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.

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 reviewers and the editor. We outline the core changes to structure and argumentation below, and then explain how we addressed the more localised reviewers’ suggestions inline 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 broader implications and pointers for future work only at the very end of the paper, in Section 6. We have also considered an alternative option of putting this section into Appendix; whatever reviewers/editor prefers.

The second key change is in how we present the identified challenges to learning. Previous version first drew out four broader learning principles in one section, and then used these to outline the related HCI literature another section. In the revision, we combine these two steps into a single section (Section 3). We reframe the four learning principles into three challenging areas for SEL in education---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 also immediately complemented 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 readership and readers from other disciplines, as well as provide improved ‘evidence’ that future HCI work is likely to 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 that were made more specific to SEL in education.

* Section 4 addresses the ‘Opportunities for HCI’, which outline the research opportunities that focus on SEL will likely open for HCI. We particularly highlight the possibility to use SEL settings as a test-bed and guidance for real-world grounding of Affective Computing and Social Signals Processing research, well fitting with the recent calls in and outside of these two communities around the need to identify plausible real-world application areas. We also draw out how the focus on social and emotional learning will support emerging HCI interest around ‘social reflection’ – i.e., understanding (and supporting) reflective processes as a collaborative activity.
* Section 5 then identifies the ‘immediate next steps’ 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 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 present. We also suggest a number of (tentative) design considerations for SEL support systems to inspire initial work in this space: 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.

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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,

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

Point out the additional search we did and the books read, with no avail.

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

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.

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.)?

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. 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.

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.

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. ).

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.

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.

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.

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.

**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”.

**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).

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.

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.

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?

**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

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?

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.

**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.

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?

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

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.

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.

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

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

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?

**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.

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 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?

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?

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

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……”

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?

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”

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.

Pg 18 line 39 tone down statement

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).

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).

**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.

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

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

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.

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

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.

***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.

*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