among the curricula (in terms of content).

The progression in terms of method (simple model situations -> role play -> role-play on more complex examples -> out-of-lesson practice) is then outlined in section 2.3 (last paragraph p4).

In this section, the authors discuss challenges faced by curriculum designers, but what about challenges faced by learners? This surely is an area where in some cases technology might be able to help for example by providing opportunities to practice in private. I also feel this Section (and the following) should address in some way whether there are common challenges for learners associated with SEL. For example, I imagine embarrassment might be a significant factor across age ranges and domains particularly related to existing methods such as role-play. This one example would seem suitable for technological intervention. This consideration could help make Sections 5 & 6 more specific to the existing (and possibly unmet) needs of SEL learners. For example, if anxiety is a significant issue in SEL, then HCI researchers could have a clearer idea of where HCI could engage.

We added section 5.1. (p21) to address this point … also cf. point (2) from the beginning of this review.

Section 2.3

This section covers the methods for teaching SEL but reads more like it addresses the topics covered, and less about what specific methods are used and why.

We added more detail about the methods used, progression of learning, as well as the section 2.3.1 on (the lack of) common theoretical frameworks.

Pg 6 The transfer of learning to real world is clearly important for SEL, as it is in many other areas, but what can we learn from the existing SEL about what type of support is needed and what methods have had success? Are there examples from current programs that the authors can include that would be illustrative? For example, what support do learners typically need when learning mindfulness?

We added further detail around the transfer of skills in SEL for education in section 3.1. We first directly ground this challenge in SEL literature through quotes (which highlight specific unmet needs of SEL community), and then explicate the challenges in supporting the learners directly (section 3.1.1 and respective subsections, p11-p14), as well as the need for social support from peers and parents (section 3.1.2, p14-p15). These challenges are explicitly grounded in the scaffolding that is available in SEL lessons, but is lacking once skills are to be transferred outside of these lessons.

**Section 3.**

This Section provides a useful overview of several domains. I would recommend a re-ordering of the sub-sections in order of evidence and use of SEL techniques: 3.1 Therapy (mindfulness, social phobia, exposure therapy, assertiveness therapy), 3.2 Medicine, 3.3 Business and 3.4 Everyday Life Skills

We re-ordered sections as suggested. After deliberation, we left the section on therapy without adding the specific links to social phobia, exposure therapy, and assertiveness therapy due to space constraints; also considering that, in the revised flow, section 6 aims to only point to other possible domains, without attempting to be complete.

We are however ready to include these topics should the reviewers and the editor still see it as relevant under the new flow that focuses mainly on SEL in education.

Section 3.3: I wonder whether are there models from therapy (or other domains) that the authors think might be more broadly applicable to other SEL domains – such as the use of an exposure therapy model for communication or assertiveness skills?

While there might be some common aspect shared among curricula in SEL education and other domains (as partially outlined in section 2.3.1), we did not see any explicit links to therapeutic models that could be argued as widely applicable in this setting.

Perhaps a figure at the end of this Section summarizing the range of SEL skills taught and linking them to methods commonly used would provide a useful overview for readers and a suitable recapitulation of the ground covered.

We added Figure 1 and Figure 2 to provide overview of skills and methods within SEL in education.

**Section 4**

It is not transparent where the four learning principles emerge. This needs to be much clearer. The authors state that they emerged from “similarities” across domains, but how the were arrived at needs more evidence.

The revision no longer explicitly builds on the broad learning principles. However, following the spirit of this suggestion, the challenges used to structure Section 3 are now directly grounded in SEL literature and quotes.

In addition, the challenges for example related to feedback such as post-hoc manner and unguided recollection currently has little supporting evidence. Are video recordings and role-play observation not used to provide real time observation and expert feedback? How then is the reader to assess the claim that feedback is a significant challenge? There seems to be an emphasis put on real time expert feedback but it is not clear to me from the text why this is – is simulation (via role-play) then reflection and discussion insufficient?

The revised version does not draw out real-time feedback as an explicit broad challenge, although it is implicitly one of the challenges during the transfer of skills. In these settings, real-time feedback is a replacement for the ongoing coaching the teachers do in-class (e.g., the expert feedback), which is however no longer available in out-of-SEL-lesson contexts, (see e.g., ‘Identification of teachable moments’ on p12 for example).

Peer feedback pg 14 line 22 Why are peers not suitably qualified to give feedback on interpersonal skills given they are the target population?

We no longer make this argument explicitly under the current flow. However, the argumentation earlier draws on the understanding that peers are also learning the same skills, and might not have fully grasped it themselves, thus often being unable to provide as useful feedback.

The authors posit a two-stage model (inside and outside the learning environment). Why is controlled practice in safe environment with encouragement to practice in ‘real world’ not enough? It might also be worth considering if technology could provide a third intermediate space between the two where technology could support the learner in practicing and transitioning these skills into their everday life. A mindfulness tool could be one example, a communication karaoke game learners could play in the safety and privacy of their own home could be another.

As now outlined in more detail in section 3.1 (p11), the transfer of skills from SEL lessons into the real-world is a serious challenge, and further support for scaffolding the learning outside of the lesson space is needed. As suggested by R1, a significant part of the benefit of technology could be exactly in extending the support for transitioning the skills learning into other contexts. Section 3.1.1 now discusses these possibilities in detail (p11-p14); Section 3.3 (p17-p18) outlines the potential of technology to provide an intermediate, ‘mixed space’ for practice and learning; and finally, last three paragraphs of section 4.1 (p19-p20) outline the possible contexts in which technology could support learning (from in-class to completely ‘in-the-wild’).

Pg 15 line 52 & Figure 2: This figure was hard to understand for me and I do not feel it adds sufficient value beyond the existing text to merit inclusion.

We removed the figure as part of the re-structuring.

That motivation and engagement as a challenge is hard to argue with, but what specifically is challenging about engaging and motivating learners about SEL?

After the restructuring, engagement is discussed as part of section 5.2 (p22). We now particularly highlight the challenges around promoting engagement of parents in supporting the children’s learning.

Pg14 line 51 (“transfer limited in scope and effectiveness”) - Need additional evidence or argument for the limitations of current approaches

We provided SEL references and direct quotes to evidence this need – see Section 3.1 (p.11)

Section 4 would be improved if it could better elucidate a) the need for technology, b) identify more specific opportunities for HCI to create engagement. This is another argument for why including a list of SEL skill and techniques currently used to support them would be helpful to the HCI reader to see ways to engage?

The new Section 3 now specifically motivates each of SEL challenges by SEL literature to better highlight the need of curricula for novel support mechanisms that could be provided by technology.

After the reframing, engagement is no longer listed as one of the specific challenges, but is an important underlying aspect in several sections outlining the opportunities for HCI (e.g., support for Parental involvement (p15), or Mixed spaces for practice (p17-p18)).

Moreover, we added a paragraph on engagement as part of Tentative design factors (p22).

**Section 5**

Sections 5 & 6 I feel are the areas of most need of specificity. There is also some uncritical mention of HCI work in particular throughout – for example pg 18 line 38-40 reference to Meeting Mediator – “such feedback lowers domination of individuals and helps achieve a more balanced discussion”. This is a very strong statement with little support and is unlikely to be true for all individuals, some of whom might simply stop using the system entirely. It might be worth considering other avenues, such as how the limitations placed on the medium of communication might implicitly support turn-taking and effectively sidestep having to provide delicate feedback.

We have tried to do a better job in avoiding overly strong statements throughout (see also below). For example, the statement around MeetingMediator has been now changed to:

“*For example, DiMicco et al. [2007] and Kim et al. [2008] explore how increased awareness of speaking behaviour within an interaction (e.g., through a visualisation) can affect and shape group dynamics” (p17).*

We thank the reviewer for the pointers to the effects of placing limitations on the communication medium. We have included new examples in this regard on p18 (last paragraph before Section 4).

Some of the literature in this section is presented too uncritically – it would be nice to read not only can previous HCI studies find, but also what is the quality of evidence to support this? I understand that it is not the authors’ intention to provide a detailed summary of existing HCI work, but in their current form, the arguments for the relevance of HCI to SEL based on current work are not as convincing as they could be.

In general, the existing HCI work on these topics is mostly in the form of initial, stand-alone exploration or design prototypes (to some extent quite understandably as this is an emerging domain).

We are more explicit about these limitation in the revision (e.g., in the introduction, end of p1), are careful about scoping the implications of existing findings (using verb such as “suggests” or “indicates”), and explicit about the limitations and/or gaps with respect to SEL, especially in Section 3.

In this regard, the sections on behaviour change and gamification in particular could be improved. For example, in what ways does it make sense to engage SEL learners? Does it seem that a life-life representation of real-world situations where learners are free-to-fail would be appealing? Would some aspects of games such as playfulness create a suitable atmosphere for teaching SEL skills?

This section has been removed during the restructurating – we now link any examples of behaviour change/gamification work directly to SEL examples as part of Section 3 (e.g., Promoting perspective taking, p18).

5.1 What are the ways in which HCI could support SEL? It would be helpful if this could made more specific than feedback. What are the challenges related to providing feedback on emotions skills for example?

Section 3.1 to 3.3 are not much more specific about the challenges in SEL and ways in which HCI can likely be beneficial.

Not clear to me the case that has been convincingly for the need for immediate feedback on practice.

Cf. the explanation above.

5.4 Engagement and motiviation

Particularly gamification paragraph where little evidence to show this actually works.

Needs to be less of a list of what has been done, and more that “this approach in HCI has been shown to……”

We have been clearer that most of gamification work in HCI in this space is preliminary, and can only suggest the potential for positive effects. To best of our knowledge there are no large scale trials proving the effects, which is however a common pattern throughout HCI. We highlight this limitation of HCI work more broadly for example in the introduction, and are more careful in our argumentation elsewhere (e.g., in the second paragraph of section 4 (p19)).

In relation to behaviour change, what do we actually know about the impact of what ways do SEL require behaviour change? Again leading with an SEL example and then supporting HCI example might be helpful here. For example, this could be making a point that increasing awareness of breath is helpful in scaffolding initial mindfulness practice.

What are the motivators for change in SEL? What are the prerequisites for learning – increasing confidence? Creating a safe space to fail? Privacy?

We have removed the behaviour change section, and distributed some of the more specific examples across Section 3, where relevant. As suggested, all subsections of section 3 now tie specific SEL topics/challenges with the HCI work.

I’ve included some minor suggestions below of general statements about HCI research that could be improved through specificity and/or example.

Pg 21 line 21“a large body of research exists on using technology to facilitate behavioural change, supporting ….

“many of the techniques introduced in HCI to promote behaviour change for health or ecological sustainability are likely to be relevant for SEL”

Text removed during restructuring

Pg 22 could be talking about any subject here (not just SEL), needs to be more specific about what needs to be addressed in sel AND HOW HCI MIGHT help.

We addressed the specificity of examples as part of the restructuring.

Pg 18 line 39 tone down statement

As per above, the MeetingMediator statement was reframed and toned down (p17).

Pg 20 Research has looked at X – but what can we say about it? If this was a conversation with SEL curricula designers what could you say to convince them that HCI has much to offer? (for one example see below for one suggested reference related to gamification).

The reframing in terms of specific HCI challenges rather than broad principles + HCI topics has, we believe, addressed this important suggestion throughout the paper.

Some of the literature HCI connections feel tenuous – the fact that a game Coyle et. al’s study reported a positive impact of a computer game for teenagers in therapy feels very loosely related to SEL (pg 20).

The closer link between SEL challenges and HCI work after restructuring, as presented throughout Section 3 should alleviate such tenuous connections for the examples we kept, making the argumentation clearer.

**Section 6**

6.2.2 The authors make the point that technology will need to adapt to differences across SEL. This is a very general point – why will it need to adapt? Is a modular approach (for example creating a support for mindfulness or public speaking) not an equally valid approach? If SEL is similar to therapy in that underlying factors of client-therapy relationship are at play via many different therapeutic approaches, then this should be made clearer and would provide more convincing evidence for the need.

This section has been removed during the restructuring.

General statements that could be more specific or where authors could give examples

Most of the text has been removed, or fully reframed as part of the restructure, with the focus on being more specific (see Sections 4 and 5).

Pg 30 “pragmatics will also come into play including issues around supporting training…..”

Removed as part of restructuring of the paper.

6.4.1. Curricula complex etc., citing Matthews & Doherty show how such co-operation is possible etc. – descriptive and too general – what can be learned from this.

Removed as part of restructuring of the paper.

Pg 24 line 41 – formatting of the four points is off.

Removed as part of restructuring of the paper.

Pg 26 line 46 “the situation is role-played and thus (most probably) less personally sensitive for participants). This is not necessarily so – this is one of the greatest strengths of role-play approaches particularly when used in therapy (see for e.g. Corsini, R.J., Role playing in psychotherapy. 2010:Transaction Pub.), however there may be added consequences to using personal content amongst peers or in the workplace, and this could be an area where technology might have very meaningful application.

We removed this sentence from the revision.

***Suggestions for Online Appendix Content:***

*The ACM Digital Library offers an online appendix feature, which allows authors to include additional content with their submissions beyond what can be included in the print article. This content may include additional text, videos, etc. If there is particular content that you believe should be included in the online appendix, please describe it here.:*

This literature review in both SEL and HCI spans a wide scope. However, it may be worth making more of examples of work in SEL that makes use of technology – such as below – in order to illustrate what could be possible.

References to check:

Experiences in using immersive virtual characters to educate medical communication skills, K Johnsen, R Dickerson, A Raij, B Lok… - … . Proceedings. VR …, 2005 - ieeexplore.ieee.org

Using crowdsourcing to support pro-environmental community activism, Massung et al., CHI 2013 could provide more specificity to coverage of gamification.

We thank R1 for the suggested references, which we gladly added.

*Please help ACM create a more efficient time-to-publication process: Using your best judgment, what amount of copy editing do you think this paper needs?:* Light

*Most ACM journal papers are researcher-oriented. Is this paper of potential interest to developers and engineers?:* Maybe

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Referee: 2

Recommendation: Needs Major Revision

The Review:

I had the opportunity to read the manuscript “Teaching and Developing Social and Emotional

Skills with Technology,” which reviews the literature on social and emotional skill learning (SEL) curricula across a variety of domains (school, workplace, medical/therapeutic) from the perspective of identifying opportunities for HCI research to contribute to this space. Three key related contributions of the review are (1) identifying a core set of topics, methods, and challenges to teaching social and emotional skills that cut across the various curricula and domains, (2) identifying existing technologies and approaches in the HCI research space that could be brought to bear upon these challenges, and (3) the challenges that supporting such curricula presents for the HCI community.

The audience for this review may potentially be not just HCI researchers looking for opportunities to do research in this space, but also psychology and education researchers looking to identify potential ways to incorporate technologies into the implementation and evaluation of these programs. In order to serve these two functions, however, the review would benefit from a tighter focus and deeper links between specific technologies and their potential applications in SEL curricula.

One suggestion for accomplishing this would be to limit the scope of the review to SEL curricula in school settings. The authors conducted a deep analysis of the content of actual school-based curricula via mind maps and iterative theme extraction, and the resulting topics and methods that are derived are specific and grounded in examples. In contrast, the sections on SEL programs in workplace, medical, & therapeutic settings are not as deeply fleshed out, and it seems the same content-based analytic approach was not applied to this literature. As a result, these sections are more high level and seem shoehorned into the framework of topics and methods already identified in the school section.

We thank R2 for this suggestion and have used it to guide the restructuring of the paper (as described in detail earlier)

Grounding the review in school-based interventions would force the authors to ground the learning principles and lead to a deeper consideration of relevant existing technologies and HCI approaches and how they can be brought to bear upon these principles. As is, by cutting across so many domains, the set of learning principles that authors derive (feedback, practice, transferring skills, supporting motivation) are not specific to social-emotional learning, they are arguably generic to teaching any task or skill. That may well be the case, but I would argue that by focusing on school-based interventions, the authors could delve deeper into the *unique* challenges of, for example, providing feedback or opportunities for practice and transfer of skills to school-age children and in school settings.

Sections 3.1 to 3.3 are now pointing to the some of the unique key challenges SEL in education faces.

Section 5 could similarly benefit from a tighter focus, as the parallels it draws between the learning principles and existing HCI work remain mostly high level. The section currently reads like a laundry list of any and all technologies that may be relevant, without deep consideration for the fact that different technologies will be more or less appropriate for different user groups (e.g. adults versus children, patients versus otherwise healthy individuals, employees versus employers) or contexts (home, school, clinic, hospital, workplace). For example, reflection and emotional self-awareness means something quite different for a first grader interacting with peers than an adult trying to navigate work relationships, and very different technologies would be required for each. If this section can be constrained somewhat, as would be the case with focusing on children and school-based interventions in mind, it would enable a deeper discussion of specific technologies that would be appropriate for feedback, practice, real-word transfer, and supporting motivation and engagement in this population and in this setting.

We hope that the change of focus on SEL in education, and tighter connection between the challenges and HCI work, both jointly identified in Section 3, has lead to the deeper discussion of how specific technologies could support SEL (e.g., the third level subsections of sections 3.1 to 3.3).

There is some redundancy and too much high-level discussion across sections 4-6. First, the challenges to learning social and emotional skills outlined in section 4 are not strikingly different from the “challenges that supporting social and emotional skill curricula pose for HCI” outlined in section 6. In fact, the discussion of inside/outside settings in section 6.1 echoes the mention for need for feedback and practice outside of sessions, going beyond short-term role-play, and embedding and transfer of skills in section 4. Second, as the authors themselves point out, a lot of the technical, design, and methodological challenges (discussed at great length) in sections 6.2-6.4 are rather generic in that they’re common to most ubiquitous systems. Again, I would argue that grounding the discussion in a particular domain, such as social and emotional skills training in education settings, would allow the authors to devote more time to giving specific examples of challenges that supporting teachers in delivering curricula aimed at improving social and emotional skills in school-age children pose for HCI.

As R2 suggested, we hope that reframing the paper for SEL in education has helped in reducing the high-level discussion into more specific arguments. We also removed/distilled most of the text originally in section 6, and instead added the new material in current sections 4 and 5 to more specifically outline the benefits SEL could bring to HCI; as well the explicit next steps.

As a more radical proposal, I wonder whether sections 5-6 could be combined, condensed, and re-structured to more closely follow the challenges outlined in section 4. For each of the four learning principles and associated challenges, there could be a section on existing technologies and approaches that can be applied toward these challenges, followed by a section on design opportunities the challenges pose for HCI. Such re-structuring might ameliorate the sense that the technology discussions in sections 5 and 6 have too much breadth and not enough depth.

The revision combines the challenges and the technologies/approaches that can be applied towards these into single sections (3.1-3.3). We hope that exchanging sections 5 and 6 for the current take on 4 and 5 also serves the purpose of deepening and concretising the discussion of opportunities for HCI, and the next steps to take when engaging with SEL.

In summary, I believe that a literature review focusing on content-based analysis of socialemotional skills learning curricula with the goal of identifying specific challenges and hence opportunities for HCI research would be of great interest to the ToCHI readership. However the review would benefit from some limiting of scope; focusing on SEL curricula in educational settings would ground the discussion of how these programs can be supported with existing technologies and HCI approaches, and what new technology and design opportunities they afford the HCI research community.

1. [Bar-On et al. 2007; Elias 1997; Pasi 2001; Zins et al. 2004; Patrikakou et al. 2005]. [↑](#footnote-ref-1)