Eudaily: Supporting University Students in Daily Eudaimonic Reflection Using the Reflective Play Framework

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Abstract: Since introducing "slow technology" and "reflective informatics" in human-computer interaction (HCI) research, developing prototypes for eudaimonic activities (such as learning and critical thinking) has gained attention. With 'eudaily', students are encouraged to reflect on philosophical ideas playfully. Using the framework of reflective play, a database of 22,216 perspectives across 1,507 philosophical ideas, and a measure for reflective activities in interaction with technology, this prototype was designed and evaluated by 21 students in an initial use case. Five practical implications to support reflection in HCI can be derived: (1) creating positive disruption is a design template for disruptions and (2) diversity of perspectives can serve as a design blueprint for positive disruption. Furthermore, (3) the importance of enabling the customization of the reflective process and (4) creating a balance between instruction and exploration have been identified. Finally, (5) users demand a variety of self-expression mechanisms during the interaction.

1 INTRODUCTION

Beyond the doctrine of simplicity or usability in HCI (Sarkar, 2023), we can create spaces for humans to engage with profound questions and activities, to foster deeper self-exploration, and to 'dwell more in this world'. "Slow Technology" (Hallnäs and Redström, 2001) was the first call for an alternative development doctrine for technology that does not focus on task accomplishment but on the creation of space for reflection and thinking. Perceiving "slow technology" remaining "somewhat vague as to what constitutes reflection" (Baumer, 2015, p. 587), Baumer introduced the term "reflective informatics" (Baumer, 2015), i.e. a conceptual formulation of designing for reflection in HCI. Several applications of these concepts can be found today in a large number of prototypes that have been published in the last two years alone (Li et al., 2023; Behzad, 2023; Pasumarthy et al., 2024; Cremaschi et al., 2024; Sathya and Nakagaki, 2024; Kwon et al., 2024; Liedgren et al., 2023). Betran et al. state: "[...] we argue that, in a world where technology is increasingly present, functional and productive; it is equally important to also support the socio-emotional value of play" (Altarriba Bertran et al., 2020, p. 3). In 2024, Miller et al. developed the "Design Framework for Reflective Play" (Miller et al., 2024) presenting a procedural design guideline for reflective activities in interaction with games. The ideas of abstract thinking and perspective-taking are often referred to as eudaimonic habits (Huta, 2016). Consequently, contributions in HCI often refer to eudaimonic perspectives when addressing these activities (Schrier, 2024; Joers and De Luca, 2024; Mekler and Hornbæk, 2016). For example, Cole & Gillies describe the eudaimonic (play) experience as one that aims to encourage reflection and self-development of the activity afterward (Cole and Gillies, 2022). Strengthening these critical thinking skills is an important component for the development of students in the 21st century (Soffel, 2016). This use case applies the new framework for reflective play to foster the reflective processes of students within a playful environment. In this context, the prototype 'eudaily' was developed using a wordplay of *eudaimonia* and *daily*. This use case is the first application of this novel framework, thus no state of practice does yet exist. Furthermore, it contains practical implications for the development of reflection-enhancing interactive systems. 'Eudaily' is also a contribution to the existing challenge of fostering eudaimonic activities and enhancing eudaimonic well-being in HCI (Stephanidis et al., 2019). Thus, beyond the mere application

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of this model, important practical implications can be deduced in the specific context of technology design for eudaimonic reflection and eudaimonic well-being.

2 BUILDING EUDAILY

For the conception of 'eudaily'[1] we used a novel framework for reflective play (Miller et al., 2024), the design guidelines for slow serious games (Marsh, 2016), and the eudaimonic interaction design principles (Joers and De Luca, 2024). The design framework for reflective play has five sequential phases: *disruptions*, *slowdowns*, *questioning*, *revisiting*, and *enhancers*. Design templates are available to the developer in all process-related design steps to enable a reflective experience in a game. The aim of this framework application is not only a reflection during the interaction (endo-transformation) but also a real behavior change (exo-transformation). For the development of the interaction during the slowdown, the guidelines for slow serious games were considered. Marsh defined eleven design guidelines for slow serious gaming, e.g. avoiding narration and further information but creating a space for de-accelerated reflection (Marsh, 2016). Finally, the eudaimonic interaction design principles call for the reduction of quantification within the interaction, the promotion of the user flow, and the reduction of informal feedback instead of the gamification of the activity per se (Joers and De Luca, 2024). These principles were also taken into account during the development.

The core idea of 'eudaily' is encouraging students to reflect on philosophical ideas (e.g. laws of nature, subjective truth, free will, infinity, or love) taking existing perspectives of philosophers into account. Accordingly, a database of philosophical perspectives on topics was used for the development of 'eudaily'. Through years of preliminary work by Gibson and Berry, who together maintain the website "Philosophy Ideas"[2], we were able to access 22,126 perspectives on 1,507 topics such as freedom of lifestyle, nature, and virtue of courage. The students interact playfully with the existing perspectives on the randomly chosen topic and are supported in his or her eudaimonic process of reflection. The topic is selected at random via a web interface and the perspectives are loaded into 'eudaily' accordingly. In the following, the exact course of the interaction is illustrated in detail in the subsections.

[1] http://eudaily.joersi.com/

[2] http://www.philosophyideas.com/

2.1 Disruptions

At the beginning of the interaction, the student is confronted with a random topic and its perspectives serving as a disruptive moment within 'eudaily'. A screenshot of the disruptive moment is shown in Figure 1. In the moment of disruption, we specifically aim for an uncomfortable, possibly contradictory encounter with perspectives on a philosophical object, causing a general moment of friction. During

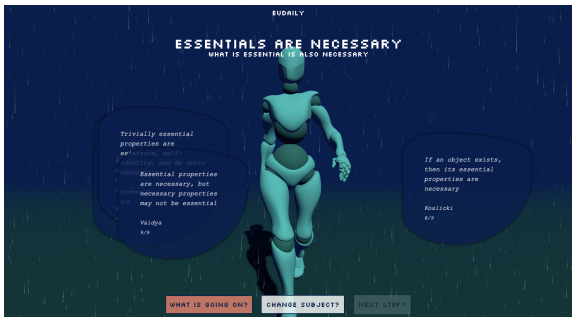

Figure 1: The 'Eudai-Bot' takes a walk in the rain and reflects on the philosophical positions of a construct (phase of disruption).

the disruptive phase, one "creates an opportunity for the player to question their own assumptions and re-evaluate their own systems of thought" (Miller et al., 2024, p. 5). Thus, the direct *confrontation* "with the player in relation to their beliefs and actions" (Miller et al., 2024, p. 7) has been chosen as a design approach to create *discomfort* in the interaction. The students can change the topic at any time using the refresh button. The perspectives are shown overlapping, forcing the student to 'solve' the thought by clicking on the perspectives and moving on to another statement. Only after all possible thoughts have been resolved the student can access the next page by an activated next button and thus enter the phase of *slowdown*.

2.2 Slowdown

Based on the reflective play framework, it is intended to implement a speed bump as "attention as a mechanic" (Miller et al., 2024, p. 8). (De-)acceleration through input devices can be a significant mediator of interaction, such as writing a tweet using an old-fashioned typewriter (Cremaschi et al., 2024). The user receives an overview of past statements in order to leave the chosen cognitive and perceptual load (intended disruption, the 'eudai-bot' running in an endless loop, statements moving up and down) and thus enter a merely 'calmer' phase of interaction. An example can be seen in Figure 2. Based on the game

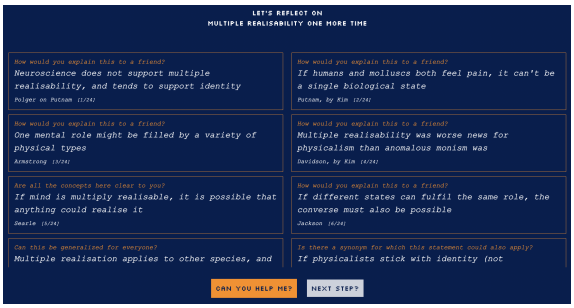

Figure 2: The text statements are displayed again with additional questions to guide the students (phase of slowdown).

principles of slow serious games (Marsh, 2016, p. 50), this situation aims to open up opportunities for thinking and reflection. In addition, according to number 10 of the design guidelines for slow serious games (Marsh, 2016, p. 50), the user can use a button to call up random reflection questions to address the concepts. These are displayed via a random generator in the respective text boxes.

2.3 Questioning

In the sense of "demanding self-explanation", a "refection-in-action" is enabled in the *questioning* section (Marsh, 2016, p. 10-11), i.e. the student should translate the confrontation with the perspectives into their own explanations. This process is divided into two parts in the interaction: (1) The students formulate their own quotation of the topic so that their own interpretation and thus a reflection process and perspective-taking are initiated. This first step of questioning can be seen in Figure 3. (2)

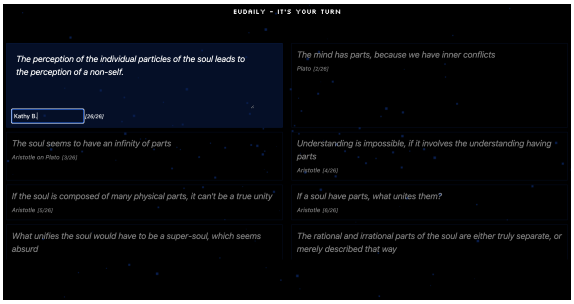

Figure 3: The student must become active by providing their quotation (phase of questioning).

Then, along the design principle of "ambiguous instructions" (Miller et al., 2024, p. 11), the students should express themselves creatively and visually on a small HTML5 canvas, which they associate with their interpretation of the topic. This second step can be seen in Figure 4. We have used a simple editor (color selection and brush thickness), which, after saving the artwork, redirects to the page that enables the *revisiting* of the experience.

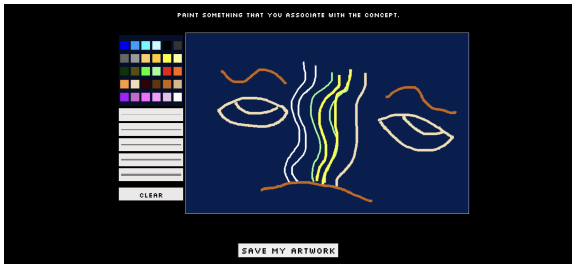

Figure 4: A minimalist painting surface designed to inspire artistic activities (phase of questioning).

2.4 Revisiting

In the *revisting* phase, we have chosen a form of *reflective revisiting*, i.e. the user receives a simple visualization of his or her painting, his or her quote, and a dwell time within the system. Actively informing users about their time spent on video platforms initiates reflection processes (Sathya and Nakagaki, 2024). The times are not stored user-specifically, as a shift in extrinsic motivation should be prevented (focus shift to high dwell times in the system, instead of serious engagement with topics). Thus, from our perspective, there should be no direct reward for long dwell times in the system. Forms of evaluation may cause decreases in creativity (Amabile, 1982), complex problem solving (McGraw and McCullers, 1979), and deep conceptual processing of information (Grolnick and Ryan, 1987). However, at the end of the phase, a small fireworks simulation is played in the background to acknowledge the time spent in the system by the student (an example can be seen in Figure 5). The actual moment of the *enhancer* takes place in the last interaction.

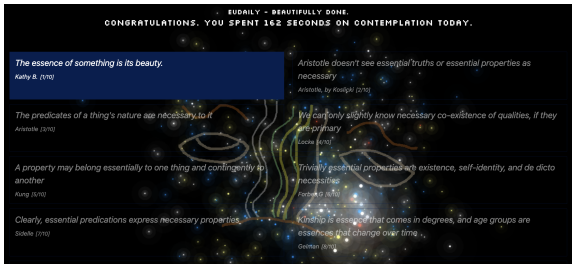

Figure 5: The image is displayed with slight transparency in the background, and the user's quote definition is displayed next to the concepts. The user is simply informed positively about the dwell time in the system (phase of revisiting).

2.5 Enhancer

A random generator chooses a slogan from a list of ready-made motivational statements at the top of the last page. It is intended to motivate reflection practices outside of this environment and has been preselected by the author. It is a combination of the design template, *explicit encouragement of reflection* and *breaking the fourth wall* (Miller et al., 2024), as the student should be motivated to engage in out-of-system reflection processes. Furthermore, for the exploration of multiple perspectives of the game experience, all user artworks are displayed on the last page of the interaction - no likes, just text, acronym, and the artwork, arranged from last to newest timestamp. It can be seen in Figure 6. We want to emphasize

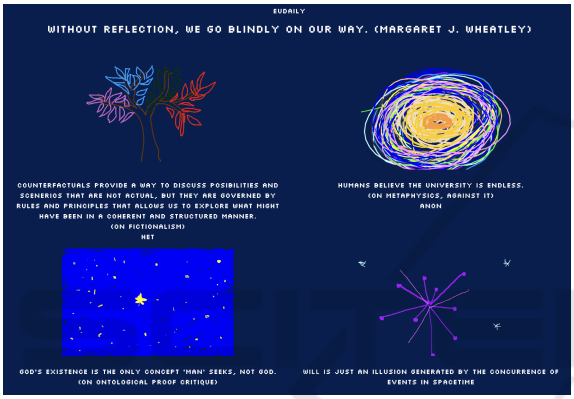

Figure 6: At the end of the interaction, the user sees the works of the other users in their variety. A random quota is intended to reinforce the effectiveness of reflective activities (phase of enhancer).

this feature of the prototype, as social reflection is mentioned as an important research object in reflective play: “Lastly, refective revisiting features can be made into social learning activities. Instead of reviewing your own processes and playbacks, reviewing your friends’ gameplay can provide opportunities for comparison, mentorship, and other forms of social learning.” (Miller et al., 2024, p. 16). However, it is not only friends with whom one interacts but each student of the platform and their visual and textual ideas. In the course of the user study, we are particularly interested in whether this would contribute to a more collective enjoyment of the interaction or whether it would lead to an uncomfortable and thus unwanted sharing of personal artworks. In the following, we want to discuss the initial results of the experience with ’eudaily’ and highlight both positive and negative aspects, as well as further ideas, so that multiple implications for the development of reflective play emerge.

3 CASE STUDY

We recruited 21 participants on Prolific who explicitly indicate a student status in their profiles. They had to declare an interest in philosophical activities and provide a 100% acceptance rate on this platform, i.e. a submission was never rejected due to suspicious participation. This interest in philosophy was a prerequisite for authentically analyzing the effectiveness of the prototype. The age range was between 18 and 46. Eleven men (52.38%), nine women (42.86%), and one trans man (4.76%) took part in the study. The participants also shared their nationality (anonymized): Eleven European students, seven African students, and three students from America. We collected information consent that allowed the use of their statements for sharing in a research article. Furthermore, we paid £5 for each participation. On average, the test participants spent 36.03 minutes on ’eudaily’ and taking part in the subsequent survey. Participants were required to write a statement of at least 50 words detailing the negative and positive points of use. In addition, participants had to answer all items of the three subscales (reflection, rumination, and self-focused thinking) of the “Reflection, Rumination and Thought in Technology (R2T2)” scale (Loerakker et al., 2024). With the items for reflection, the consciousness of one’s behavior as well as the support of reflective activities are measured in interaction with a technology. The items of the rumination subscale are developed for assessing the amount of creating negative thought cycles and reflecting on past situations in interaction with technology. The items of the self-focused thinking scale measure the influence of technology on the analysis of one’s feelings and the origin of thoughts. The subscales should be used to measure the extent of these aspects in interaction with ’eudaily’ to determine whether all forms of the scale-related aspects are addressed in the interaction. We intended to analyze whether all forms of reflection are addressed in the interaction. The Cronbach’s alpha of the subscales were at least satisfactorily consistent (Taber, 2018), so that implications could be developed on this basis (reflection: α=0.81, rumination: α=0.66, self-focused thinking: α=0.88).

4 FINDINGS & PRACTICAL IMPLICATIONS

In general, there are five specific practical implications based on this use case. However, some general statements can be derived regarding the overall pleasantness of ’eudaily’: The most frequently mentioned

was the variety of perspectives to be evaluated in the disruptive phase together with the 'Eudai-Bot' (n = 5). Four participants share the positive feedback of an artistic expression on the canvas (19.05%). One participant (no. 14) positively emphasizes the lack of pressure for perfection described in the painting process. Another participant (no. 2) highlighted the possibility of being able to focus on the reading process, which has been evaluated positively. To summarize and structure each of the five practical implications of this use case, we will address them in the respective subsections.

4.1 Positive Disruption

The use case showed that, as assumed by the authors of the framework (Miller et al., 2024), alternative mixed-affect experiences can also serve as a design template during the disruptive phase. The students' statements showed that engaging with philosophical perspectives was sufficient for a positive reflective experience. This is also shown by the quantitative analysis of the R2T2 subscales that we could not measure any negative reflection experiences, but significantly more self-focused thinking and reflection pointing to reflection based on positive disruption. Low values were found for rumination, i.e. a t-test for reflection and rumination shows a significant difference in the mean values (t=4.939, p¡.000***). This also applies to the mean values of the subscales of self-focused thinking and rumination (t=4.546, p¡.000***). The items for rumination are scored lower in comparison to each case (the results are illustrated in Figure 7). This seems logical, as rumination "is considered to be a negative cognitive process, as it can involve a focus on loss and failures" (Loerakker et al., 2024, p. 2). Thus, the use case discovered an additional form of disruption as previously stated: positive or morally-elevated dissonance. According to the quantitative analyses, confrontation with new, inspiring perspectives that challenge one's patterns of thought also leads to reflection processes and promotes self-focused thinking. It may be close to feelings such as awe and moral elevation, which can be assigned to the eudaimonic emotional field (Landmann, 2021). Based on the results, these forms of positive eudaimonic emotions in connection with reflection processes are equally design principles of disruptions. In other words, it may be sufficient to create spaces of disruption that are not always negative or concern violation of user expectations, but also to create disruptions with positive eudaimonic emotions.

4.2 Variety During Disruption

The most frequently mentioned positive aspect among the participants was the variety of perspectives (n = 5, 23.81%), e.g. participant no. 4 wrote: "*I really appreciated the variety of sentences selected and the possibility of giving my point of view too. I think it's something that makes you think*". An alternative interpretation is given by the 21st participant: "*I really liked that many quotes were presented, so we could tune in to the topic and learn from those who figured it out in their way*". Other participants also commented positively on the variety of perspectives, e.g. Participant No. 17: "*I found it interesting to read all of the different ideas that where being put forward*". Participant no. 6 adds: "*I really enjoyed the simplicity of the visuals and how the screen was organized to provide all different perspectives while not being visually overwhelming*". Lastly, Participant No. 3 manifests: "*I really appreciated the variety of sentences selected and the possibility of giving my point of view too*". Thus, the second practical implication of this use case is that a variety of perspectives during the disruptive phase may enhance the reflection process instead of a single event such as a narrative twist. From this, we conclude that confronting a variety of perspectives, opinions or interpretations can be sufficient as a disruptive momentum.

4.3 Customizing the Disruption

A fourth practical implication was drawn from the use case, namely that the customization of the ambience and interaction spaces was noticeably demanded. For example, participant no. 18 stated that he or she "*felt that the overall 'atmosphere' was a little too unserious and overly 'spiritualistic' for my tastes, which mainly regards the particular way the content was presented (e.g. floaty animated UI, walking android in the backdrop), and not the content itself*". Participant no. 13 mentions the customization of the theme as a specific point for improvement: "*I found the theme (the color mostly) set a particular mood, about which I wasn't sure how to feel. It made me a little pensive, but in a "gloomy" sense (similar to how rainy weather may trigger a particular kind of atmosphere). Overall, I found it a bit distracting and would prefer the option to choose a theme*". In two cases there was an explicit wish to add ambient music. Participant no. 12 writes: "*ambient music should be used to enhance the aspect of focus*". Participant no. 15 adds: "*For improvements, I think having some fitting ambience music in the background would further enhance the experience*". Finally, participant no. 13

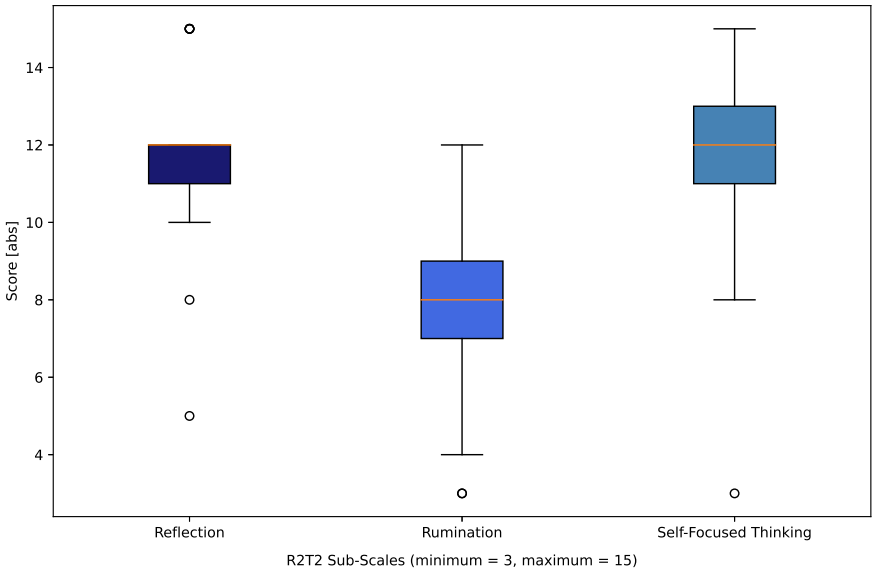

Figure 7: The evaluation of the subscales of the R2T2 scale. The Rumination subscale showed significantly lower scores on average.

mentioned the capacity to choose the topic in the interface instead of using a randomizer: "*At the outset, I would have preferred an option that listed how many topics there were from which to choose - I did want to explore others, [...]*". The supposedly subjective aspects of interaction design have the practical implication of wide modification of the disruption such as the ambience or even the topic. It may indicate that an overly prefabricated reflection procedure does not allow for the desired degree of reflection in the system for each student. For two students, the 'Eudai-Bot' was irritating or even annoying in the first step. This results in the potential importance of influencing the design of disruptive events and following steps of the reflective play experience.

4.4 Instructive Reflection While Questioning & Slowdowns

There is another important practical implication for the subsequent steps of slowdowns and questioning. The principles of slow serious games explicitly demand the avoidance of instructions in two points ("7. No commentary/narration used/permitted" and "8. No extra information or text boxes displayed during gameplay" (Marsh, 2016, p. 50)). The participants were sometimes unable to understand the phases and the corresponding task. Participant no. 19 writes: "*And as for the project itself in general I would add a bit of an introduction, a really easy task to get me comfortable or something like that*". Participant no. 4 mentions the importance of additional questions: "*I think It could be improved by adding questions. What I mean is, instead of just having the quotes, also having questions that make people reflect and think by themselves about the topic*". Participant no. 1 clearly demands: "*I would probably add further explanation if I where you*". It seems to be not clear from the experiences of the students what exactly needs to be done, what the next steps are, and what is aimed for within the interaction. The participants were informed in advance in the introduction to the study that they would encounter such a prototype. However, there is still a certain need for guidance in the process itself. The use case has shown that this guidance cannot be always implicitly derived from the events and that textual information can be useful. Even though they should be avoided during phases of questioning and slowdowns, a minimum introduction and help options are recommended.

4.5 Variety of Self-Expressiveness

In the questioning phase, the need for a variety of personal expressiveness is particularly evident. Two participants stated that the reflection is only expressed by their quotation and minimal painting should be expanded by including other forms of expression. Participant no. 10 mentions writing a description and documenting expressions of feelings: "*maybe you should find a way for the user to be able to 'paint' the concept without actually having to draw,- maybe write a description? explain their feelings regarding the concept? [...]*". Participant no. 21 states: "*How-*

ever, I missed having to write more on the topic in my own words. Making a quote makes you want to think philosophically and therefore you miss the important part of self-reflection. Furthermore the artistic part is very controversial in my opinion because it's the kind of thing that only works for some people". On the other hand, participant no. 14 writes: "*[...] the artwork wasn't perfect but I enjoyed the process*". The necessity of different forms of expression of reflection can be derived from these perspectives. In the diversity of statements, some may want to express themselves artistically, others may want to avoid it. In the systems of reflection, a wide range of forms of expression must be made possible, which also enables reflection in the final phase of enhancement.

Finally, one statement regarding the presentation of other artworks and quotes by other students should be addressed. A participant (no. 20: "*It was interesting to see the user(?) generated quotes at the end, [...]*") briefly commented positively on the viewing of other participants. However, all other participants did not mention any concerns or further positive comments. It may therefore not have been perceived as having any explicit significance in the interaction, but merely as an 'extra' to one's interaction. It may make sense to anchor these social aspects of reflection in the interaction at an earlier stage (e.g. questioning). This research question, which arises from the implicit derivation of non-mentioning, needs to be analyzed in an alternative system design.

5 LIMITATIONS

The first limitation of the practical implications is the reference to only one use case and a limited number of students participating from three nationalities (Europe, Africa, and America). In its novelty, however, it may serve as a useful foundation for future implementations of the reflective play framework, as it represents the first application of this framework. The second limitation is the lack of analysis of the long-term effect. With the scales, we have only measured a short-term perception of reflective activities. In the next step, we aim to analyze the long-term effect by using well-being metrics, e.g. with the Questionnaire for Eudaimonic Well-Being (QWEB) (Waterman et al., 2010). The final limitation is the inclusion of students who are explicitly interested in philosophy (using the profile information on Prolific). For further research, transfer effects and development of interest are important for students who are not necessarily enthusiastic about these eudaimonic activities, but who may be inspired by the interaction. For example, one participant (no. 10) comments as follows: "*[...] liked it a lot, and would possibly use it in my down time, but I must say I have an interest in these subjects (although not an intense one or anything) so I don't know if people that hadn't taken a class on the matter would feel the same*". We want to address this question in further studies.

6 CONCLUSION

To summarize, there are five practical implications for technologies to enhance reflective practices: (1) Positive disruption can be a design element, i.e. being confronted with fragments (even if only textual) can already generate positive forms of disruption that initiate reflective processes. (2) Diversity of perspectives can serve as a design concept for positive disruption. (3) The technology should be customizable regarding ambience and interaction space for reflection. (4) Instructions can be helpful during phases of slowdowns, even if the user's free exploration has a higher priority in reflective activities. (5) The user must be able to develop his or her reflections playfully through a variety of self-expressive mechanisms. To conclude, these five initial implications expand the development spectrum around the question of eudaimonic and reflection-enhancing technology and are more closely analyzed concerning the aforementioned limitations.

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