See the Change. Reflections on Wellbeing in the Context of Life-Philosophical Lecturing

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Abstract

Background

Life-philosophical lecturing is a non-directive pedagogical approach that facilitates sustained personal reflection for the benefit of the participants' flourishing and positive attitude to life. We work with the PERMA framework developed by Seligman and his associates to reflect upon the self-reported values of wellbeing in the context of a university class on life-philosophical lecturing over the time span of three months.

Results

It is found that among the participants that gave their assessments before and after the course (N=197), on average there is a positive change in all the measured domains of wellbeing, despite of the individual variation. Also, there seems to be an interesting connection between course activity and wellbeing. To see the positive change and account for the multidimensional nature of the data we apply various visual representations and suggest such techniques to be particularly useful in connection of rich and multifaceted phenomena such as flourishing.

Conclusions

Overall, our visualizations and findings based on condensing the data with factor analysis provide empirical evidence for the applicability of the PERMA framework for wellbeing studies.

Keywords: Wellbeing, Visualization, PERMA, PERMA-Profiler, Life-Philosophical Lecturing, Flourishing, Multidimensionality, Factor Analysis

1. Background

Life-Philosophical Lecturing (LPL) is a pedagogical approach developed by philosopher Esa Saarinen for the purposes of personal growth and human flourishing (Saarinen & Slotte 2003; Saarinen 2008; Saarinen & Lehti 2014; Saarinen 2013a; Saarinen 2013b; Saarinen 2015; Saarinen & Korhonen 2015; Saarinen 2016). Successful as a form of university pedagogy, adult education, and managerial training (Jones & Hämäläinen 2013; Lonka 2013, Taylor 2013; Wilk 2013), the practice involves staging lectures for the purpose of subjective deliberation on one's personal life.

In sharp contrast to traditional pedagogy, LPL does not target towards explicit learning goals. The lecturer does not offer advice, solutions or explicit instructional content. The aim is to stimulate the participants' "reflective mind" (Stanovich 2011) and "narrative mode of thought" (Bruner 1986). The participants' "task negative looking-in system" is activated along with their "constructive internal reflection" (Immordino-Yang, Christodoulou, & Singh 2012). Participants are explicitly encouraged to allow their thinking to associate and thus to engage in "mind wandering" and in "positive constructive daydreaming" (McMillan, Kaufman, & Singer 2013) during the lecture.

LPL emphasises applicability and personal relevance. Recognizing that rational thought "cannot be recruited appropriately and usefully in the real world without emotion" (Immordino-Yang & Damasio 2007, p. 8; Saarinen & Korhonen 2015), the lecture is crafted carefully both in its cognitive and affective content. Delivery and the way the lecture unfolds are considered fundamental. The lecture situation is envisioned in many respects not unlike an artistic performance and stories appear prominently in the delivery.

Aiming at enriching the actual life and seeking to connect with the experience of the participants, LPL makes use of material that the participants are familiar with. References to public figures, icons of the popular culture and the lecturer's personal friends appear along more

academically respectable authorities. Short video clips (2-4 minutes) are used to remind the participants of the fine-tuned abundance of human experience. Always combined with an in-depth analysis, a video clip could be, for example, the two minute cut from the film “*Invictus*” involving the first encounter of Mandela and the rugby captain and leading to an hour-long articulation of “The Leadership Principles of Mandela in Two Minutes”, or the “Marvin shot scene” episode from Tarantino’s “*Pulp Fiction*” as a demonstration of “The Life Principles of Vincent Vega”.

Such a life-philosophical practice has been tested in several contexts: (1) since 2001 with university students with a hugely popular lecture series that 500-600 students take annually in Aalto University (Science, Technology, Business, Economics, Art, and Design), Finland; (2) since 1995 in one-week seminars for managers and general audiences in Paphos, Cyprus, organized almost 50 times for groups around 100-130 participants; and (3) in hundreds of individual lectures lasting from one hour to several days in companies and for the general public (Saarinen 2013a; Saarinen 2015; Saarinen & Lehti 2014). In this paper, our focus is on the context (1), more specifically on the course that was organized in 2015.

The general theme of the 2015 course was “*Life-Philosophy, Learning from Experience, and Systems Intelligence*”. The course consisted of eight life-philosophical lectures on Wednesdays from 3pm to 6pm (incl. a 30min break), starting on the 21st of January and ending on the 25th of March. Supporting the general theme, each lecture had a specific, inspirational, thought-provoking label. In 2015, these labels (in English) were: “*Towards Extreme Limits*”, “*Encounter on the Eric Street*”, “*Lady Gaga and Kill Bill*”, “*Creative Madness*”, “*Spec Brilliance Revisited*”, “*Me We*”, “*Multiple You*”, and “*The Pink Tuxedo*”.

As a supplementary feature started on the 2013 course, and since then continuously further developed, each lecture is captured on video in Full HD quality, edited and annotated by a professional team from the Digital Communications Services of Aalto University. Each video lasts about two hours and includes brief, reflexive interviews of the lecturer before the lecture, during the

break, and right after the lecture. Ready-made web links to the short video clips shown during the lecture are provided within the lecture videos, so that the participants may also watch the video clips afterwards. The videos of the lectures are published on YouTube under Standard YouTube License within the same week. For example, the first lecture of the 2015 course, entitled, “*Towards Extreme Limits*”, has been viewed more than 14 000 times, and the various lectures since 2013 over 200 000 times. Note that these lectures are not part of any MOOC (Massive Open Online Course). Recall that the lectures are in Finnish (https://en.wikipedia.org/wiki/Finnish_language) that is spoken mainly in Finland, a country with a population of 5.5 million (<https://en.wikipedia.org/wiki/Finland>).

The last lecture of the 2014 course, hence preceding the 2015 course, is available online with English subtitles at <https://youtu.be/680A7kcJ4D8>. The title of the lecture (in English) is “*From Glory to Glory, The Queen, and the Way Forward*”. That special lecture was Prof. Esa Saarinen’s *return lecture* that took place on the 2nd of April, 2014, in the Dipoli building in Otaniemi, Espoo, just four weeks after the dramatic stabbing of Saarinen by a disturbed young man in front of the same building on the 5th of March, 2014. (With the help of Saarinen’s assistant Jaakko Korhonen and outsiders, the attacker was apprehended on the spot into police custody. After surgery, Saarinen recovered fully.)

The course could be followed freely, either on the spot or from distance (watching the YouTube videos afterwards), depending on everyone’s possibilities and interests. The requirements for completing the course in 2015 were the following: 1) writing a summary of three given articles before the 11th of February, 2) performing an oral discussion and reflecting in writing the learning experiences as a group exercise before the 4th of March, and 3) writing a concluding reflection essay before the 9th of April. It was also possible to participate on the course without opting for a grade.

Our primary interest was to investigate potential changes in the students’ wellbeing during the course. There is a wide variety of ways to measure wellbeing, depending on the types of studies

(Adler & Seligman 2016; Hone, Jarden, Schofield, & Duncan 2014). In this study we focused on the PERMA framework originally developed by Seligman (2011). Its five well-known domains of wellbeing are positive emotion (P), engagement (E), relationships (R), meaning (M), and accomplishment (A). In addition, we studied four supporting domains (negative emotion, physical health, loneliness, and happiness) that are also measured by the PERMA-Profiler, a brief, 23 item multidimensional measure of flourishing developed by Butler & Kern (2016).

Throughout the course, the participants were explicitly encouraged to *think their own thoughts in the living presence of there and then*. According to the idea and practice of LPL, the participants were led to *associate on the spot* and *link* the lecturer's suggestions, perspectives, conceptualizations, key words, and stories to *their own experiences*. We were specifically interested in whether and how this encouragement to active thinking would be reflected in the wellbeing measures after the course, compared with the situation before the course. Because of the applied research design, we did not claim detailed hypotheses related to the causality between LPL and wellbeing. Instead, we wanted to both analyse and visualize the observed changes on both general and individual levels, as it could help to understand the multifaceted nature of the phenomenon of LPL and perhaps generate new ideas and hypotheses for further research.

2. Methods

The target group of our study was comprised of the students registered to the “*Philosophy and Systems Thinking*” course organized by Aalto University (Science, Technology, Business, Economics, Art, and Design), Finland, in the spring term of 2015. The number of participants in the beginning of the course was about 800, and 576 completed the course. The course was graded using a six-stage, non-proportionate scale with the values 5 (*excellent*), 4 (*very good*), 3 (*good*), 2 (*satisfactory*), 1 (*adequate*), and 0 (*fail*), that is in general use in Finnish universities. The grade 5 was earned by 180 students (30.9 %), the grade 4, which was the most typical, was earned by 365

students (62.7 %), while the lower grades 3, 2, and 1 were given only to 31 students (5.3 %). Only about one percent (six students) of those who opted for a grade, failed to complete the course.

To study the wellbeing, we applied the PERMA framework (Seligman 2011). We measured the students' wellbeing before and after the course using the PERMA-Profiler, a brief, 23 item multidimensional measure of flourishing developed by Butler & Kern (2016). Each of the five domains of PERMA is measured by three items in the PERMA-Profiler. The additional eight items measure four supporting domains of wellbeing. Three items measure negative emotion (N) and three items measure physical health (H). In addition, there is a single item for loneliness and another one for happiness (Butler & Kern 2016). All items are on an 11-point scale ranging from 0 to 10, with the end points appropriately labelled. The 23 items of the PERMA-Profiler were translated into Finnish by Esa Saarinen and his research team in early 2015.

The data were collected before and after the course using an online questionnaire. Its web address was sent to the participants for the first time before the lectures started and for the second time after the final deadline of the concluding reflection essays of the course. In addition to the PERMA-Profiler (Butler & Kern 2016), the questionnaire included a set of background questions (such as gender, age, subject and phase of studies), the course completion (yes/no) as well as the student's estimates of class participation times, hours of watching the course videos, and hours used for the activities required for completing the course, that is, writing a summary of three given articles, performing an oral discussion, reflecting in writing the learning experiences as a group exercise, and writing a concluding reflection essay.

The number of participants that gave their self-reported assessments was 321 before the course (in January) and 197 after the course (in April), which means that the time span between the measurements was three months, and the number of students participating in both measurements was N=197 (110 men and 87 women, mostly of age 20-30). Of those 197 students, 168 reported

having completed the course. As the students gave their answers anonymously, this could not be verified, and their course grades could not be connected to their answers.

We investigated the domains of wellbeing measured by the 23 item PERMA-Profilier both analytically and graphically. Firstly, we computed the basic statistics of the PERMA-Profilier subscales following the scoring instructions of Butler & Kern (2016) and compared the results before and after the course. To see the changes in the subscales, we draw side-by-side boxplots (Tukey 1977, Benjamini 1988, Everitt 2010).

Secondly, we studied the wellbeing (WB) measured by the PERMA-Profilier in two parts that we call WB1 and WB2, for short. WB1 refers to the set of the 15 core items of the PERMA domains (Seligman 2011, Butler & Kern 2016) while WB2 consists of the eight additional or supporting items (Butler & Kern 2016). For both parts separately, we conducted several factor analyses applying the Minres method (Harman & Jones 1966, Harman 1976) and direct oblimin rotation (Jennrich & Sampson 1966, Everitt 2010). Instead of purely exploratory, our factor analyses were “semi-confirmatory”, because they were much based on earlier work related to the wellbeing measurement as well as to the dimensionality and other psychometric properties of the PERMA framework (Butler & Kern 2016; Kern, Waters, Adler, & White 2015). The factors were extracted and rotated similarly for the measurements before and after the course to check how the various dimensions of wellbeing were measured by the items and whether the factor structures were invariant over the three month time span of our study. Instead of serious psychometric investigations of the PERMA-Profilier measuring instrument, our aim was to contribute to the empirical studies of applying the PERMA-Profilier in practical research.

To see the changes in wellbeing compactly, we combined the inter-correlated domains of wellbeing by creating various linear combinations of the PERMA-Profilier items. Instead of plain sums of the items, we applied several one-dimensional factor analyses and saved the results as standardized factor scores (by regression method) for each respondent in the data. To avoid linear

dependencies, the single item of happiness was used in the factor analyses instead of the overall wellbeing, which includes the effects of the 15 core items of the PERMA-Profiler.

Standardization ensured the comparability of the factor scores, but the mean differences would have been lost because the scores were centered to the origin. Therefore, we shifted the factor scores of the second measurement using the average absolute differences between the original subscales. These calculations made it possible to reveal and visualize the changes in both individual and overall co-variation of wellbeing dimensions by graphically rich, yet simple, two-dimensional scatterplots. Additional elements of the graphs, such as contour ellipses and trend lines, helped to interpret certain areas of special focus in the graphs (Everitt 2010). The aim of creating the visual representations of this study was to understand both the “big picture” of the measured domains of wellbeing while also paying attention to the individual changes and hence to provide deeper insights of the phenomenon under study.

The visualizations and the statistical analyses were achieved with Survo R software (Sund, Mustonen, & Vehkalahti 2012; Mustonen 1995; Mustonen 1992) that has been implemented as a freely available, open-source package “Muste” for R (R Core Team 2016).

3. Results

We will present the results beginning from the wellbeing domains measured by the PERMA-Profiler, then proceeding to our visual representations along with the factor analyses that reveal the multidimensional views of the wellbeing domains and form the grounds for the visualizations.

3.1 Wellbeing Measured by the PERMA-Profiler

We begin with a finding related to the PERMA-Profiler measurements. Namely, there is a clear, positive change in each of the wellbeing domains during the course, as after the course each wellbeing subscale shows on average more positive results than before the course.

This result is summarized in Fig. 1 where the scores of the PERMA-Profiler subscales (two of which are represented by single items) are visualised by side-by-side boxplots, measured before (on

the left side) and after the course (on the right side). The boxes are drawn between the lower quartile (q_1 , 25 %) and the upper quartile (q_3 , 75 %), hence including 50 % of the data ($N=197$) in each case. The thick line and the cross inside a box marks the median and the mean, respectively. The lines (“whiskers”) from the box extend to a typical span of 1.5 times the inter-quartile range (q_3-q_1) to both directions from the median, taking into account the range of the data. The points outside this span are plotted individually with a random horizontal and vertical jittering to reveal the overlapping points.

Fig. 1 Side-by-side boxplots of the PERMA-Profilers subscales (P = positive emotion, E = engagement, R = relationships, M = meaning, A = accomplishment, O = overall wellbeing, N = negative emotion, H = physical health, L = loneliness, h = happiness), measured before (on the left) and after the course (on the right)

Fig. 1 shows the striking trend immediately: after the course all the means of the positively oriented subscales (or items) are higher than before the course, and, correspondingly, the means of the negatively oriented subscales (or items) are lower than before the course.

With symmetric distributions, the mean and the median would be close to each other, but with these data they differ in almost all cases because of the skewness of the distributions. Because of its robustness to skewness and outliers, the median would often be a better choice for a measure of the central tendency, but we will stick to the means, despite of the fact that they do represent a bit biased or conservative (too negative) view of the wellbeing domains compared to the medians.

One of the PERMA-Profiler subscales (Butler & Kern 2016) is the overall wellbeing (O), which is a sum of the 15 core items of PERMA and the single item happiness (h), divided by 16. We have also presented the happiness score here as a single item, because we will use it later in the factor analyses. Recall that all the 23 items were measured on an 11-point scale ranging from 0 to 10. The three items of the negative emotion (N) and the single item of loneliness (L) are the only ones that are negatively oriented in respect to their contents. Therefore, the negative change in those scores is perfectly in line with the other changes, which means that in the end all the observed differences contribute to positive changes in wellbeing. The biggest average change (0.49 units) concerns the positive emotion (P), while the smallest average change (0.12 units) is related to the physical health (H).

Table 1 displays the basic statistics of the data behind Fig. 1, including the (biased) means, standard deviations (SD, also biased because of the skewness), minimum values (Min), medians (Md), maximum values (Max), and Cronbach's alpha estimates (alpha) of the internal consistency of the subscales. The rightmost column (Diff) gives the differences of the means that are used for shifting the values of the factor scores in subsequent visualizations.

Table 1 The basic statistics of the PERMA-Profiler subscales before and after the course (N=197)

PERMA-Profiler	Before the course						After the course						Diff
subscale	Mean	SD	Min	Md	Max	alpha	Mean	SD	Min	Md	Max	alpha	Mean
Positive emotion	7.20	1.69	1.00	7.67	10.0	0.93	7.69	1.50	1.00	8.00	10.0	0.92	0.49
Engagement	7.40	1.30	3.33	7.67	10.0	0.59	7.73	1.28	3.00	8.00	10.0	0.68	0.33
Relationship	7.40	1.84	1.00	7.67	10.0	0.86	7.66	1.71	1.00	8.00	10.0	0.87	0.26
Meaning	7.37	1.83	1.33	7.67	10.0	0.90	7.83	1.53	0.33	8.00	10.0	0.90	0.46
Accomplishment	7.53	1.40	1.67	7.67	9.67	0.79	7.80	1.26	1.67	8.00	9.67	0.79	0.27
Overall wellbeing	7.38	1.37	1.69	7.63	9.81	0.94	7.75	1.25	1.38	7.88	9.69	0.95	0.37
Negative emotion ^	3.54	1.64	0.67	3.33	8.33	0.71	3.31	1.65	0.33	3.00	8.00	0.72	-0.23
Physical health	7.72	1.47	3.00	8.00	10.0	0.86	7.84	1.45	3.33	8.00	10.0	0.87	0.12
Loneliness *^	3.74	2.56	0.00	3.00	9.00	NA	3.43	2.55	0.00	3.00	10.0	NA	-0.31
Happiness *	7.47	1.80	1.00	8.00	10.0	NA	7.90	1.57	1.00	8.00	10.0	NA	0.43

NA = Not Applicable, * = single item, ^ = negative orientation

Almost all statistics of Table 1 are showing a substantially more positive result after the course. Recall that these N=197 respondents were exactly the same students before and after the course, as we only used those responses that were available from the both measurements. Also the estimates of the internal consistency (the alpha values) of the subscales are quite good for most of them, even very good for many of them, and hence in line with the much more detailed psychometric results of Butler & Kern (2016). Only the engagement (E) subscale seems to behave a bit differently in our data. Details of the factor analyses given later may shed some light to this exception.

3.2 Representing Movement of Thought

We now proceed to our visual representations of the various aspects of wellbeing. Our graphs are based on several distinct, one-dimensional factor analyses that were conducted to condense the variation and co-variation in the PERMA-Profiler measurements. We will explain the phases of the factor analyses after summarizing and interpreting the visualizations.

Fig. 2 “Movement of thought”: an overall positive change of wellbeing (WB), measured by the PERMA-Profiler split in two parts, depicted by the 95 % contour ellipses (dashed grey: before the course, solid blue: after the course). Both parts (WB1, the condensed five core domains of PERMA on vertical axis and WB2, the condensed four supporting domains on horizontal axis) display individual changes in positive and negative directions (largest ones shown by red arrows). The coordinate axes represent standardized factor scores ranging between -3.5 and +3.0

Fig. 2 displays the “movement of thought” (as we would like to call it): the change of the wellbeing (WB) measured by the PERMA-Profiler before and after the course, split in two separate parts: WB1, the set of the 15 core items measuring the five domains of PERMA (Seligman 2011,

Butler & Kern 2016) and WB2, the additional eight items measuring the four supporting domains of wellbeing (Butler & Kern 2016). Both parts are factor scores that represent the values of each individual on these two condensed dimensions of wellbeing. The grey squares (mostly inside the dashed grey ellipse) mark the individual students' scores before the course, while the blue circles (mostly inside the solid blue ellipse) mark their scores after the course. The values of the scores after the course have been shifted using the average absolute differences between the original subscales of the PERMA-Profiler. The raw differences of the means used in calculating these averages appear (signed and rounded) in the rightmost column of Table 1. For WB1, the average shift is +0.36 units and for WB2 it is +0.28 units, based on their five and four subscales or single items, respectively. These tiny shifts generate the slight "elevation" of the blue ellipse that visualizes the "movement of thought" on the general level.

On the individual level, the "movement of thought" is visualized in Fig. 2 by the red arrows that emphasize the largest individual changes in wellbeing either on WB1 or WB2, by connecting the before and after scores of selected 28 students. Their WB changes on these dimensions represent the largest 10 % of the changes on either part separately (that would correspond to 18 students on WB1 and 17 students on WB2, but seven of these students belong to both of these top 10 % groups). It can be seen that most of the arrows are pointing to positive direction on both dimensions: upwards on the WB1 (vertical) axis and to the right on the WB2 (horizontal) axis, while only a few of those arrows reflect negative individual changes. To be precise, 22 of the arrows indicate positive changes on both dimensions, five indicate negative changes on both dimensions, and only one shows a mixture where the large negative change is on WB2, accompanied with a small positive change on WB1.

In general, both parts of the PERMA-Profiler seem to be extremely stable, as the overall changes are clear but still quite mild. Of course, it would not be plausible if the overall changes were huge. The individual changes in all directions are quite well within the typical "clouds"

formed by the 95 % contour ellipses. Yet, the positive change in wellbeing is evident in Fig. 2, as the “cloud” is clearly “moving” to positive direction. The view gets support from some fairly large positive individual changes (red arrows), but simultaneously the whole setting allows all sorts of positive or negative individual changes on either parts of wellbeing. This finding corresponds very well with the idea and practice of LPL, as during the lectures, the students were specifically encouraged to think their own thoughts and to associate the lecturer’s suggestions, stories etc. to their own experiences. We would like to interpret that the reflections of these various different individual thinking processes are visually represented in Fig. 2, therefore allowing us to suggest the concept “movement of thought”.

3.3 Representing Changes in Wellbeing

Our next visualization is based on an even more condensed factor analysis. The factor scores of the wellbeing parts WB1 and WB2 have now been replaced by scores from a one-dimensional factor analysis summing up the students’ wellbeing (WB) separately before and after the course. Fig. 3 shows the relationship of these scores with the simple regression line (scores after the course predicted by the scores before the course, $R^2 = 0.63$) and a 95 % contour ellipse, which gives the typical region of the scatter plot. Similarly as in Fig.2, the values of the scores after the course have been shifted using the average absolute differences between the original subscales of the PERMA-Profiler. In Fig.3, the tiny shift that hence “elevates” the scores and the ellipse, is +0.32 units. Only a few points (roughly 5 %, about 10 in this case) appear outside of the ellipse, which means that they deviate a bit more in their wellbeing scores, either before or after (or both). Most of those extreme points appear in the lower-left quadrant, where the wellbeing is negative before and after the course (marked by --), and only a few appear in the mixed quadrants where the wellbeing is negative either before (-+) or after (+-) the course. The upper-right quadrant (++) has overall less variation and includes no extreme points.

Fig. 3 “Changes in wellbeing”: scores of wellbeing (WB) of N=197 students before the course (horizontal axis) and after the course (vertical axis), with the simple regression line ($R^2 = 0.63$) and a 95 % contour ellipse. The circle size is proportional to the student’s overall course activity. The number inside the circle indicates whether the student completed the course (1) or not (0). The groups limited by the coordinate axes and the regression line are marked with combinations of + and – signs (see text for details). The coordinate axes represent standardized factor scores ranging between -3.5 and +3.0

The circle size in Fig. 3 is proportional to the student's self-estimated overall course activity in hours. It is a summated variable that consists of class participation times (transformed to hours), hours of watching the course videos, and hours used for the activities required for completing the course (writing a summary of three given articles, performing an oral discussion, reflecting in writing the learning experiences as a group exercise, and writing a concluding reflection essay). The average activity in total was about 40 hours per student (see Fig. 4).

Fig. 3 also suggests the overall activity to be positively related to wellbeing. There are more large points in the positive region of the graph, especially above the regression line (in the region marked with the symbol $+++$, total of 72 points), compared with the positive region below the regression line ($++-$, total of 28 points). These two regions are similar in the sense that the wellbeing of those students is positive both before and after the course (the quadrant $++$), but the difference is that the wellbeing of those students who appear above the regression line, has changed more than predicted by the simple regression based on the wellbeing before the course.

The numbers inside the circles in Fig. 3 indicate whether the student completed the course (1) or not (0). From the 197 students, 168 (95 men and 73 women) completed, while 29 (15 men and 14 women) did not complete the course. In practice, there was no difference between men and women in this respect. However, on average, women were somewhat more active on the course than men, which is shown by the boxplot on the left panel of Fig. 4.

Another boxplot on the right panel of Fig. 4 shows that those students who completed the course were clearly more active in general, that is, they typically spent much more time with the various course activities, compared to those who did not complete the course.

In conclusion, our visualizations show that along with the activities during the course, there has been all sorts of “movements of thought” – perhaps back and forth, according to the very idea of LPL – eventually leading to changes in wellbeing, most often in positive direction.

Fig. 4 Boxplots of gender (m = men, w = women) and course completion (no/yes) with the overall course activity in hours (a sum of various self-estimated activities, see text for details)

3.4 Factor Analyses of the PERMA-Profiler

In this final subsection, we go through the analytical details behind our main visualizations. In addition, our results contribute to the empirical studies related to the PERMA framework. We start from the factor analyses of the PERMA-Profiler split in two separate parts: WB1, the set of the 15 core items measuring the five domains of PERMA (Seligman 2011, Butler & Kern 2016) and WB2, the additional eight items measuring the four supporting domains of wellbeing (Butler & Kern 2016). Then, we proceed to the phases of the more condensed factor analyses that are conducted to form the factor scores for drawing the Fig. 2 and Fig. 3.

Following the PERMA framework and the idea of five core dimensions of wellbeing (Seligman 2011; Butler & Kern 2016) we extracted five factors of WB1, although the last two factors were quite weak, especially for the first measurement. Table 2 displays the factor loadings, communalities (sums of squared loadings by rows), and factor variances (sums of squared loadings by columns) from both analyses, together with the short item names and abbreviated item wordings.

Table 2 Five factors of WB1, the 15-item part of the PERMA-Profiler, measured before/after course

WB1	Before the course						PERMA-Profiler, the 15 core items						After the course					
item	F1	F2	F3	F4	F5	h ²	item wording (abbreviated)						F1	F2	F3	F4	F5	h ²
m3	0.80	-0.03	0.09	-0.09	0.15	0.68	..sense of direction in your life?						0.83	-0.08	0.12	-0.05	0.12	0.73
m2	0.78	0.10	0.01	0.16	-0.13	0.67	..what you do .. is valuable and worthwhile?						0.57	0.20	0.09	0.12	0.03	0.56
m1	0.73	0.09	0.18	0.07	-0.17	0.61	..lead a purposeful and meaningful life?						0.72	0.14	0.10	0.08	-0.07	0.39
a1	0.62	0.14	-0.05	-0.03	0.33	0.52	..progress towards accomplishing your goals?						0.53	0.15	-0.10	0.08	0.29	0.41
p2	-0.05	0.98	-0.05	-0.02	0.06	0.97	..how often do you feel positive?						-0.01	0.88	0.05	-0.01	0.05	0.79
p1	0.05	0.79	0.14	0.01	-0.04	0.64	..how often do you feel joyful?						0.11	0.68	0.24	-0.02	0.00	0.53
p3	0.18	0.59	0.20	0.12	-0.03	0.43	..do you feel contented?						0.24	0.46	0.18	0.09	0.14	0.33
e2	0.25	0.40	0.09	0.14	0.06	0.25	..feel excited and interested in things?						0.24	0.44	0.02	0.15	0.10	0.29
r2	-0.04	-0.02	0.90	-0.02	0.02	0.82	..do you feel loved?						0.18	0.11	0.71	0.00	-0.06	0.59
r3	0.01	0.04	0.86	0.02	-0.04	0.74	..satisfied .. with your personal relationships?						0.04	0.02	0.75	0.15	0.07	0.55
r1	0.14	0.09	0.55	0.01	0.05	0.34	..help and support from others when you need it?						-0.05	0.23	0.53	-0.04	0.24	0.39
e1	0.06	-0.06	0.15	0.58	0.34	0.48	..absorbed in what you are doing?						0.21	0.17	-0.07	0.64	0.03	0.51
e3	-0.01	0.03	-0.03	0.56	-0.07	0.32	..lose track of time while doing something you enjoy?						-0.06	-0.07	0.06	0.71	0.01	0.49
a3	0.03	0.20	0.12	-0.04	0.48	0.28	..able to handle your responsibilities?						0.18	-0.09	0.20	-0.06	0.53	0.54
a2	0.36	0.11	-0.03	0.20	0.45	0.38	..achieve the important goals ..?						-0.01	0.17	-0.02	0.14	0.70	0.36
var	2.43	2.20	2.01	0.76	0.74	8.14							2.06	1.87	1.52	1.02	0.97	7.44

h² = communality, var = factor variance

The PERMA domains meaning (M), positive emotion (P), and relationships (R) are identified clearly as the first three factors, while the domains accomplishment (A) and engagement (E) are partially mixed with each other or the first three ones, with weaker factor loadings. Although the factor structure is quite clear, there is some overlap within the items related to these PERMA domains (cf. Butler & Kern 2016; Kern, Waters, Adler, & White 2015). The higher loadings have been emphasized for clarity.

All the factors of WB1 in Table 2 are inter-correlated, as expected, which can be seen in detail from Table 3. The factor correlations before the course are shown below the diagonal while the corresponding correlations after the course are shown above the diagonal. There are no large differences between the correlations before and after the course. The first three factors (F1-F3) correlate around 0.6 with each other.

Table 3 The correlations of the five factors of WB1, the 15-item part of the PERMA-Profiler, measured before/after course (below/above diagonal, respectively)

factor	F1	F2	F3	F4	F5
F1	1	0.65	0.59	0.38	0.59
F2	0.69	1	0.57	0.39	0.51
F3	0.60	0.68	1	0.25	0.52
F4	0.43	0.32	0.29	1	0.33
F5	0.41	0.34	0.25	0.13	1

For the eight items of WB2, a two-factor solution appeared to be the most appropriate way to reveal the structure (see Table 4). It is very similar before and after the course: the negative emotion and loneliness go together on the first factor with the inversed happiness, while the physical health forms the other factor. Also these factors were correlated, as expected, and negatively (-0.46 before and -0.52 after the course) because of their inversed orientations.

Table 4 Two factors of WB2, the 8-item part of the PERMA-Profiler, measured before/after course

WB2	Before the course			PERMA-Profiler, the 8 additional items	After the course		
item	F1	F2	h ²	item wording (abbreviated)	F1	F2	h ²
n3	0.83	-0.03	0.69	..how often do you feel sad?	0.88	0.14	0.80
n1	0.73	-0.00	0.53	..how often do you feel anxious?	0.80	0.04	0.65
lo	0.71	0.09	0.52	..How lonely .. in your daily life?	0.74	-0.05	0.54
ha	-0.72	0.03	0.53	..how happy would you say you are?	-0.61	0.19	0.41
n2	0.23	-0.13	0.07	..how often do you feel angry?	0.36	-0.05	0.13
h2	0.13	0.94	0.89	..satisfied .. with your .. physical health?	0.00	0.84	0.71
h1	-0.11	0.79	0.63	..how would you say your health is?	-0.06	0.84	0.71
h3	-0.10	0.75	0.58	..how is your health?	0.01	0.83	0.69
var	2.35	2.09	4.44		2.48	2.16	4.64

h² = communality, var = factor variance

The above multidimensional analyses confirmed that the factor structures are found as expected and that they are invariant over time. The next step was to simplify the analyses by creating one-factor solutions of both parts and computing the corresponding factor scores for visualizing WB1 and WB2 simultaneously before and after the course (see Fig. 2).

The one-factor solutions of WB1 appear in Table 5. Again, they are extremely similar before and after the course, and hence invariant over time. The one-dimensional solutions merely reflect the five-factor solutions shown earlier, in a sense that the three “consonant” domains of PERMA (P, M, R) are found mostly among the highest factor loadings. Hence, they will have more weight in the corresponding factor scores. In contrary, the “vowel” domains (E, A) appear to have somewhat lower loadings and hence less weight in the scores. The weakest single item appears to be e3, which measures the engagement (E).

Table 5 One factor of WB1, the 15-item part of the PERMA-Profilier, measured before/after course

WB1	Before		PERMA-Profilier, the 15 core items		After	
item	F1	h ²	item wording (abbreviated)		F1	h ²
p3	0.88	0.78	..do you feel contented?		0.89	0.80
p1	0.84	0.70	..how often do you feel joyful?		0.85	0.72
m1	0.84	0.70	..lead a purposeful and meaningful life?		0.82	0.67
m2	0.81	0.65	..what you do .. is valuable and worthwhile?		0.83	0.69
m3	0.79	0.62	..sense of direction in your life?		0.80	0.65
p2	0.79	0.62	..how often do you feel positive?		0.80	0.64
a1	0.77	0.59	..progress towards accomplishing your goals?		0.78	0.60
e2	0.75	0.57	..feel excited and interested in things?		0.76	0.58
r3	0.72	0.51	..satisfied .. with your personal relationships?		0.75	0.57
a2	0.70	0.49	..achieve the important goals ..?		0.69	0.48
r1	0.68	0.47	..help and support from others when you need it?		0.71	0.50
r2	0.67	0.44	..do you feel loved?		0.76	0.58
e1	0.56	0.32	..absorbed in what you are doing?		0.61	0.38
a3	0.51	0.26	..able to handle your responsibilities?		0.60	0.36
e3	0.23	0.05	..lose track of time while doing something you enjoy?		0.30	0.09
var	7.79	7.79			8.30	8.30

h² = communality, var = factor variance

Also the one-factor solutions of Part 2 (see Table 6) seem to be invariant over time. Now, the happiness and physical health have positive loadings, and the negatively oriented items form the other ends of the bipolar factors.

Table 6 One factor of WB2, the 8-item part of the PERMA-Profilier, measured before/after course

WB2	Before		PERMA-Profilier, the 8 additional items		After	
item	F1	h ²	item wording (abbreviated)		F1	h ²
h1	0.83	0.68	..how would you say your health is?		0.80	0.64
h3	0.80	0.64	..how is your health?		0.74	0.55
h2	0.74	0.55	..satisfied .. with your .. physical health?		0.75	0.56
ha	0.55	0.31	..how happy would you say you are?		0.67	0.45
n2	-0.28	0.08	..how often do you feel angry?		-0.35	0.12
lo	-0.43	0.18	..How lonely .. in your daily life?		-0.64	0.40
n1	-0.50	0.25	..how often do you feel anxious?		-0.60	0.36
n3	-0.59	0.35	..how often do you feel sad?		-0.56	0.32
var	3.04	3.04			3.41	3.41

h² = communality, var = factor variance

As a final phase, based on the previous results of the separate factor analyses of WB1 and WB2, we condensed all the 23 items of the PERMA-Profiler into one factor, separately for both measurements. Table 7 shows the factor loadings and other results of the WB, the general, bipolar wellbeing factor before and after the course. The resulting factor scores representing the wellbeing (WB) before and after the course for each student were then plotted against each other (see Fig. 3) and analysed further by connecting extra variables to the points of the graph. Here, we wanted specifically to analyse the connection of the wellbeing with the activities during the course.

There are no surprises after studying the earlier factor solutions. The negatively oriented items form the negative ends of the bipolar factors while the items of the strongest domains of PERMA appear in the top of the positive end. However, the happiness item has now the highest loadings. This is because it is more correlated with the positive WB1 items than the more negatively oriented WB2 items of the PERMA-Profiler.

4. Discussion

Based on our data and analyses, the PERMA-Profiler, developed and thoroughly tested by Butler & Kern (2016) appears to work well in measuring and reflecting the various domains of wellbeing. The multidimensional factor structure is shown quite clearly, although there is some overlap within the items related to the core domains of PERMA, as noted by Butler & Kern (2016) and Kern, Waters, Adler, & White (2015).

There is a clear positive change in all domains of wellbeing during the course. This result is an important substantial finding that cannot be caused by chance. The individual changes in all directions are quite well within the typical “clouds” formed by the 95 % contour ellipses. Yet, the positive change in wellbeing is evident in Fig. 2, as the “cloud” is clearly “moving” to positive direction. The view gets support from some fairly large positive individual changes (red arrows), but simultaneously the whole setting allows all sorts of positive or negative individual changes on either parts of wellbeing.

Table 7 One factor of WB, the 23-item PERMA-Profiler, measured before/after course

WB	Before		PERMA-Profiler, all 23 items		After	
item	F1	h ²	item wording (abbreviated)		F1	h ²
ha	0.90	0.81	..how happy would you say you are?		0.92	0.85
p3	0.90	0.81	..do you feel contented?		0.90	0.81
p1	0.85	0.71	..how often do you feel joyful?		0.85	0.72
m1	0.82	0.67	..lead a purposeful and meaningful life?		0.81	0.66
p2	0.79	0.63	..how often do you feel positive?		0.80	0.64
m2	0.79	0.62	..what you do .. is valuable and worthwhile?		0.81	0.65
m3	0.78	0.61	..sense of direction in your life?		0.79	0.63
e2	0.75	0.56	..feel excited and interested in things?		0.74	0.55
a1	0.74	0.55	..progress towards accomplishing your goals?		0.75	0.56
r3	0.74	0.54	..satisfied .. with your personal relationships?		0.76	0.58
r2	0.67	0.45	..do you feel loved?		0.75	0.57
r1	0.67	0.45	..help and support from others when you need it?		0.72	0.52
a2	0.66	0.44	..achieve the important goals ..?		0.68	0.46
h1	0.54	0.30	..how would you say your health is?		0.57	0.33
h3	0.54	0.29	..how is your health?		0.51	0.26
e1	0.54	0.29	..absorbed in what you are doing?		0.58	0.33
a3	0.51	0.27	..able to handle your responsibilities?		0.61	0.37
h2	0.32	0.11	..satisfied .. with your .. physical health?		0.46	0.21
e3	0.24	0.06	..lose track of time while doing something you enjoy?		0.27	0.08
n2	-0.15	0.02	..how often do you feel angry?		-0.26	0.07
n1	-0.56	0.31	..how often do you feel anxious?		-0.57	0.33
lo	-0.63	0.39	..How lonely .. in your daily life?		-0.70	0.49
n3	-0.65	0.42	..how often do you feel sad?		-0.62	0.38
var	10.31	10.31			11.04	11.04

h² = communality, var = factor variance

This finding corresponds very well with the idea and practice of LPL, as during the lectures, the students were specifically encouraged to think their own thoughts and to associate the lecturer's suggestions, stories etc. to their own experiences. We interpret that the reflections of these various different individual thinking processes are visually represented in Fig. 2, therefore allowing us to use the term "movement of thought". We think that the individual variations are really quite remarkable and should deserve more attention, compared to the plain averages that are limited to

the overall changes. Hence, we would like to suggest that our technique of condensing the data with factor analysis for creating visual representations of the individual thinking processes could be particularly useful in connection of wellbeing studies, for example, in studying changes in flourishing over time. The visualizations stimulate understanding of complex, multidimensional phenomena and support hypothesis generation for further research.

The student's overall activity during the course, a summated variable that consisted of self-estimated amounts of time used for class participation, watching the course videos, writing a summary of articles, performing an oral discussion, reflecting in writing the learning experiences as a group exercise, and writing a concluding reflection essay, seemed to be positively related to the student's wellbeing. It could well be hypothesized that the various activities support the student's thinking and on average cause positive changes in the wellbeing. Also this finding was based on a visual representation of both overall and individual relations that were hidden in the data.

5. Conclusions

In the concluding reflection essays of the course, entitled "Scene of My Life", the students are asked to write about their lives in the spirit of the course and apply examples, concepts, and perspectives of the course to their own experiences. A personal, emotionally engaged approach is encouraged. The resulting essays, reporting of changes in narrative and personal perspectives on significant life events, are extremely heterogeneous. Remarkably, no particular concept, story, or perspective stands out as dominating, thus reflecting the highly personalized nature of the process of meaning-making in the context of the course. The idiosyncratic processes enabled by the course will be separately analyzed with qualitative methods, but as importantly, they are represented in the quantitative results reported in the present paper. In particular, the students' thought processes are reflected in the "movement of thought" clouds we present as an informative, descriptive method to visualize changes of wellbeing in a group intervention with an emphasis on personal growth.

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Acknowledgements

The authors are grateful to Master Jaakko Korhonen for his valuable assistance on the course and helpful discussions related to an early version of the manuscript.

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Authors' contributions

Both authors contributed essentially to this paper by planning, discussing, and writing. KV analysed the data and created the visualizations. Both authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate

The data were collected and the study was completed following the general ethics policies used in Finnish universities. The students participated voluntarily and gave their answers anonymously.

Availability of data and materials

The datasets supporting the conclusions of this article are included within the additional files.