

Erasmus+ Project Redefining nursing skills for ai and robotization in healthcare

Data collection

In all three participating countries a pre-post analysis was conducted to evaluate the intervention (IO3). Data was collected online before and after the training intervention with the validated 16-items version of the ATNP scale.

Data analysis

The data from German, the Hungarian, and the Dutch interventions were analysed.

The ATNP items that were administered to participants are listed in Table 1 with their numbers from the original version (e.g., item 2 is ATNP_8).

Table 1. ATNP Items

Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ATNP	1	8	9	11	12	13	14	16	17	19	20	21	22	23	24	26

The German sample

In the German dataset, there were 25 pre-intervention and 13 post-intervention respondents, and for 10 of them, the participant codes allowed to concatenate the pre- and the post- data to report the descriptive statistics.

The mean ATNP scores of participants, pre- and post-intervention, and the difference between them are presented in Table 2. Standard deviations are given in parentheses.

Table 2. ATNP Mean Scores, Pre- and Post-Intervention (the German Sample)

Participant	1	2	3	4	5	6	7	8	9	10
Pre	3.56 (0.51)	2.31 (1.01)	3.50 (0.52)	1.00 (0)	3.00 (0.37)	4.06 (0.57)	3.88 (0.50)	1.00 (0)	2.44 (0.81)	2.19 (0.54)
Post	3.88 (0.34)	3.00 (0.52)	3.69 (0.48)	2.69 (0.48)	3.06 (0.25)	5.00 (0)	4.94 (0.25)	1.62 (0.62)	3.50 (0.52)	2.88 (0.34)
Δ	0.32	0.69	0.19	1.69	0.06	0.94	1.06	0.62	1.06	0.69

For each participant, the mean ATNP score after the intervention was higher than the score before the intervention.

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In Table 3, pre- and post-intervention means of ATNP items, and the difference between them, are presented. Standard deviations are given in parentheses.

Table 3. ATNP Item Means, Pre- and Post-Intervention (the German Sample)

Item	Pre	Post	Δ
1	2.0 (1.05)	3.4 (0.70)	1.4
2	2.4 (1.07)	3.2 (1.14)	0.8
3	2.6 (1.26)	3.3 (1.16)	0.7
4	2.5 (1.27)	3.2 (1.23)	0.7
5	2.6 (0.97)	3.4 (1.07)	0.8
6	2.9 (1.20)	3.5 (1.18)	0.6
7	2.8 (1.40)	3.4 (1.26)	0.6
8	2.6 (1.17)	3.2 (1.23)	0.6
9	2.6 (1.17)	3.4 (1.07)	0.8
10	3.1 (1.29)	3.5 (1.18)	0.4
11	2.9 (1.37)	3.4 (1.17)	0.5
12	2.7 (1.16)	3.3 (1.16)	0.6
13	3.2 (1.23)	3.7 (0.95)	0.5
14	2.7 (1.25)	3.6 (0.97)	0.9
15	2.6 (1.26)	3.6 (0.97)	1.0
16	2.9 (1.20)	3.7 (0.95)	0.8

For each item, its mean value (averaged for 10 participants) was higher after the intervention than before the intervention.

In Figure 1, the scores of individual participants in response to each of 16 ATNP items, pre-and post-intervention, are presented graphically.

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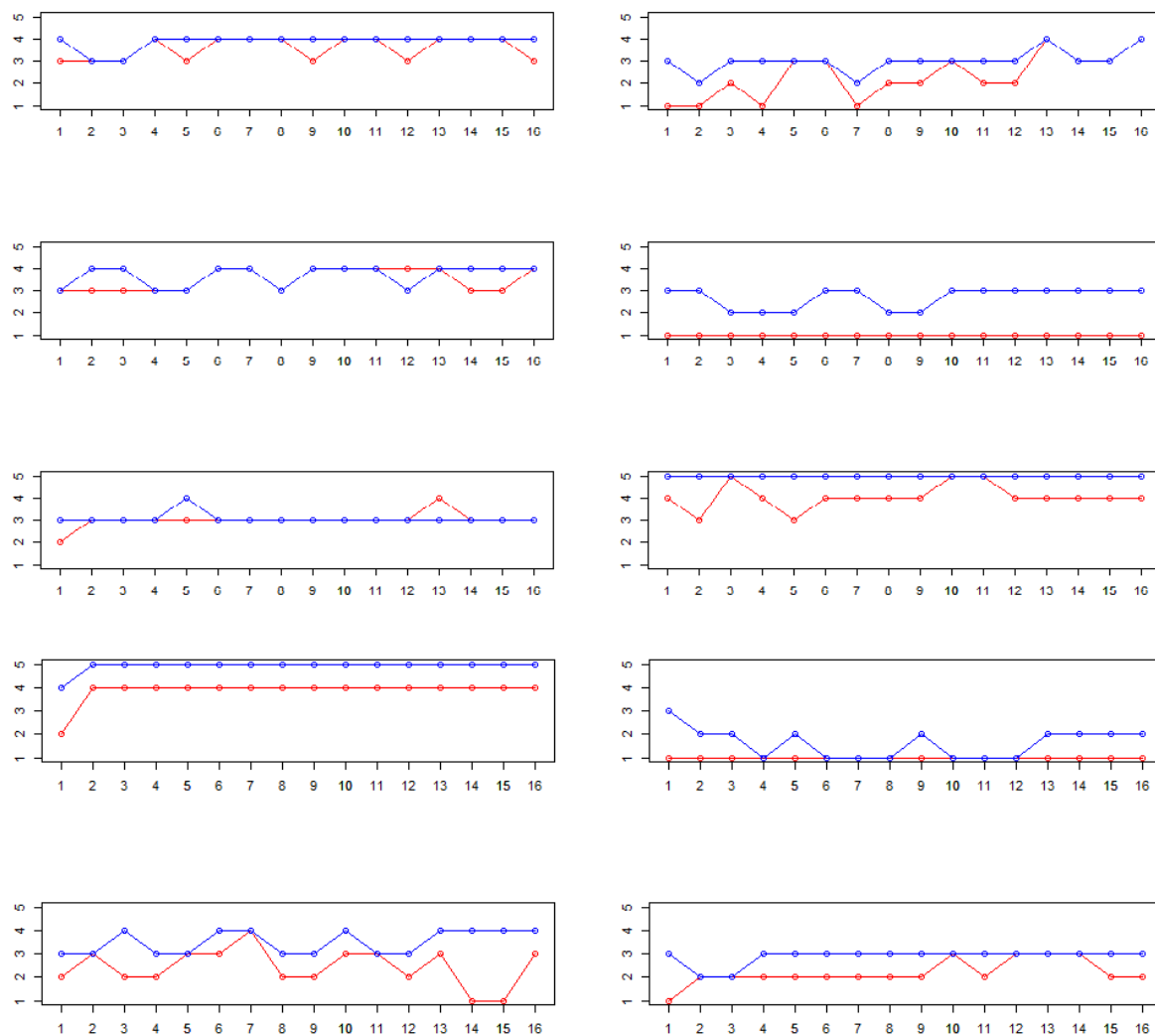


Figure 1. *ATNP Scores of German Participants, Pre- and Post-Intervention*

Note: The red line is the pre-interventions score, the blue line is the post-intervention score.

It can be seen that each of the 10 participants changed their responses to at least some, or even all, of ATNP items after the intervention.

The Hungarian sample

In the Hungarian dataset, there were 38 pre-intervention and 34 post-intervention respondents. There was a participant code that appeared twice in the pre-test sample (thus, was not unique), and the observations related to it were excluded from the analysis. For 27 participants, the

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unique codes allowed concatenating the pre- and the post- data to report the descriptive statistics.

In Table 4, pre- and post-intervention means of ATNP items, and the difference between them, are presented. Standard deviations are given in parentheses.

Table 4. *ATNP Item Means for Hungarian Participants, Pre- and Post-Intervention*

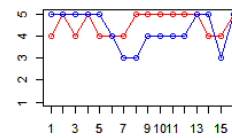
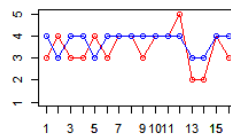
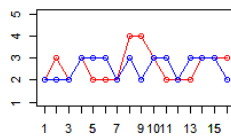
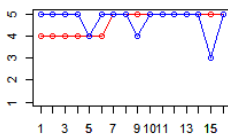
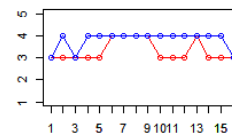
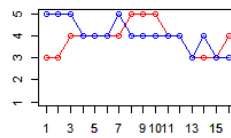
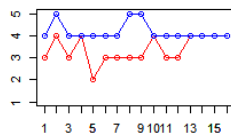
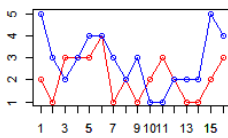
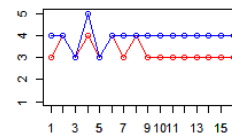
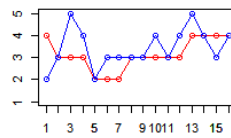
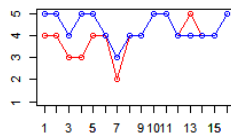
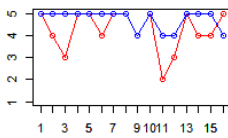
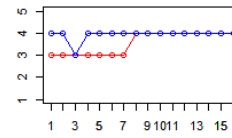
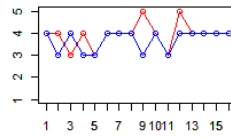
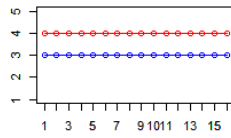
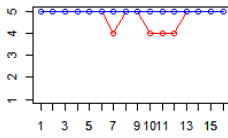
Item	Pre	Post	Δ
1	3.26 (0.81)	4.04 (0.90)	0.78
2	3.48 (0.80)	3.70 (0.99)	0.22
3	3.33 (0.83)	3.89 (0.97)	0.56
4	3.59 (0.89)	3.96 (0.81)	0.37
5	3.30 (0.87)	3.78 (0.97)	0.48
6	3.59 (0.80)	4.04 (0.71)	0.45
7	3.33 (1.11)	3.63 (0.97)	0.30
8	4.04 (0.85)	4.04 (0.76)	0.00
9	3.74 (0.94)	3.85 (0.86)	0.11
10	3.89 (0.80)	4.04 (0.85)	0.15
11	3.52 (0.89)	3.96 (0.94)	0.44
12	3.41 (0.97)	3.70 (0.82)	0.29
13	3.70 (1.03)	4.00 (0.83)	0.30
14	3.37 (1.08)	3.93 (0.78)	0.56
15	3.63 (0.69)	3.74 (0.86)	0.11
16	3.81 (0.79)	4.00 (0.73)	0.19

For each item, its mean value (averaged for 27 participants) was higher after the intervention than before the intervention, except for item 8, for each the mean value did not change.

In Figure 2, the scores of individual participants in response to each of 16 ATNP items, pre-and post-intervention, are presented graphically.



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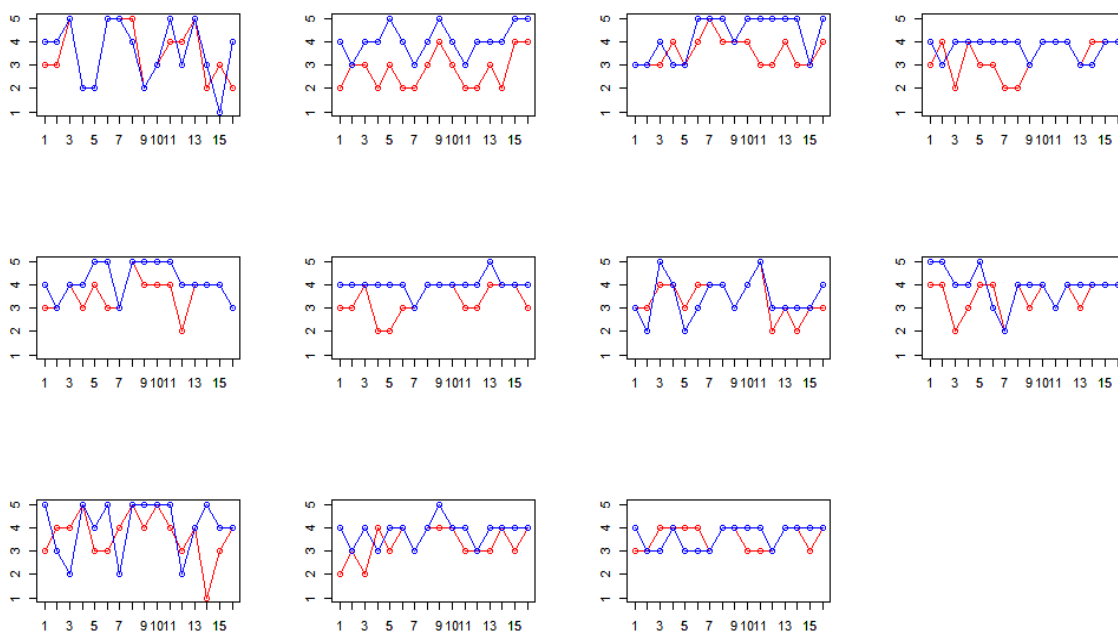


Figure 2. *ATNP Scores of Hungarian Participants, Pre- and Post-Intervention*

Note: The red line is the pre-interventions score, the blue line is the post-intervention score.

The Dutch sample

In the Dutch dataset, there were 12 pre-intervention and 3 post-intervention respondents, and for 2 of them, the participant codes allowed to concatenate the pre- and the post- data to report the descriptive statistics.

The mean ATNP scores of participants, pre- and post-intervention, and the difference between them are presented in Table 5. Standard deviations are given in parentheses.

Table 5. ATNP Mean Scores, Pre- and Post-Intervention (the Dutch Sample)

Participant	1	2
Pre	2.94 (0.77)	2.75 (0.86)
Post	3.56 (0.51)	2.81 (0.83)
Δ	0.62	0.06

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For both participants, the mean ATNP score after the intervention was higher than the score before the intervention.

In Figure 3, the scores of both participants in response to each of 16 ATNP items, pre-and post-intervention, are presented graphically.

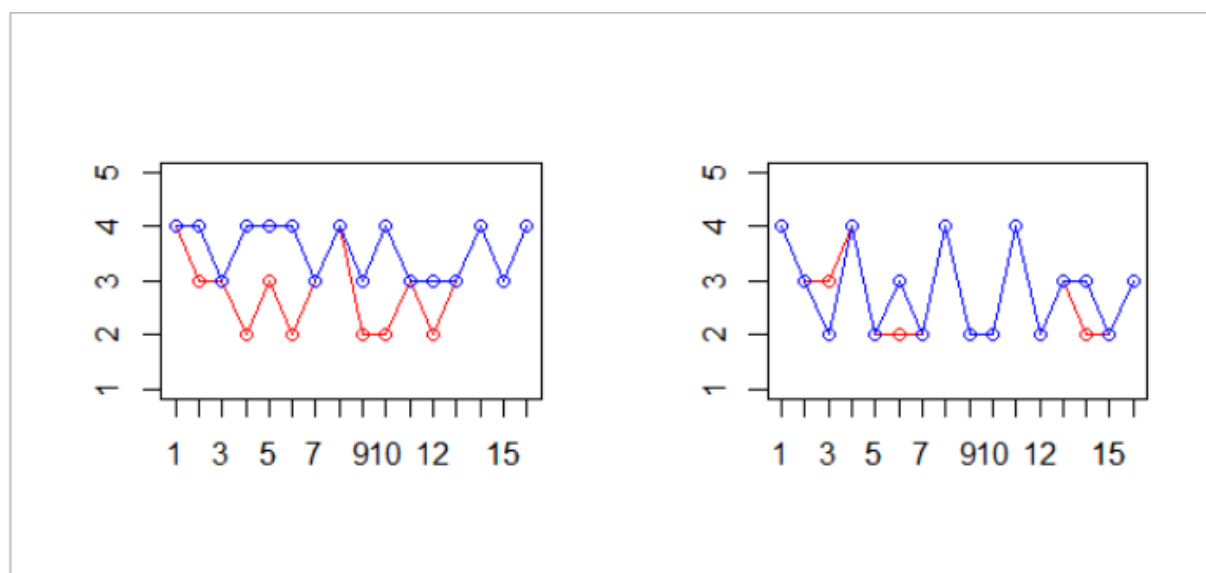


Figure 3. ATNP Scores of Dutch Participants, Pre- and Post-Intervention

Note: The red line is the pre-interventions score, the blue line is the post-intervention score.

The combined sample

As we have already tested measurement invariance and differential item functioning, we could combine the German ($n = 10$), the Hungarian ($n = 27$) and the Dutch ($n = 2$) samples to explore the differences in pre- and post-test scores on the whole sample ($N = 39$).

The boxplot of the pre- and post-test ATNP scores is presented in Figure 4.

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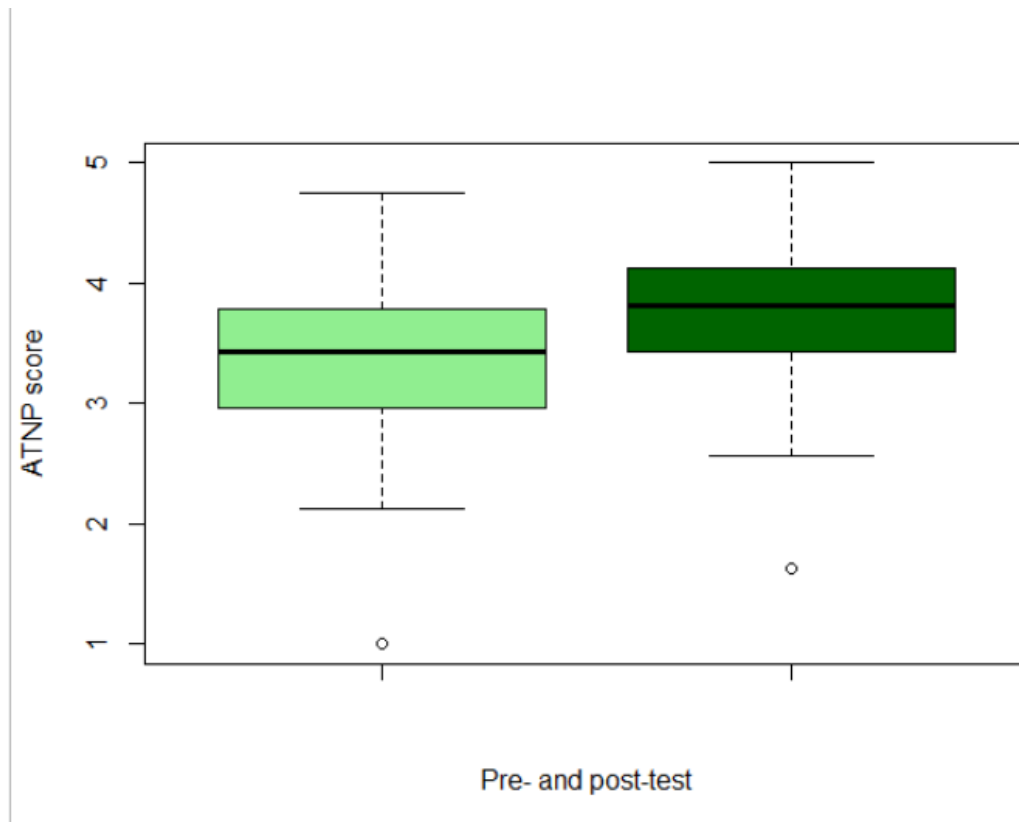


Figure 4. *Boxplot of Pre- and Post-Test ATNP Scores for German, Hungarian and Dutch Participants*

Note: Pre-test group is on the left (light green), post-test group on the right (dark green).

The normality assumption for the score differences was not met (Shapiro-Wilk test $W = 0.92$, $p = .008$). Thus, the non-parametric Wilcoxon signed-rank test was conducted with $N = 39$. The alternative hypothesis was specified as the pre-test scores lower than the post-test scores. The test showed that the pre-test scores were significantly lower than the post-test scores ($V = 171.5$, $p = .006$) with the effect size $r = -.32$.



Nursing AI



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