

INSIGHT: Thinking Issues

Software Developers and Collective Empathy – Can they be Disposed to Care?

As I write this, while on research and study leave in Professor Daniela Damian’s SEGAL lab in Victoria, Canada, we are engaged in exploring the concept of “empathy”, a topic of increasing interest to software practitioners and researchers. So what is empathy, how might we study it, how could it be developed, and why might it be important for students in the computing disciplines? This column attempts to answer some of those questions.

Empathy then, a phenomenon which has been studied across many disciplines, (with psychology, nursing and medicine being prominent), has been recognised as “*a complex phenomenon with no one unified definition*” [10]. In the software context where studies on empathy have been limited [11], it “*has been recognised as a human aspect that can help to understand software developer and stakeholder human interactions*” [11]. One definition of empathy is “*the ability to experience the affective and cognitive states of another person, while maintaining a distinct self, in order to understand the other*” [12].

While approaches to assessing and measuring empathy vary, two key methods have been identified: *measuring empathy via self-assessments, and via neurophysiological examination methods of studying different brain activities using brain images* [10]. Observations of empathy behaviours evident through verbal and non verbal behaviours have also been conducted by researchers [10]. In a recent multi-method study a self-assessment instrument “*the questionnaire of cognitive and affective empathy (QCAE)*” [10], was deemed to best fit their goal of *understanding how empathy is practised between software developers and end users* [10].

Then, extending beyond studying empathy at the individual level, for instance, investigating “*interpersonal empathy in work groups or teams..., few studies have suggested empathy at the team level as a collective phenomenon, that is, collective empathy, in software development teams* [1]”.

Akgün and colleagues have argued “that collective empathy exists when all team members (e.g., programmers, system developers, testers) perceive or imagine their teammates’ affects, partially feel what others are feeling, and then demonstrate prosocial behaviors within their team during the project” [1]. This definition of collective empathy, within software development project teams, has been broken out into the three dimensions portrayed in table 1.

Concept	Definition	Realised Through
Cognitive empathy	<i>ability of team members to understand the feelings of others within the team.</i>	taking the perspective of the other
Affective empathy	<i>the affective reaction team members have to the affective states of their teammates</i>	“we feel with you” or “we are feeling for you”
Behavioral empathy	<i>ability of team members to respond to the feelings of others within the team</i>	helping behavior, usually through communicative reaction to others’ feelings, enabling troubled team members to feel they are in an empathic team environment

Table 1. Dimensions of Collective Empathy Within Software Development Project Teams

Empathy is a growing area of interest for software engineering [11]. In a recent study of practitioners' perceptions a thematic analysis of the grey literature from the DEV community has aimed to build on the concept of empathy in software engineering [3, 15], and provides useful insights into aspects of empathy for software practitioners. The responses to the five questions asked in the study give realistic insights into how empathy is experienced and perceived. These are presented in table 2.

Research Question	Themes Identified	Selected Illustrative Quotes
RQ1: The meaning of empathy for software Practitioners	Understanding means comprehending another individual's thoughts and feelings	"Empathy means understanding how someone else is thinking and feeling."
	Compassion refers to care for the well-being of others	try to care about what is important for the client as we care about what is important for us.
	Perspective taking means adopting someone else's subjective perspective	"empathy comes into picture where we should try to see it from other person point of view."
	Embodiment entails imaginatively placing one's self in another's position	empathy is simply the ability to put yourself in the shoes of another human being."
RQ2: The value of empathy for software Practitioners	Emotional sharing means the ability to share the emotional state of others.	[empathy is] "the ability to understand and share the feelings of another."
	We find that software practitioners consider empathy as important, undervalued, needed and wanted.	
	RQ3: Applying empathy in software engineering activities	Communication and Collaboration - practitioners consider empathy useful or important when communicating with colleagues, clients, and users.
RQ4: Empathetic practices in Software Engineering	Coding - practitioners discuss the need for empathy when they are coding or maintaining the code of other developers,	Something that I learned as the time passes was to have empathy with another developer's code."
	Management and Leadership - practitioners, view the need for empathy to successfully coordinate, communicate, motivate, and work with their teams and colleagues.	"To make an impact, our SRE leaders need to lead with empathy and help the rest of the organization engineer with empathy."
	Code review - practitioners consider empathy necessary in the code review process	Empathy for other engineers - ... Be mindful that... asking for their input is essentially asking them for their time
	adopting good programming practices is related to multiple best coding practices. Practices mean caring for fellow developers and future maintainers of the code	Having a consistent code style is empathetic because it allows your teammates to understand the code faster."
	Understanding others means trying to understand what others think or feel.	"Each person has to act with empathy toward their frustrated users. Understand them. Care about them."
RQ5: Effects of practicing empathy in software engineering	Being compassionate relates to showing compassion towards others, being polite and kind to others, and communicating with kindness in a nonviolent way	Compassionate coding might, however, educate you to notice things you did not notice in the past. It might eventually show you how some of your actions cause suffering for others or for yourself."
	Being mindful means being aware of interactions with others,	by being mindful of situations where empathy is important, we can all develop this vital quality."
	Testing relates to automating tests to verify that the code works.	When we write tests ... we're making sure that the future maintainer of our code can feel safe about modifying it."
	quality improvement is related to better software quality, better code, code that is easier to maintain, to read, and to understand	By focusing on empathy in the code we write, we will produce higher quality software as a byproduct."
	The effect better products means products with fewer bugs and that are better suited to meet the users' needs.	remembering the human beings using our software focuses our attention and helps prioritize our efforts, ultimately resulting in products better suited to our users."
RQ5: Effects of practicing empathy in software engineering	The effect build trust means creating a culture of trust in the workplace, where failures and mistakes are accepted	Cultivating a culture where failure is embraced and experimentation is cultivated is important and essential".
	The effect better work environment relates to creating a better, healthier work environment with fewer conflicts	If you are a fellow developer or a lead and if you practice being empathetic, you can create a better work environment for that person and also help him/her grow eventually
	Improve stakeholders' communication refers to more effective communication with clients, team members, and colleagues, in	Remembering the human beings using our software focuses our attention and helps prioritize our efforts, ultimately resulting in products better suited to our users... You Will

	interviews, and between managers and the team.	Communicate More Effectively With Designers and Product Owners.”
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Table 2. Software Practitioner Perceptions of Empathy [Adapted ex. 3]

In these pragmatic perceptions of practitioners we see strong echoes of the theoretical dimensions of *collective empathy* from table 1. There are also links with some of our own work, drawing on analyses of job descriptions to determine the competencies demanded of software practitioners and exploring how ‘dispositions’ as one component of a competency may be understood and assessed [2,13,14,6,7]. In that work, discussing whether dispositions could be taught, I noted that “... a disposition “concerns not what abilities people have, **but how people are disposed to use those abilities**” [18]. So here we are talking about a mindset and attitudinal dimensions, which raises the question can a disposition be taught or is it some innate part of a person’s character?” [7]. Dispositions such as ‘being proactive’ are not cut and dried abilities, but “imply a tendency or an inclination to act in certain ways as determined to be appropriate in the situation” [9].

So relating that work to the idea of ‘empathy’, we can see that ‘acting with empathy’ is not simply an ability, but possesses the essential qualities of a ‘disposition’, namely being dependent on how people are disposed to act empathetically and also on them having the discretion to decide when and how to act with empathy.

Our own work studying job advertisements to determine the global software engineering capabilities desired by employers, has confirmed that acting with empathy was seen as highly valued.

“The attributes such as *Mentorship, Customer Engagement, Collaboration, Leadership, Interpersonal Skills, Knowledge Sharing, Relationship Building, Team Player, Respectful*, as...advertised by many companies having global clientele does allude towards a possible distributed or global DevOps role” [14].

While the focus there was on DevOps and global teams, the dispositions (termed ‘attributes’ in that study) listed above, have a strong fit with the concept of *collective empathy*.

Relating that concept to the curriculum work of CC2020 [5], and its competency-based approach, where a vocabulary of dispositions was defined [5], the two closest matches to the concept of *collective empathy* were *Collaborative*, and *Responsive* defined below:

- *Collaborative/Team Player/Influencing. Willingness to work with others; engages appropriate involvement of other persons and organizations helpful to the task; strives to be respectful and productive in achieving a common goal,*
- *Responsive/Respectful. Reacts quickly and positively. Respects the timing needs for communication and actions need to achieve the goals of the work.*

Further developing on that work, the study by He [13] into the distinctions between expectations of junior and senior software developers, showed that dispositions such as being a *team player* or having a *propensity to share knowledge with others* which mapped to *collective empathy* were identified as being valued:

- “The most frequent dispositions are (collaborative), (responsible) and (purpose-driven). Junior job ads focus more on being collaborative, whereas senior job ads also put emphasis on being responsible and purpose-driven on top of being collaborative. Overall, more disposition labels are assigned to competency in senior level job ads than junior level job ads” [13].
- “A noteworthy piece of data is that mentorship appears frequently in senior level job ads, and is exclusive to senior developers. This suggests that mentorship is a desired and distinctive quality of senior software developers compared to junior developers, and is a skill that aspiring senior developers should aim to hone” [13].
- “When it comes to disposition, being collaborative often comes with being responsive, since these two form the basis of communication skills.” [13]

In a further cross-country study of job advertisements for product manager, product owner and business analyst roles [2], categorising the employer expectations into broad themes after a systematic mapping study [16], again we saw a strong fit between findings and the value of empathy in all three roles. Theme headings for the identified themes were depicted below, with the *intrapersonal* and *interpersonal* distinction drawn from [17], where the *intrapersonal* theme tended to strongly map to dispositions, with the term ‘*empathetic*’ now occurring explicitly in the job advertisements, as opposed to its earlier implicit presence in advertisements.

Intrapersonal	Cognitive	Managerial	Technical	Knowledge Area	Interpersonal
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Table 3. Theme headings categorised within the study of the *Skills of Product Managers, Product Owners, and Business Analysts in New Zealand, Australia, and India* [2]

Excerpts from the study indicating examples of Job Advertisement content seeking differing forms of *collective empathy*, for specific roles are given below [2], (where the numbers in brackets indicate number of occurrences of a theme).

- *Product Manager Skills Required in New Zealand* According to 15 Ads on Seek.co.nz - [Intrapersonal] *Empathetic* (3) 15 Job Ads [Managerial] *PM Practices and Disciplines* (5); [Interpersonal] *Facilitation* (5)
- *Product Manager Skills Required in India* According to 15 Ads on Naukri.com – [Intrapersonal] *Empathetic* (1) 15 Job Ad [Managerial] *Lead a Team of Product Owners, Scrum Masters and Business Analysts* (2)
- *Product Owner Skills Required in Australia* According to 15 Ads on Seek.com.au – [Intrapersonal] *Self Motivated* – [Managerial] *Inclusive Leadership/Encourages diversity/ Environment of collaboration and creativity/Team empowerment* (7); [Interpersonal] *Skill Development/Knowledge Sharing/Mentorship and Coaching* (4)

So we can see an increasing interest and awareness of the concept and role of *collective empathy* in software teams, as evidenced through job advertisements and the literature. Cerqueira and colleagues [3] have identified contributions for researchers, practitioners and educators from their work, where they conclude “*Our work emphasizes the value of empathy in software engineering. Nonetheless, it remains an under-researched subject*” [3]. They further conclude “**For educators:** *SE educators might consider our results to approach the development of empathy throughout SE education. Moreover, our findings could be helpful for pedagogical interventions to build students’ empathetic capacities*”[3]. The related work we have discussed here on dispositions and their assessment [6,7,9,17], and competency-based curriculum development [5, 4], we believe, has potential to more explicitly incorporate *collective empathy* into the computing curriculum, and suggests one direction for furthering research and educational practice.

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Empathy Logo

185x185mm (35 x 35 DPI)



Empathy - Actions can cause suffering

52x34mm (300 x 300 DPI)



Collective Empathy and Mutual Understanding

186x186mm (180 x 180 DPI)