SUPPLEMENTAL MATERIAL - INSTRUMENTS AND STATISTICS FOR THE MEASURED VARIABLES

The survey was administered online in Italian. However, in the following we report both the original version and its translation in English.

A. Perception of emergency remote instruction

1. Effectiveness and organization of the course

Scale for the items: 1 = very poor (per niente efficace); 2 = poor (poco efficace); 3 = fair (abbastanza efficace); 4 = good (efficace); 5 = very good (del tutto efficace).

- How do you rate the organization of the courses (schedule, exams, ...) held at your university during Emergency Remote Instruction? (Cosa pensi dell'organizzazione dei corsi (orari, esami, ...) adottata dal tuo CdS in fisica nei mesi di marzo giugno 2020 causa pandemia da COVID-19?)
- How do you rate the effectiveness of the courses held at your university during Emergency Remote Instruction? (Cosa pensi della "didattica a distanza" erogata dal tuo CdS in fisica nei mesi di marzo giugno 2020 causa pandemia da COVID-19?)

2. Perceived difficulties and Relationship with the instructors

This part of the survey began with the sentence: Please, answer the following items by referring to your experience of in-person instruction (*Rispondi alle seguenti domande riferendoti alla tua esperienza di didattica in presenza*).

Scale for the items: 1 = definitely worse (molto peggiorata); 2 = worse (peggiorata); 3 = neither worse nor better (né peggiorata né migliorata); 4 = better (migliorata); 5 = definitely better (molto migliorata).

- How do you rate your *preparation* after emergency remote instruction with respect to in-person instruction? (Come è cambiata la tua preparazione generale in fisica dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale?)
- How do you rate your perception of the **chances of attaining your degree** after emergency remote instruction with respect to in-person instruction? (Come è cambiata la tua percezione delle tue difficoltà nel completare il corso di studi in fisica dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale?)
- How do you rate your perception of the difficulties related to the *degree program* after emergency remote instruction with respect to in-person instruction? (Come è cambiata la tua percezione delle problematiche relative al corso di studi in fisica dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale?)
- How do you rate your perception of the *study benefits* after emergency remote instruction with respect to in-person instruction? (Come è cambiata la tua percezione dell'utilità degli studi in fisica dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale?)
- How do you rate your perception of the *job perspectives* after emergency remote instruction with respect to in-person instruction? (Come è cambiata la tua percezione delle prospettive lavorative dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale?)
- How do you rate your instructors' *capability to stimulate interest* during Emergency Remote Instruction with respect to in-person instruction? (*Com'è cambiata la capacità dei tuoi docenti di stimolare l'interesse per la materia dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale*?)
- How do you rate your instructors' **attitude** during Emergency Remote Instruction with respect to in-person instruction? (*Com'è cambiato l'atteggiamento dei docenti nei confronti delle tue difficoltà dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale?*)

- How do you rate your instructors' *clarity* during Emergency Remote Instruction with respect to in-person instruction? (*Com'è cambiata la chiarezza dei docenti nell'esposizione degli argomenti dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale?*)
- How do you rate your instructors' *effectiveness* during Emergency Remote Instruction with respect to in-person instruction? (*Come è cambiata la tua percezione dell'efficacia dei docenti dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale*?)
- How do you rate your instructors' *capability to interact* during Emergency Remote Instruction with respect to in-person instruction? (*Come è cambiata la tua interazione con i docenti dopo l'esperienza della "didattica a distanza" del secondo semestre scorso e quella attuale*?)

In Tables I and II, we report, respectively, the descriptive and Rasch statistics for the items of the *Perception of Emergency Remote Instruction* scales. In the reported statistics, calculated through SPSS v.26, we use 0 to denote no excess kurtosis.

| Dimension | Cronbach's alpha | Items | M | SD | Asimmetry | Kurtosis |
|----------------------------|---------------------|----------------------------------|------|------|-----------|----------|
| | | Attitude | 3.22 | 0.84 | -0.034 | 0.627 |
| Polationship with the | | Clarity | 3.05 | 0.95 | -0.001 | -0.004 |
| in structure | 0.85 | Effectiveness | 2.99 | 0.10 | 0.0730 | -0.381 |
| instructors | | Capability to raise interest | 2.81 | 0.95 | -0.093 | -0.068 |
| | | Capability to interact | 2.66 | 1.10 | 0.231 | -0.567 |
| | | Preparation | 3.10 | 1.00 | 0.061 | -0.197 |
| | 0.80 | Chances of attaining your degree | 2.73 | 0.10 | 0.146 | -0.152 |
| Perceived difficulties | | Degree program | 2.72 | 0.88 | -0.081 | 0.337 |
| | | Job perspectives | 2.87 | 0.83 | -0.270 | 0.980 |
| | | Perception of study benefits | 3.04 | 0.81 | 0.0147 | 1.302 |
| Effectiveness and | 0.70 | Organization (schedule, exams,) | 3.55 | 1.00 | -0.502 | -0.132 |
| organization of the course | 0.79 | Effectiveness | 3.44 | 0.98 | -0.420 | -0.234 |

| TABLE I. Descriptive statistics for the items of the | Perception of emergency remote instruction construct |
|--|--|
|--|--|

TABLE II. Rasch statistics for the items of the Perception of emergency remote instruction construct.

| T. | Measure | | In | fit | Outfit | | |
|--|---------|--------|--------|---------|--------|---------|--|
| Item | (logit) | PTMEA | MNSQ | ZSTD | MSNQ | ZSTD | |
| Relationship with the instructors | | | | | | | |
| Attitude | -0.43 | 0.6703 | 0.8557 | -1.9691 | 0.8595 | -1.8791 | |
| Clarity | -0.07 | 0.6745 | 0.8253 | -2.3992 | 0.8119 | -2.5392 | |
| Effectiveness | +0.06 | 0.6755 | 0.8453 | -2.0992 | 0.8424 | -2.0992 | |
| Capability to raise interest | +0.42 | 0.6771 | 0.8632 | -1.8591 | 0.8401 | -2.1292 | |
| Capability to interact | +0.74 | 0.6768 | 1.4765 | 5.5915 | 1.4703 | 5.3015 | |
| Perceived difficulties | | | | | | | |
| Preparation | -0.18 | 0.6734 | 1.0149 | 0.2210 | 1.0025 | 0.0610 | |
| Chances of attaining your degree | +0.59 | 0.6772 | 1.1640 | 2.0912 | 1.3250 | 3.7913 | |
| Degree program | +0.62 | 0.6771 | 0.8557 | -1.9891 | 0.8526 | -1.9591 | |
| Job perspectives | +0.31 | 0.6769 | 0.9783 | -0.2590 | 0.9843 | -0.1690 | |
| Perception of study benefits | -0.06 | 0.6746 | 0.7285 | -3.8893 | 0.7263 | -3.8493 | |
| Effectiveness and organization of the co | urse | | | | | | |
| Organization (schedule, exams,) | -1.13 | 0.6573 | 1.2685 | 3.4413 | 1.3041 | 3.7413 | |
| Effectiveness | -0.89 | 0.6622 | 1.0564 | 0.7811 | 1.0554 | 0.7411 | |

B. Subjective well-being (SWB)

We asked the respondents to describe their feelings and emotions, felt during emergency remote instruction with respect to in-person activities, by rating each adjective in the list according to the following scale:

- 1 =definitely less (decisamente meno);
- 2 = less (meno);
- 3 =neither less nor more (né più né meno);
- $4 = \text{more } (pi\dot{u});$
- 5 = definitely more (decisamente più).

In Table III, the items are reported in decreasing order of average score. Cronbach's alpha is 0.93 (0.89) for positive (negative) affect.

| Item | М | SD. | Asimmetry | Kurtosis |
|-------------------------------|-------|------|-----------|----------|
| Bored (Annoiat*) | 3.63. | 1.04 | -0.627 | -0.123 |
| Disoriented $(Disorientat^*)$ | 3.38 | 0.96 | -0.137 | -0.074 |
| Pessimistic (Pessimista) | 3.33 | 0.92 | 0.036 | 0.015 |
| Stressed (Stressat*) | 3.33 | 1.06 | -0.130 | -0.373 |
| Sad (Triste) | 3.31 | 0.95 | 0.011 | 0.213 |
| Disappointed $(Delus^*)$ | 3.25 | 0.88 | -0.028 | 0.530 |
| Frustrated (Frustrat*) | 3.25 | 0.93 | -0.174 | 0.357 |
| Angry (Arrabbiat*) | 3.23 | 0.92 | -0.146 | 0.833 |
| Scared (Spaventat*) | 3.20 | 0.79 | 0.239 | 1.184 |
| Anxious $(Ansios^*)$ | 3.14 | 1.02 | -0.195 | -0.113 |
| Inadequate (Inadeguat*) | 3.05 | 0.79 | -0.286 | 2.094 |
| Respected $(Rispettat^*)$ | 3.00 | 0.53 | -0.326 | 5.943 |
| Excluded $(Esclus^*)$ | 2.99 | 0.77 | -0.355 | 2.178 |
| Accepted $(Accettat^*)$ | 2.95 | 0.57 | -0.550 | 5.031 |
| Embarrassed $(Imbarazzat^*)$ | 2.93 | 0.85 | -0.482 | 0.955 |
| Guilty (In colpa) | 2.89 | 0.69 | -0.985 | 3.222 |
| Welcome $(Accolt^*)$ | 2.87 | 0.73 | -0.426 | 1.826 |
| Proud (Fier*) | 2.84 | 0.67 | -0.818 | 2.675 |
| Despised $(Disprezzat^*)$ | 2.82 | 0.64 | -1.683 | 4.364 |
| Supported $(Supportat^*)$ | 2.82 | 0.81 | -0.411 | 0.716 |
| Effective (<i>Efficace</i>) | 2.76 | 1.13 | 0.185 | -0.641 |
| Valued ($Valorizzat^*$) | 2.76 | 0.70 | -0.625 | 1.736 |
| Gratified (Gratificat*) | 2.73 | 0.82 | -0.268 | 0.633 |
| Optimistic (Ottimista) | 2.70 | 0.98 | -0.047 | -0.384 |
| Amused (<i>Divertit</i> *) | 2.65 | 0.88 | -0.367 | -0.055 |
| Satisfied (Soddisfatt*) | 2.65 | 0.97 | 0.167 | -0.247 |
| Happy (Felice) | 2.61 | 0.96 | 0.126 | -0.105 |
| Stimulated (Stimolat*) | 2.51 | 1.02 | 0.281 | -0.351 |
| Energetic (Energetic*) | 2.48 | 1.11 | 0.433 | -0.427 |
| Enthusiastic (Entusiasta) | 2.48 | 0.99 | 0.259 | -0.190 |

TABLE III. Descriptive statistics for the items of Subjective well-being.

C. Motivation to learn physics

Scale for the items in the three dimensions of this construct (*interest*, *recognition*, and *utility value*):

- 1 = not at all (per niente);
- 2 =to a small extent (poco);
- 3 =to some extent (abbastanza);
- 4 =to a great extent *(molto)*;
- 5 =completely (del tutto).
- To what extent are you interested in *physics topics*? (Quanto ti interessano gli argomenti di Fisica?)
- To what extent are you interested in the *latest physics results*? (Quanto ti interessano i risultati delle ricerche in Fisica?)
- To what extent are you interested in *physics related hobbies*? (Quanto saresti interessat* ad avere un hobby legato alla Fisica)
- To what extent do your **peers** consider you a good physics student? (Quanto i tuoi compagni ti giudicano brav* in fisica?)
- To what extent do your *instructors* consider you a good physics student? (*Quanto i tuoi docenti ti giudicano brav* in fisica?*)
- To what extent do you think that studying physics is important for your *future*? (Quanto pensi sia utile per il tuo futuro studiare Fisica?)
- To what extent do you think that studying physics topics is important for your future *career*? (Quanto pensi sia utile per la tua carriera imparare argomenti di Fisica?)

| | - | | | | | |
|---------------|----------------------|-------------------------|------------|------|-----------|----------|
| Dimension | Cronbach's alpha | Item | M | SD | Asimmetry | Kurtosis |
| | | Physics topics | 4.16^{a} | 0.71 | -0.479 | -0.142 |
| Interest | | r hysics topics | 3.99^{b} | 0.87 | -0.762 | 0.329 |
| | $0.76^{a}, 0.81^{b}$ | Latast physics popults | 3.90^{a} | 0.87 | -0.411 | -0.535 |
| | 0.70 ; 0.81 | Latest physics results | 3.86^{b} | 0.94 | -0.670 | 0.131 |
| | | Physics related hobbies | 3.54^{a} | 1.04 | -0.386 | -0.407 |
| | | | 3.49^{b} | 1.08 | -0.364 | -0.526 |
| | | Peers | 3.23^{a} | 0.79 | -0.001 | 0.553 |
| Pagamitian | 0.97^a , 0.99^b | | 3.14^{b} | 0.78 | -0.073 | 0.620 |
| песоутноп | 0.87 ; 0.82 | Instructors | 3.15^{a} | 0.72 | 0.168 | 0.977 |
| | | Instructors | 3.05^{b} | 0.72 | -0.128 | 1.032 |
| | | Futuro | 4.10^{a} | 0.83 | -0.859 | 0.697 |
| Utility value | 0.87^a , 0.00^b | Future | 4.03^{b} | 0.92 | -0.829 | 0.244 |
| | 0.87 ; 0.90 | Cancon | 4.06^{a} | 0.83 | -0.809 | 0.745 |
| | | Career | 3.97^{b} | 0.92 | -0.858 | 0.618 |

TABLE IV. Descriptive statistics for the items of the motivation toward physics construct.

 a Before emergency remote instruction; b After emergency remote instruction.

D. Physics Academic Orientation towards Physics Inventory (PAOI)

In Table V we report the statistics relative to the *Academic orientation towards physics* construct. For each item we asked: To what extent do you feel able to _____? according to the following scale:

- 1 = not at all (per niente);
- 2 =to a small extent (poco);
- 3 =to some extent (abbastanza);
- 4 =to a great extent (molto);
- 5 =completely (del tutto).

| TABLE V. Descriptive statistics for the items of th | e Academic orientation towards physics construct |
|---|--|
|---|--|

| $Metacognition 0.86^{6} (Prequest schedule programma di studio stabilito) (10, 2176 1.01 0.0219 -0.510 (10, 0.0219 -0.510 (10, 0.0219 -0.510 (10, 0.0219 -0.510 (10, 0.0219 -0.510 (10, 0.0219 -0.510 (10, 0.0219 -0.514 (10, 0.0219 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.514 (10, 0.001 -0.515 (10, 0.011 -0.558 (10, 0.01$ | Dimension | Cronbach's alpha | Item | M | SD | Asimmetry | Kurtosis |
|---|------------------|--------------------------|--|---------------------------|------|-----------|----------|
| $Metacognition 0.86^{a} \\ Metacognition 0.88^{a} \\ Metacognition 0.88^{a} \\ 0.88^{a} \\ Self-regulation 0.88^{b} \\ 0.88^{b} \\ Schedule your study \\ 0.88^{b} \\ Schedule your study \\ (Programmare to studio in base alla difficoltà degli argomenti) \\ 0.88^{b} \\ Schedule your study \\ (Programmare to studio in base alla difficoltà degli argomenti) \\ 0.88^{b} \\ Schedule your study \\ (Programmare to studio in base alla difficoltà degli argomenti) \\ 0.88^{b} \\ (Drganizzare il tempo di studio a casa in maniera efficace) \\ 0.88^{b} \\ (Drganizzare il tempo di studio a casa in maniera efficace) \\ 0.88^{b} \\ (Drganizzare il tempo di studio a casa in maniera efficace) \\ 0.88^{b} \\ (Drganizzare il tempo di studio a casa in maniera efficace) \\ 0.88^{b} \\ (Drganizzare il tempo di studio a casa in maniera efficace) \\ 0.88^{b} \\ (Drganizzare il tempo di studio a casa in maniera efficace) \\ 0.88^{b} \\ (Stabilire obiettivi di rendimento raggiungibili, valutando capacità e limiti) \\ (Stabilire obiettivi di rendimento raggiungibili, valutando capacità e limiti) \\ (Stabilire efficacemente le la contania \\ 0.88^{b} \\ (Drequente le lezioni con costanza) \\ 0.117 \\ (Utitizzare efficacemente il materiale di studio (libro, appunti,)) \\ 3.34^{b} \\ 0.48 \\ 0.018 \\ 0.010 \\ (Create links between concepts \\ 0.88^{b} \\ (Reflective learning strategies \\ 0.88^{b} \\ (Reflective learning trategies \\ 0.88^{b} \\ (Reflective learning strategies \\ 0.84^{b} \\ 0.85^{b} \\ (Reflective learning strategies \\ 0.84^{b} \\ 0.84^{b}$ | | | Respect schedule | 3.03^{a} | 1.01 | 0.219 | -0.510 |
| $Metacognition 0.86^{a} 0.86^{a} (Prequest of a standy study hythm (3.07° 1.12) -0.023 -0.678 (Mantener un ritmo costante di studio) 2.77b 1.23 0.036 -0.814 (Mantener un ritmo costante di studio) 3.00° 1.06 0.003 -0.544 (7079012207° 1.124 0.202 -0.967 (709012207° 1.054) 3.00° 0.38 0.122 -0.100 (Programmare lo studio in base alla difficoltà degli argomenti) 2.97° 1.07 0.053 -0.503 (Stabilire obiettivi di rendimento raggiangibili, valutando capacità e limiti) 3.08° 1.09 0.071 -0.586 (Prequentare le lezioni con costanza) 3.64° 1.25 -0.582 -0.678 (Prequentare le lezioni con costanza) 3.64° 1.25 -0.582 -0.678 (Prequentare le lezioni con costanza) 3.64° 1.25 -0.582 -0.678 (Prequentare le lezioni con costanza) 3.64° 1.25 -0.582 -0.678 (Prequentare le lezioni con costanza) 3.44° 0.84 -0.023 -0.100 (Programmare di studio (tibro, appunti,)) 3.33° 0.10 -0.123 -0.130 (Prequentare le lezioni con costanza) 3.44° 0.44 -0.213 -0.161 (Prequentare de lezioni con costanza) 3.44° 0.88 -0.000 -0.117 (Printizzar efficacemente il materiale di studio (libro, appunti,)) 3.33° 0.10 -0.123 -0.490 (Prequentare de topics 3.41° 0.84 -0.213 -0.161 (Prequentare efficaceri strutegies 1.298° 1.07 -0.0789 -0.444 (Prer uso di adeguate ed efficaci strutegie di apprendimento) 3.00° 1.15 -0.038 -0.796 Take notes 3.49° 0.44 -0.345 -0.464 (Prenter appunti) 3.52° 1.04 -0.345 -0.464 (Prenter appunti) 3.52° 1.04 -0.345 -0.404 (Prequentare contents (Samper indusperse) 3.44° 0.44 -0.273 -0.362 (Cogliner e rielaborare i contenti essensiali di una lezione) 3.44° 0.88 -0.025 -0.022 (Saper trovare collegamenti con altri corsi) 3.44° 0.87 -0.219 0.0594 (Prequentare su contenti essensiali di una lezione) 3.44° 0.88 -0.025 -0.022 (Saper trovare collegamenti con altri corsi) 3.44° 0.47 -0.258 (D.022 (Saper trovare collegamenti con altri corsi) 3.44° 0.87 -0.219 0.0594 (Rielect on lecture contents (Samper indusperse 3.44° 0.87 -0.219 0.0594 (Prequentare supplicity problems 3.44° 0.47 -0.258 (D.022 (Saper trovare collegamenti con altri corsi) 3.44° 0.47 -0.$ | | | (Rispettare sempre il programma di studio stabilito) | 2.75^{b} | 1.01 | 0.402 | -0.323 |
| $Metacognition 0.88^{\circ} 0.88^{\circ} (Organizzare il tempo di studio) 2.73^{\circ} 1.23 0.336 -0.814 Organizzare il tempo di studio a casa in maniera efficace) 2.77^{\circ} 1.24 0.200 -0.967 0.88^{\circ} (Organizzare il tempo di studio a casa in maniera efficace) 2.77^{\circ} 1.24 0.200 -0.967 0.98^{\circ} 0.88^{\circ} 0.88^{\circ} 0.88^{\circ} 0.98^{\circ} 0.33 0.122 -0.100 (Programmare lo studio in base alla difficoltà degli argomenti) 2.97^{\circ} 1.07 0.053 -0.513 (Stabilire obiettivi di rendimento raggiungibili, valutando capacità e limiti) 3.03^{\circ} 1.09 0.071 -0.558 0.101 (Organizzare efficacemente l'anterniale di studio (libro, appunti,)) 3.34^{\circ} 0.84 -0.082 -0.172 -0.185 (Utilizzare efficacemente il materiale di studio (libro, appunti,)) 3.34^{\circ} 0.84 -0.082 -0.172 -0.185 (Utilizzare efficacemente il materiale di studio (libro, appunti,)) 3.34^{\circ} 0.84 -0.082 -0.172 (Creare collegamenti tra i diversi concetti che stai studiando) 3.43^{\circ} 0.04 -0.213 -0.161 Rework the learned topics 3.44^{\circ} 0.44 -0.233 -0.101 0.117 (Creare collegamenti ra i diversi concetti che stai studiando) 3.34^{\circ} 0.44 -0.233 -0.106 (Fare uso di adeguate ed efficaci strategie di apprendimento) 3.30^{\circ} 1.10 -0.078 -0.544 Adopt effective learning strategies 2.98^{\circ} 1.07 0.0789 -0.544 (Fare uso di adeguate ed efficaci strategie di apprendimento) 3.34^{\circ} 0.84 -0.023 -0.406 (Prendere appunti) 3.52^{\circ} 1.19 -0.417 -0.5196 (Cogliere e rielaborare i contentui essenziali di una lezione) 3.34^{\circ} 0.87 -0.219 -0.549 (Cogliere e rielaborare i contentu essenziali di una lezione) 3.34^{\circ} 0.87 -0.218 -0.261 (Cogliere e rielaborare i contentu essenziali di una lezione) 3.44^{\circ} 0.87 -0.218 -0.261 (Cogliere e rielaborare i contentu essenziali di una lezione) 3.44^{\circ} 0.87 -0.219 -0.544 (Creare societti pri importanti) 3.44^{\circ} 0.87 -0.219 -0.540 (Cogliere e rielaborare i contentu essenziali di una lezione) 3.44^{\circ} 0.87 -0.219 -0.540 (Cogliere e rielaborare i contentu essenziali di una lezione) 3.44^{\circ} 0.87 -0.219 -0.187 -0.436 (Cogliere e rielaborare i contenti essenziali$ | | | Keep a steady study rhythm | 3.07^{a} | 1.12 | -0.023 | -0.678 |
| $Metacognition 0.86^{6} \\ 0.86^{6} \\ 0.88^{b} \\ 0.786^{c} \\ (Organizzer i tempo di studio a casa in maniera efficace) 2.77^{b} 1.24 0.020 -0.967 \\ 0.88^{b} \\ 0.001 \\ (Programmer to studio in base alla difficoltà degli argomenti) \\ 0.97^{b} \\ 0.075 \\ 0.016 \\ 0.011 \\ 0.000 \\ 0.001 \\ 0.001 \\ 0.000 \\ 0.001 \\ 0.000 \\ 0.001 \\ 0.000 $ | | | (Mantenere un ritmo costante di studio) | 2.73^{b} | 1.23 | 0.336 | -0.814 |
| $Self-regulation 0.85^{\circ} (Organizzare il tempo di studio a casa in maniera efficace) 2.77^{\circ} 1.24 0.220 - 0.967 \\ 3.08^{\circ} 0.93 0.122 - 0.100 \\ (Programmare lo studio in base alla difficoltà degli argomenti) 2.97^{\circ} 1.07 0.053 - 0.503 \\ Schedule you study 3.08^{\circ} 0.93 0.122 - 0.006 \\ (Programmare lo studio in constanza) 3.17^{\circ} 0.95 0.016 - 0.131 \\ (Stabilire obiettiui di rendimento raggiungibili, valutando capacità e limiti) 3.98^{\circ} 1.09 0.071 - 0.558 \\ Attend classes regularly 3.98^{\circ} 1.03 - 0.712 - 0.185 \\ (Prequentare le lezioni con costanza) 3.64^{\circ} 1.25 - 0.582 - 0.678 \\ Use learning materials (textbook, notes,) 3.34^{\circ} 0.84 - 0.082 - 0.172 \\ (Utilizzer efficacemente el materiale di studio (libro, appunti,)) 3.34^{\circ} 0.84 - 0.082 - 0.172 \\ (Utilizzer efficacemente el materiale di studio (libro, appunti,)) 3.34^{\circ} 0.84 - 0.082 - 0.123 - 0.490 \\ Create links between concepts 3.41^{\circ} 0.88 - 0.048 - 0.023 - 0.161 \\ Rework the learned topics 3.41^{\circ} 0.88 - 0.048 - 0.203 \\ (Rielaborare adeguatamente gli argomenti studiati) 3.41^{\circ} 1.01 - 0.2538 - 0.449 \\ Adopt effective learning strategies 2.98^{\circ} 1.07 - 0.0789 - 0.454 \\ (Fare uso di adeguate ed efficaci strategie di apprendimento) 3.00^{\circ} 1.15 - 0.038 - 0.766 \\ Take notes 3.52^{\circ} 1.19 - 0.477 - 0.562 \\ Netacognition 0.86^{\circ} (Prendere appunti) 3.47^{\circ} 1.04 - 0.273 - 0.362 \\ Focus on the main aspects of an experiment 3.46^{\circ} 0.92 - 0.147 - 0.118 \\ (Cogliere e rielaborare i contenuti essenziali di una lezione) 3.47^{\circ} 1.04 - 0.273 - 0.362 \\ Focus on the main aspects topics 3.41^{\circ} 0.87 - 0.281 - 0.281 \\ (Cogliere e rielaborare i contenuti essenziali di un seperimento) 3.26^{\circ} 1.05 - 0.187 - 0.436 \\ Link different subjects topics 3.41^{\circ} 0.87 - 0.283 - 0.129 \\ (Saper trovare collegamenti con altri corsi) 3.44^{\circ} 0.87 - 0.283 - 0.129 \\ (Saper trovare collegamenti con altri corsi) 3.44^{\circ} 0.87 - 0.283 - 0.129 \\ (Risolvere correttamente semplici problemi 3.39^{\circ} 0.92 - 0.0066 - 0.121 \\ (Risolvere correttamente semplici pro$ | | | Organize homework | 3.00^{a} | 1.06 | 0.003 | -0.544 |
| Self-regulation 0.88 ^b Schedule your study 3.09 ^a 0.122 -0.100 (Programmare lo studio in base alla difficoltà degli argomenti) 2.97 ^b 1.07 0.053 -0.533 Stabilish attainable goals 3.17 ^a 0.95 0.016 -0.131 (Stabilire obiettivi di rendimento raggiungibili, valutando capacità e limiti) 3.03 ^b 1.03 -0.712 -0.185 (Prequentare le lezioni con costanza) 3.64 ^b 1.25 -0.582 -0.678 Use learning materials (textbook, notes,) 3.34 ^b 0.84 -0.082 -0.112 (Utilizzare efficacemente il materiale di studio (libro, appunti,)) 3.34 ^b 0.84 -0.023 (Itilizare efficacemente) 3.41 ^e 0.88 -0.044 -0.203 (Rielaborar adeguatamente gli argomenti studiati) 3.14 ^b 0.88 -0.044 -0.203 (Rielaborar adeguatamente gli argomenti studiati) 3.15 ^b 1.04 -0.233 -0.161 (Perae uso di adeguate de efficaci strategie di apprendimento) 3.52 ^b 1.04 -0.234 -0.040 (Cogliere e riclaborare i contenuti es | | 0.85^{a} | (Organizzare il tempo di studio a casa in maniera efficace) | 2.77^{b} | 1.24 | 0.220 | -0.967 |
| $Metacognition \begin{array}{c c c c c c c c c c c c c c c c c c c $ | Self-regulation | 0.88^{b} | Schedule your study | 3.09^{a} | 0.93 | 0.122 | -0.100 |
| Metacognition 3.17° 0.95 0.016 -0.131 (Stabilish attainable goals 3.03° 1.09 0.071 -0.558 Attend classes regularly 3.98° 1.03 -0.712 -0.185 (Prequentare le lezioni con costanza) 3.64° 1.25 -0.582 -0.678 Use learning materials (textbook, notes,) 3.34° 0.48 -0.023 -0.123 (Utilizzare efficacemente il materiale di studio (libro, appunti,)) 3.33° 0.10 -0.133 -0.400 Create links between concepts 3.44° 0.88 -0.010 -0.1172 (Creare collegamenti tra i diversi concetti che stai studiando) 3.43° 0.94 -0.213 -0.161 Rework the learned topics 3.41° 0.88 -0.048 -0.203 -0.400 Adopt effective learning strategies 2.98° 1.07 0.0789 -0.544 Adopt effective learning strategies 2.98° 1.01 -0.2538 -0.449 Adopt effective learning strategies 2.98° 1.05 -0.035 -0.043 O.80° Reflect on lecture contents 3.49° 0.94 -0.128 <td></td> <td></td> <td>(Programmare lo studio in base alla difficoltà degli argomenti)</td> <td>2.97^{b}</td> <td>1.07</td> <td>0.053</td> <td>-0.503</td> | | | (Programmare lo studio in base alla difficoltà degli argomenti) | 2.97^{b} | 1.07 | 0.053 | -0.503 |
| Stabilire obiettivi di rendimento raggiungibili, valutando capacità e limiti) 3.03 ^b 1.09 0.071 -0.558 Attend classes regularly 3.64 ^b 1.25 -0.582 -0.678 (Frequentare le lezioni con costanza) 3.64 ^b 1.25 -0.582 -0.678 Use learning materials (textbook, notes,) 3.34 ^b 0.84 -0.082 -0.172 (Utilizzare efficacemente il materiale di studio (libro, appunti,)) 3.34 ^b 0.10 -0.123 -0.490 Create links between concepts 3.43 ^a 0.88 -0.008 -0.171 (Creare collegamenti tra i diversi concetti che stai studiando) 3.43 ^b 0.94 -0.213 -0.490 Metacognition (Rielaborare adeguatamente gli argomenti studiati) 3.41 ^b 1.01 -0.253 -0.449 Adopt effective learning strategies 2.98 ^c 1.07 0.0789 -0.544 (Fare uso di adeguate de efficaci strategie di apprendimento) 3.00 ^b 1.15 0.038 -0.796 Take notes 3.52 ^b 1.19 -0.477 -0.556 (Cogliere e rielaborare i contenuti essenziali di una lezione) 3.47 ^b 0.4077 -0.566 -0.280 -0.223 | | | Establish attainable goals | 3.17^{a} | 0.95 | 0.016 | -0.131 |
| Attend classes regularly 3.98° 1.03 -0.712 -0.185 (Frequentare le lezioni con costanza) 3.64° 1.25 -0.582 -0.678 Use learning materials (textbook, notes,) 3.34° 0.84 -0.082 -0.172 (Utilizzare efficacemente il materiale di studio (libro, appunti,)) 3.34° 0.84 -0.082 -0.172 (Create collegamenti tra i diversi concetti che stai studiando) 3.43° 0.83 -0.100 0.117 (Creare collegamenti tra i diversi concetti che stai studiando) 3.44° 0.88 -0.038 -0.400 Rework the learned topics 3.41° 0.80 -0.017 -0.153 -0.161 (Rare uso di adeguate ed efficaci strategie di apprendimento) 3.00° 1.15 0.038 -0.491 Adopt effective learning naspects of an experiment 3.53° 1.04 -0.355 -0.404 (Bare notes 3.54° 1.04 -0.213 -0.213 -0.213 (Cogliere e rielaborare i contenuti essenziali di una lezione) 3.50° 1.04 -0.355 -0.494 (Cogliere e rielaborare i contenuti essenziali di una lezione) 3.44° 0.80 -0.011 | | | (Stabilire obiettivi di rendimento raggiungibili, valutando capacità e limiti) | 3.03^{b} | 1.09 | 0.071 | -0.558 |
| (Prequentare le lezioni con costanza) 3.64 ^b 1.25 -0.582 -0.678 Use learning materials (textbook, notes,) 3.34 ^a 0.84 -0.082 -0.172 (Utilizzare efficacemente il materiale di studio (libro, appunti,)) 3.33 ^b 0.10 -0.123 -0.490 Create links between concepts 3.43 ^a 0.83 -0.100 0.117 (Creare collegamenti tra i diversi concetti che stai studiando) 3.43 ^b 0.84 -0.203 -0.161 Rework the learned topics 3.41 ^b 1.01 -0.2538 -0.449 Adopt effective learning strategies 2.98 ^c 1.07 -0.0789 -0.544 Metacognition 0.86 ^a (Prendere appunti) 3.52 ^b 1.19 -0.477 -0.596 Metacognition 0.86 ^a (Prendere appunti) 3.52 ^b 1.19 -0.477 -0.596 Metacognition 0.86 ^a (Prendere appunti) 3.52 ^b 1.99 -0.477 -0.596 Metacognition 0.86 ^a (Prendere appunti) 3.29 ^a 1.04 -0.273 -0.362 | | | Attend classes regularly | 3.98^a | 1.03 | -0.712 | -0.185 |
| | | | (Frequentare le lezioni con costanza) | 3.64^{b} | 1.25 | -0.582 | -0.678 |
| $Metacognition \begin{array}{c} (Utilizzare efficacemente il materiale di studio (libro, appunti,)) & 3.33^{b} 0.10 & -0.123 & -0.490 \\ Create links between concepts & 3.43^{a} 0.83 & -0.100 & 0.117 \\ (Creare collegamenti tra i diversi concetti che stai studiando) & 3.43^{a} 0.83 & -0.010 & 0.117 \\ Rework the learned topics & 3.41^{a} 0.88 & -0.048 & -0.203 \\ (Rielaborare adeguatamente gli argomenti studiati) & 3.41^{b} 1.01 & -0.2538 & -0.449 \\ Adopt effective learning strategies & 2.98^{c} 1.07 & 0.0789 & -0.544 \\ Adopt effective learning strategies & 2.98^{c} 1.07 & 0.0789 & -0.544 \\ (Fare uso di adeguate ed efficaci strategie di apprendimento) & 3.00^{b} 1.15 & 0.038 & -0.706 \\ Take notes & 3.52^{b} 1.19 & -0.477 & -0.596 \\ 0.89^{b} Reflect on lecture contents & 3.49^{e} 0.94 & -0.128 & -0.261 \\ (Cogliere e rielaborare i contenuti essenziali di una lezione) & 3.47^{b} 1.04 & -0.273 & -0.362 \\ Focus on the main aspects of an experiment & 3.46^{a} 0.92 & -0.147 & 0.011 \\ (Cogliere e rielaborare i contenuti essenziali di un esperimento) & 3.32^{b} 1.05 & -0.187 & -0.362 \\ Saper trovare collegamenti con altri corsi) & 3.44^{b} 0.87 & -0.219 & 0.0594 \\ Reflect on main concepts & 3.41^{e} 0.88 & -0.0081 & 0.259 \\ (Concentrarti sui concetti pin importanti) & 3.30^{b} 0.91 & -0.253 & 0.0292 \\ Focus on the main concepts & 3.68^{a} 0.80 & -0.001 & -0.239 \\ (Concentrarti sui concetti principali) & 3.61^{b} 0.87 & -0.219 & 0.0594 \\ Reflect on main concepts & 3.64^{a} 0.99 & -0.216 & -0.645 \\ Solve simple problems & 3.64^{a} 0.99 & -0.217 & -0.319 \\ (Esporre adeguatamente in forma orale gli argomenti che hai studiato) & 3.26^{b} 1.05 & -0.146 & -0.645 \\ Solve simple problems & 3.14^{a} 0.98 & 0.99 & 0.026 & -0.022 \\ (Saper trovare correttamente semplici problemi & 3.31^{b} 1.00 & -0.079 & -0.355 \\ Solve simple problems & 3.14^{a} 0.99 & 0.92 & -0.006 & -0.348 \\ (Avere un buon voto alla fine di un esame) & 3.31^{b} 1.00 & -0.079 & -0.355 \\ Solve non-trivial problems & 3.14^{b} 0.99 & 0.159 & -0.056 \\ (Intervenire in classe per $ | | | Use learning materials (textbook, notes,) | 3.34^{a} | 0.84 | -0.082 | -0.172 |
| $ Metacognition \\ Self-efficacy \\ Self-efficacy \\ 0.80^{6} \\ 0.80$ | | | (Utilizzare efficacemente il materiale di studio (libro, appunti,)) | 3.33^{b} | 0.10 | -0.123 | -0.490 |
| $Self-efficacy = 0.80^{a} \\ Self-efficacy = 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{b} \\ 0.80^{c} \\$ | | | Create links between concepts | 3.43^{a} | 0.83 | -0.100 | 0.117 |
| $Self-efficacy = 0.80^{a} (Risolvere correttamente semplici problems (Concentrati sui concetti principali) (Risolvere correttamente semplici problems (Risolvere correttamente ring classes (Risolvere Correttamente ring classes (Risolvere Correttamente ring classes (Risolvere Correttamente problems (Risolvere Correttamente ring classes (Risolvere Correttamente problemi complicati) (Ris$ | | | (Creare collegamenti tra i diversi concetti che stai studiando) | 3.43^{b} | 0.94 | -0.213 | -0.161 |
| $Self-efficacy = 0.80^{a} \\ Self-efficacy = 0.80^{a} \\ 0.80^{b} \\ 0.80^{c} \\ 0.80^{a} \\$ | | | Rework the learned topics | 3.41^{a} | 0.88 | -0.048 | -0.203 |
| $Self-efficacy = 0.80^{a} (Risolvere correttamente semplici problemi \\ Self-efficacy = 0.80^{a} (Risolvere correttamente semplici problemi \\ 0.80^{a} (Risolvere correttamente semplici problemi \\ 0.80^{a} (Risolvere correttamente problemi complicati) \\ 0.80^{a} (Risolvere correttamente problemi complicati) \\ 0.80^{a} (Risolvere correttamente problemi complicati) \\ 0.80^{b} (Riflection lecture contents \\ 0.80^{c} (Saper trovae collegamenti con altri corsi) \\ 0.80^{c} (Riflection lecture concetts principali) \\ 0.80^{c} (Risolvere correttamente in forma orale gli argomenti che hai studiato) \\ 0.80^{a} (Risolvere correttamente semplici problemi \\ 0.80^{a} (Risolvere correttamente semplici problemi \\ 0.70^{b} (Risolvere correttamente semplici problemi \\ 0.70^{b} (Risolvere correttamente semplici problemi \\ 0.70^{b} (Risolvere correttamente semplici problemi \\ (Risolvere correttamente problemi complicati) \\ 0.70^{b} (Risolvere correttamente semplici problemi \\ (Risolvere correttamente problemi complicati) \\ 0.70^{b} (Risolvere correttamente semplici problemi \\ (Risolvere correttamente problemi complicati) \\ (Risolvere correttamente problemi complicat$ | | | (Rielaborare adequatamente gli argomenti studiati) | 3.41^{b} | 1.01 | -0.2538 | -0.449 |
| $ Metacognition \\ Metacognition \\ 0.86^{a} \\ 0.89^{b} \\ Reflect on lecture contents \\ 0.89^{b} \\ Reflect on lecture contents \\ $ | | | Adopt effective learning strategies | 2.98^{a} | 1.07 | 0.0789 | -0.544 |
| | | 0.86^{a} 0.89^{b} | (Fare uso di adequate ed efficaci strategie di apprendimento) | 3.00^{b} | 1.15 | 0.038 | -0.796 |
| | | | Take notes | 3.53^{a} | 1.04 | -0.345 | -0.404 |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $ | | | (Prendere appunti) | 3.52^{b} | 1.19 | -0.477 | -0.596 |
| $Self-efficacy = 0.80^{\circ} (Cogliere e rielaborare i contenuti essenziali di una lezione) (Cogliere e rielaborare i contenuti essenziali di una lezione) (Cogliere e rielaborare i contenuti essenziali di una lezione) (Cogliere e rielaborare i contenuti essenziali di un esperiment) (Cogliere e rielaborare i contenuti essenziali di un esperiment) (Cogliere e rielaborare i contenuti essenziali di un esperiment) (Cogliere e rielaborare i contenuti essenziali di un esperiment) (Cogliere e rielaborare i contenuti essenziali di un esperiment) (Cogliere e rielaborare i contenuti essenziali di un esperiment) (Cogliere e rielaborare i contenuti essenziali di un esperimento) (Cogliere e rielaborare collegamenti con altri corsi) (Cogliere e rielaborare collegamenti con altri corsi) (Cogliere e rielaborare collegamenti con altri corsi) (Concentrarti sui concetti più importanti) (Cogliere e rielaborare i concetti più importanti) (Cogliere e rielaborare i concetti più importanti) (Cogliere e rielaborare concetti più importanti) (Cogliere e rielaborare i concetti più importanti) (Cogliere e rielaborare e concettari e rincipali) (Concentrarti sui concetti più engliere orale gli argomenti che hai studiato) (Concentrarti sui concetti più engliere orale gli argomenti che hai studiato) (Cogliere e rielaborare e correttamente semplici problemi (Cogliere e rielaborare e concentrati esemplici problemi (Cogliere e rielaborare e rielaborare e concentrati esemplici problemi (Cogliere e rielaborare e concentrati esemplici problemi (Cogliere e rielaborare e rielaborare esemplici problemi (Cogliere e rielaborare e rielaborare esemplici econcentrati (Cogliere e rielaborare e rielaborare esemp$ | Metacognition | | Reflect on lecture contents | 3.49^{a} | 0.94 | -0.128 | -0.261 |
| $Self-efficacy = 0.80^{a} \\ 0.79^{b} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.79^{b} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.79^{b} \\ 0.80^{a} \\ 0.79^{b} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.80^{a} \\ 0.79^{b} \\ 0.80^{a} \\ 0.80$ | | | (Cooliere e rielaborare i contenuti essenziali di una lezione) | 3.47^{b} | 1.04 | -0.273 | -0.362 |
| $Self-efficacy = 0.80^{a} \\ 0.79^{b} \\ 0.80^{a} \\ 0.91^{a} \\ 0.259 \\ 0.80^{a} \\ 0.80^{a} \\ 0.91^{a} \\ 0.92^{a} \\ 0.91^{a} \\ 0.91^{a$ | | | Focus on the main aspects of an experiment | 3.46^{a} | 0.92 | -0.147 | 0.011 |
| $Self-efficacy 0.80^{a} (Risolvere correttamente semplici problemi complicati) 0.302 - 0.005 - 0.022 - 0.003 - 0.012 - 0.003 - 0.012 - 0.003 - 0.022 - 0.006 - 0.121 - 0.319 - 0.056 - 0.348 - 0.059 - 0.022 - 0.006 - 0.121 - 0.319 - 0.056 - 0.348 - 0.059 $ | | | (Cooliere e rielaborare i contenuti essenziali di un esperimento) | 3 3 2 2 5 | 1.05 | -0.187 | -0.436 |
| $Self-efficacy 0.80^{a} (Risolvere correttamente semplici problemi con altri corsi) 3.44^{b} 0.87 -0.219 0.0594 0.259 (Riflettere sui concetti più importanti) 3.00^{b} 0.91 -0.253 0.0298 (Concentrarti sui concetti più importanti) 3.00^{b} 0.91 -0.253 0.0298 (Concentrarti sui concetti principali) 3.61^{b} 0.87 -0.283 0.129 (Concentrarti sui concetti principali) 3.53^{a} 0.84 -0.059 -0.221 -0.045 Solve simple problems 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti sui concetti problemi s) 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti sui concetti problemi s) 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti sui concetti problemi s) 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti sui concetti problemi s) 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti sui concetti problemi s) 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti sui concetti problemi s) 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti sui concentri semplici problemi s) 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti semplici problemi s) 3.53^{a} 0.84 -0.059 -0.022 (Concentrarti semplici problemi s) 3.53^{a} 0.84 -0.059 -0.056 (Concentrarti semplici problemi s) 3.53^{a} 0.84 -0.059 -0.056 (Concentrarti semplici problemi s) 3.53^{a} 0.84 -0.059 -0.056 (Concentrarti semplici problemi s) 3.53^{b} 0.92 -0.006 -0.121 (Concentrarti semplici problemi s) 3.53^{c} 0.56 -0.348 (Concentrarti semplici problemi complicati) 3.55 Solve non-trivial problemi s) 3.53^{c} 0.99 0.159 -0.056 (Concentrarti semplici semplicati) 2.98^{b} 0.99 0.159 -0.056 (Concentrarti semplici semplicati) 2.98^{b} 0.99 0.159 -0.056 (Concentrarti semplici semplicati) 2.50^{b} 1.22 0.408 -0.805 (Concentrarti semplici semplicati semplicati semplicati sem$ | | | Link different subjects topics | 3.45^a | 0.80 | -0.025 | 0.022 |
| $Self-efficacy = 0.80^{a} (Risolvere correttamente semplici problemi conlegation (construction)) = 0.010 (construction) = 0.010 (construction) = 0.010 (construction) = 0.010 (construction) = 0.000 (constru$ | | | (Saper trovare collegamenti con altri corsi) | 3 110 | 0.87 | -0.219 | 0.0594 |
| $Self-efficacy = 0.80^{a} \\ (Righter e sui concetti più importanti) \\ Self-efficacy = 0.80^{a} \\ (Risolvere correttamente semplici problemi \\ (Risolvere correttamente problemi complicati) \\ (Risolvere correttamente problemi complicati) \\ Solve simple problems \\ (Risolvere correttamente problemi complicati) \\ (Risolvere correttamente problemi complicati) \\ Solve simple problems \\ (Risolvere correttamente problemi complicati) \\ (Risolvere correttamente proble$ | | | Reflect on main concepts | 3.41^{a} | 0.83 | -0.215 | 0.259 |
| $Self-efficacy = 0.80^{a} (Risolvere correttamente semplici problemi complicati) (Correttamente problems (Risolvere correttamente problemi complicati) 2.88^{b} 0.92 -0.026 -0.238 (Risolvere correttamente problemi complicati) 2.88^{b} 0.92 -0.006 -0.121 (Risolvere correttamente problemi complicati) 2.88^{b} 0.92 -0.006 -0.121 (Risolvere correttamente problemi complicati) 2.88^{b} 0.92 -0.056 -0.348 (Risolvere correttamente problemi complicati) 2.88^{b} 0.92 -0.056 -0.355 -0.056 (Intervenire in classe per chiedere chiarimenti al docente) 2.50^{b} 1.22 0.408 -0.805$ | | | (Biffettere sui concepti niù importanti) | 3 30 ^b | 0.00 | 0.253 | 0.0200 |
| $Self-efficacy = 0.80^{a} (Concentrarti sui concetti principali) = 0.001 = 0.$ | | | Focus on the main concepts | 3.50 | 0.91 | -0.200 | -0.239 |
| $Self-efficacy = 0.80^{a} \\ (Risolvere correttamente problemi complicati) \\ ($ | | | (Concentranti avi concepts | 2.00 | 0.00 | -0.001 | 0.120 |
| $Self-efficacy = 0.80^{a} (Sisolvere correttamente semplici problemi Solve simple sinconstructure simple simple simple simple simple simp$ | | | Explain clearly what you have studied | $\frac{3.01}{3.41^a}$ | 0.07 | -0.283 | 0.129 |
| $Self-efficacy = \begin{pmatrix} 0.89^{abc} & adeguatamente in forma orale gli argomenti che hai statiato) \\ Solve simple problems \\ Solve simple problems \\ 0.89^{abc} & (Risolvere correttamente semplici problemi \\ 0.79^{bb} & Pass exams with a good grade \\ (Avere un buon voto alla fine di un esame) \\ Solve non-trivial problems \\ (Risolvere correttamente problemi complicati) \\ Solve non-trivial problems \\ (Risolvere correttamente problemi complicati) \\ Ask for clarifications to the instructor during classes \\ (Intervenire in classe per chiedere chiarimenti al docente) \\ 2.50^{b} & 1.22 \\ 0.408 \\ -0.048 \\ -0.048 \\ -0.805 \\ -0.805 \\ -0.048 \\ -0.805 \\ -0.805 \\ -0.048 \\ -0.805 \\ -0.805 \\ -0.048 \\ -0.805 $ | | | (Explain clearly what you have studied | 2.41 | 1.05 | -0.217 | -0.315 |
| $ \begin{array}{c} Self\text{-efficacy} & 0.80^a & (Risolvere correttamente semplici problemi & 3.33^b & 0.92 & -0.006 & -0.121 \\ 0.79^b & Pass exams with a good grade & 3.31^b & 0.92 & -0.006 & -0.121 \\ (Avere un buon voto alla fine di un esame) & 3.31^b & 1.00 & -0.079 & -0.355 \\ Solve non-trivial problems & 3.14^a & 0.92 & 0.081 & 0.0784 \\ (Risolvere correttamente problemi complicati) & 2.98^b & 0.99 & 0.159 & -0.056 \\ Ask for clarifications to the instructor during classes & 2.75^a & 1.14 & 0.219 & -0.665 \\ (Intervenire in classe per chiedere chiarimenti al docente) & 2.50^b & 1.22 & 0.408 & -0.805 \end{array} $ | | | (Esporte adegualamente in jorma orale gli argomenti che nai studiato) | 3.20 3.53^{a} | 1.05 | -0.140 | -0.045 |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | | 0.004 | (Discluse comption onto complici emblemi | $2.00 \\ 2.00 \\ 0.00 $ | 0.04 | -0.035 | -0.022 |
| 0.79 Fass exams with a good grade 5.40 0.93 -0.050 -0.548 $(Avere un buon voto alla fine di un esame)$ 3.31^b 1.00 -0.079 -0.355 Solve non-trivial problems 3.14^a 0.92 0.081 0.0784 $(Risolvere correttamente problemi complicati)$ 2.98^b 0.99 0.159 -0.056 Ask for clarifications to the instructor during classes 2.75^a 1.14 0.219 -0.665 $(Intervenire in classe per chiedere chiarimenti al docente)$ 2.50^b 1.22 0.408 -0.805 | Self- $efficacy$ | 0.80 | (Risolvere correliamente semplici problemi | 3.39 2.46ª | 0.92 | -0.000 | -0.121 |
| $(Avere un buon voto alla fine di un esame)$ $3.31^{\circ} 1.00^{\circ} -0.079^{\circ} -0.355^{\circ}$ Solve non-trivial problems $3.44^{\circ} 0.92^{\circ} 0.081^{\circ} 0.0784^{\circ}$ $(Risolvere correttamente problemi complicati)$ $2.98^{b} 0.99^{\circ} 0.159^{\circ} -0.056^{\circ}$ Ask for clarifications to the instructor during classes $2.75^{\circ} 1.14^{\circ} 0.219^{\circ} -0.665^{\circ}$ $(Intervenire in classe per chiedere chiarimenti al docente)$ $2.50^{b} 1.22^{\circ} 0.408^{\circ} -0.805^{\circ}$ | | 0.79 | Pass exams with a good grade | 3.40 | 0.95 | -0.056 | -0.348 |
| Solve non-trivial problems 3.14 0.92 0.081 0.0784 (Risolvere correttamente problemi complicati) 2.98^b 0.99 0.159 -0.056 Ask for clarifications to the instructor during classes 2.75^a 1.14 0.219 -0.665 (Intervenire in classe per chiedere chiarimenti al docente) 2.50^b 1.22 0.408 -0.805 | | | (Avere un buon voto alla fine di un esame) | 3.31° | 1.00 | -0.079 | -0.355 |
| $(Risolvere correttamente problemi complicati)$ 2.98° 0.99° 0.159° -0.056° Ask for clarifications to the instructor during classes 2.75° 1.14° 0.219° -0.665° (Intervenire in classe per chiedere chiarimenti al docente) 2.50° 1.22° 0.408° -0.805° | | | Solve non-trivial problems | 3.14 2.00 ^b | 0.92 | 0.081 | 0.0784 |
| Ask for clarifications to the instructor during classes $2.75^{-1.14}$ 0.219 -0.665 (Intervenire in classe per chiedere chiarimenti al docente) 2.50^{b} 1.22 0.408 -0.805 | | | (Risolvere correttamente problemi complicati) | 2.98° | 0.99 | 0.159 | -0.056 |
| (Intervenire in classe per chiedere chiarimenti al docente) 2.50° 1.22 0.408 -0.805 | | | Ask for clarifications to the instructor during classes | 2.75° | 1.14 | 0.219 | -0.665 |
| | | 0.000 | (Intervenire in classe per chiedere chiarimenti al docente) | 2.50° | 1.22 | 0.408 | -0.805 |
| $Engagement \qquad 0.82^{\circ} Participate to class discussion \qquad \qquad 2.69^{\circ} 1.11 0.285 -0.492$ | Engagement | 0.82^{a} | Participate to class discussion | 2.69^{a} | 1.11 | 0.285 | -0.492 |
| 0.86° (Partecipare attivamente alla discussione in classe) 2.39° 1.15 0.561 -0.449 | | 0.86° | (Partecipare attivamente alla discussione in classe) | 2.39 | 1.15 | 0.561 | -0.449 |
| Participate to laboratory discussion 3.21° 0.98 -0.072 -0.195 | | | Participate to laboratory discussion | 3.21^{a} | 0.98 | -0.072 | -0.195 |
| (Partecipare attivamente alla discussione in laboratorio) 2.82° 1.13 0.072 -0.676 | | | (Partecipare attivamente alla discussione in laboratorio) | 2.82 | 1.13 | 0.072 | -0.676 |
| Do not dishearten when facing difficulties 2.96^a 1.14 0.177 -0.663 | | _ | Do not dishearten when facing difficulties | $2.96^{a}_{,}$ | 1.14 | 0.177 | -0.663 |
| Anxiety 0.72^{a} (Non scoraggiarti in seguito ad un brutto voto o ad una bocciatura) 2.80^{b} 1.21 0.264 -0.720 | Anxiety | $0.72^{a}_{.}$ | (Non scoraggiarti in seguito ad un brutto voto o ad una bocciatura) | 2.80^{b} | 1.21 | 0.264 | -0.720 |
| 0.71^{b} Control anxiety before examinations 2.91^{a} 1.18 0.086 -0.777 | | 0.71^{b} | Control anxiety before examinations | 2.91^{a} | 1.18 | 0.086 | -0.777 |
| (Controllare l'ansia prima dell'esame) 		 2.85b 	 1.26 	 0.069 	 -0.980 | | | (Controllare l'ansia prima dell'esame) | 2.85^{b} | 1.26 | 0.069 | -0.980 |

 a In-person; b During emergency remote instruction.

E. Attitude toward physics

Respondents were asked to rate their agreement with each statement, by using the following scale: 1 = not at all (*per niente*); 2 = to a small extent (*poco*); 3 = to some extent (*abbastanza*); 4 = to a great extent (*molto*); 5 = completely (*del tutto*).

| TABLE VI. Statistics for the A : | ttitude toward physics construct. |
|------------------------------------|-----------------------------------|
|------------------------------------|-----------------------------------|

| Dimension | Cronbach's alpha | Item | M | SD | Asimmetry | Kurtosis |
|---|---------------------|---|------------------------------|------|-----------|----------|
| | | We need to understand it because it has important effects on our lives | 4.05^{a} | 0.95 | -0.793 | 0.074 |
| Perceived value of | 0.758 | (Abbiamo bisogno di comprenderla perché ha effetti non trascurabili sulla nostra vita) | 4.09^{b} | 0.97 | -0.900 | 0.253 |
| physics in today's | 0.75 | It is relevant for technological progress | 4.51 ^a | 0.69 | -1.330 | 1.350 |
| society | 0.74° | (È importante per il progresso tecnologico) | 4.56^{0} | 0.65 | -1.388 | 1.455 |
| | | It is relevant for our country's progress | 4.10- | 0.82 | -0.592 | -0.300 |
| | | (E importante per lo sviluppo del nostro paese) | 4.13° | 0.83 | -0.634 | -0.317 |
| | | (Le conoscenze e i contenuti necessari ner diventare un esperto sono tronni) | 2.76 ^b | 1.04 | 0.482 | -0.125 |
| | | It is necessary to know too much to learn it well | 2.77^{a} | 1.04 | 0.396 | -0.354 |
| | | (C'è bisogno di conoscere troppe cose per impararla bene) | 2.79^{b} | 1.07 | 0.360 | -0.479 |
| Perceived difficulty of | 0.71^{a} | It requires too many mathematical skills | 4.18^{a} | 0.77 | -0.532 | -0.509 |
| physics as a | 0.746 | (Richiede molte conoscenze e abilità matematiche) | 4.21^{b} | 0.76 | -0.536 | -0.633 |
| discipline | 0.14 | It is more demanding than other subjects | 3.84 ^a | 1.00 | -0.456 | -0.802 |
| | | (E necessario molto più impegno di quanto richiesto per altre materie) | 3.88° | 1.02 | -0.577 | -0.571 |
| | | (I contents are too abstract | 2.14 0.17b | 0.84 | 0.760 | 0.810 |
| | | (1 contenut sono troppo astratti) It is difficult to learn | $\frac{2.17}{3.04^a}$ | 0.86 | 0.774 | -0.440 |
| | | (È difficile da imparare) | 3.01^{b} | 0.99 | 0.267 | -0.477 |
| | | I find it interesting | 4.51 ^a | 0.68 | -1.220 | 0.799 |
| | | (Penso sia interessante) | 4.47^{b} | 0.76 | -1.398 | 1.698 |
| · · · · · · · · · · | 0.73^{a} | It arouses my curiosity | 4.48^{a} | 0.70 | -1.228 | 1.053 |
| Intrinsic interest in | 0.75 | (Stimola la mia curiosità) | 4.39 ^b | 0.80 | -1.211 | 0.996 |
| physics | 0.76 | I prefer it to other subjects | 3.83 ^u | 1.05 | -0.675 | -0.161 |
| | | (La preferisco alle altre materie del mio corso di studio) | 3.83° | 1.05 | -0.636 | -0.225 |
| | | (Ne come entrelieste guerde la studie) | 2610 | 0.95 | -0.381 | -0.399 |
| | | I am interested in working in a field that requires a deep knowledge | 3 94a | 1.04 | -0.335 | -0.410 |
| D | _ | (Sono interessato a svolaere un lavoro in un settore che ne richiede la conoscenza approfondita) | 3.90^{b} | 1.09 | -0.704 | -0.308 |
| Personal relevance of working in a | 0.88^{a} | I am interested in doing research | 3.71^{a} | 1.25 | -0.614 | -0.755 |
| physics-related field | 0.89^{b} | (Sono interessato a fare ricerca) | 3.59^{b} | 1.30 | -0.505 | -0.925 |
| | | I am interested in pursuing a career based on it | 4.03^{a} | 1.05 | -1.042 | 0.648 |
| | | (Sono interessato ad intraprendere una carriera legata ad essa) | 3.97 ^b | 1.07 | -0.988 | 0.422 |
| | | Relevance lies in its usefulness in solving practical problems | 3.37^{u}_{b} | 0.94 | 0.045 | -0.692 |
| | | (La sua importanza risiede nell'applicazione alla risoluzione di problemi pratici) | 3.39° | 0.97 | -0.014 | -0.692 |
| D-louis of looming | _ | (Usanda la concessora annuala, neces anigare i fanomeni natural phenomenia to people | 3.32 2.52b | 1.02 | -0.390 | -0.185 |
| neuevance of learning physics at the | 0.72^{a} | The exam questions are important because they concern daily life | 2.59^{a} | 0.97 | 0.364 | -0.069 |
| university | 0.70^{b} | (Le domande all'esame sono importanti perché riguardano problemi legati al mondo reale) | 2.58^{b} | 0.98 | 0.367 | -0.137 |
| | | What I learn in lectures affects and is relevant for daily life | 2.99^{a} | 1.04 | 0.208 | -0.573 |
| | | (Quel che studio nei corsi influenza ed è importante per le attività di tutti i giorni) | 3.01^{b} | 1.05 | 0.169 | -0.609 |
| | | What is taught in lectures can be applied to daily life | 3.26 ^a | 1.02 | 0.085 | -0.612 |
| | | (La conoscenza appresa nei corsi può essere applicata alla vita quotidiana) | 3.270 | 1.05 | 0.045 | -0.708 |
| | | They are held in high esteem in today's society | 2.59 ^a | 0.90 | 0.302 | -0.057 |
| | | (Neula società odierna sono motio stimati) They are bighly regarded in todavis society | 2.50^{-2} | 0.89 | 0.268 | -0.069 |
| | | (Nella società adierna aodono di un'altissima considerazione) | 2.01 2.76 ^b | 0.91 | 0.204 | -0.142 |
| | | They are important for the development of today's society | 4.10^{a} | 0.84 | -0.545 | -0.414 |
| | | (Sono importanti per lo sviluppo della società attuale) | 4.15^{b} | 0.83 | -0.540 | -0.697 |
| D 111 A.1 | | They can solve many of the problems of today's society | 3.41^{a} | 0.91 | 0.007 | -0.527 |
| Recognition of the | 0.65^{a} | (Possono risolvere molti problemi della società attuale) | 3.46 ^b | 0.96 | -0.039 | -0.790 |
| society | 0.66^{b} | I trust them a lot | 4.05^{a} | 0.84 | -0.536 | -0.144 |
| | | (Ho molta fiducia in loro) Our society can do without them (P) | 3.97° | 0.96 | -0.738 | 0.168 |
| | | (La nastra società nuò farma a meno) | 2 600 | 0.00 | -2.544 | 10.610 |
| | | Our society cannot trust them (R) | 3.59^{a} | 0.07 | -2.410 | 6.597 |
| | | (La nostra società non può fidarsi di loro) | 3.58^{b} | 0.82 | -2.423 | 6.094 |
| | | Their research results are always correct | 2.43^{a} | 0.93 | 0.360 | -0.138 |
| | | (Le loro ricerche producono risultati sempre corretti) | 2.43^{b} | 0.93 | 0.332 | -0.242 |
| | | Their research is bad for the environment (R) | 3.58^{a}_{b} | 0.63 | -1.894 | 5.381 |
| | | (Provocano gravi problemi all'ambiente con le loro ricerche) | 3.590 | 0.63 | -1.948 | 5.592 |
| | | They can do many jobs | 3.91- | 0.85 | -0.391 | -0.231 |
| | | Their jobs are well-paid and rewarding | 2.99^{a} | 0.93 | -0.480 | -0.423 |
| | | (La carriera è remunerativa e di alto livello) | 2.91^{b} | 0.92 | 0.219 | -0.016 |
| 1/1 /11 | 0.81a | In today's society they are in high demand | 2.98^{a} | 0.93 | 0.199 | -0.205 |
| value of the physicists' careers | 0.816 | (Nella società attuale c'è un'altissima richiesta) | 2.92^{b} | 0.93 | 0.299 | -0.224 |
| 1 | 0.01 | In today's society they can earn a lot of money | 2.60^{a} . | 0.88 | 0.301 | -0.081 |
| | | (Nella società attuale hanno la possibilità di guadagnare molto dal punto di vista economico) | 2.52^{b} | 0.88 | 0.433 | 0.137 |
| | | In today's society they have a lot of job opportunities | 3.32^{u} | 0.86 | 0.042 | -0.223 |
| | | (Neua societa attuale hanno un'ampia scelta di possibili carriere da intraprendere) Many companies are hiring them | 3.28° 3.01^{a} | 0.87 | 0.072 | -0.200 |
| | | (Nella società attuale c'è arande attenzione nel loro impiano in diverse industrio) | 2 000 | 0.97 | 0.119 | -0.421 |
| | | (neua societa attante e granae attenzione nei toro imprego in arverse industrie) | 2.99 | 0.90 | 0.097 | -0.421 |

 a Before emergency remote instruction; b After emergency remote instruction. (R) indicates reversed item.

F. Cluster analysis

In Tables VII, VIII, and IX we report the results of cluster analysis of the students' responses to SWB and *Attitude* toward physics scales, respectively. Cluster analysis was performed using the factorial scores obtained from the multiple correspondence analysis. The extracted factorial components were interpreted using the test values associated to the modalities. The modality of an item is one of the five values used in the Likert scale (e.g., more, definitely more, less,

| TABLE | VII. | Subjective | well-being - | Modalities | of the | identified | three | clusters. |
|-------|------|------------|--------------|------------|--------|------------|-------|-----------|
| | | | | | | | | |

| Cluster | Item | Modality | Modal/Class | Class/Modal | Test values |
|----------------------------|--------------|------------------------|-------------|-------------|-------------|
| | C-4:-6:-1 | Definitale land | (%) | (%) | 11.99 |
| | Eathuriantia | Definitely less | 93.43 | 64.20 | 11.20 |
| | Enthusiastic | Definitely less | 71.70 | 60.14 | 10.02 |
| | Stressed | Definitely more | 82 76 | 59.26 | 10.93 |
| | Sad | Definitely more | 87.76 | 53.09 | 10.63 |
| | Stimulated | Definitely less | 77 78 | 60.49 | 10.55 |
| | Optimistic | Definitely less | 85.71 | 51.85 | 10.00 |
| | Happy | Definitely less | 84.00 | 51.85 | 10.20 |
| | Pessimistic | Definitely more | 86.67 | 48.15 | 9.89 |
| Cluster 1 | Angry | Definitely more | 91.89 | 41.98 | 9.57 |
| Significantly damaged | Frustrated | Definitely more | 91.43 | 39.51 | 9.18 |
| (N=81, 22.4%) | Effective | Definitely less | 76.92 | 49.38 | 9.14 |
| | Disoriented | Definitely more | 79.17 | 46.91 | 9.05 |
| | Disappointed | Definitely more | 90.63 | 35.80 | 8.59 |
| | Gratified | Definitely less | 88.24 | 37.04 | 8.57 |
| | Amused | Definitely less | 71.43 | 43.21 | 7.90 |
| | Valued | Definitely less | 91.67 | 27.16 | 7.38 |
| | Supported | Definitely less | 83.33 | 30.86 | 7.32 |
| | Anxious | Definitely more | 78.79 | 32.10 | 7.15 |
| | Scared | Definitely more | 85.19 | 28.40 | 7.10 |
| | Bored | Definitely more | 54.79 | 49.38 | 6.81 |
| | Proud | Definitely less | 86.36 | 23.46 | 6.43 |
| | Inadequate | Definitely more | 94.12 | 19.75 | 6.29 |
| | Accepted | Definitely less | 72.73 | 19.75 | 5.02 |
| | Proud | More | 50.00 | 32.35 | 99.99 |
| | Secluded | Definitely less | 73.91 | 50.00 | 7.81 |
| | Effective | Definitely more | 66.67 | 52.94 | 7.72 |
| | Guilty | Definitely less | 66.67 | 52.94 | 7.72 |
| | Frustrated | Definitely less | 83.33 | 44.12 | 7.66 |
| | Angry | Definitely less | 68.18 | 44.12 | 6.97 |
| | Inadequate | Definitely less | 65.22 | 44.12 | 6.83 |
| | Energetic | Definitely more | 70.00 | 41.18 | 6.77 |
| Cluster 2 | Satisfied | Definitely more | 91.67 | 32.35 | 6.70 |
| Significantly supported | Disoriented | Definitely less | 91.67 | 32.35 | 6.70 |
| (N=24, 0, 4%) | Enthusiastic | Definitely more | 91.67 | 32.35 | 6.70 |
| (11-34, 5.470) | Pessimistic | Definitely less | 100.00 | 29.41 | 6.66 |
| | Happy | More | 47.37 | 52.94 | 6.55 |
| | Despised | Definitely less | 50.00 | 47.06 | 6.26 |
| | Valued | More | 66.67 | 35.29 | 6.03 |
| | Stimulated | Definitely more | 83.33 | 29.41 | 6.03 |
| | Gratified | More | 48.39 | 44.12 | 5.91 |
| | Optimistic | Definitely more | 90.00 | 26.47 | 5.90 |
| | Embarrassed | Definitely less | 45.45 | 44.12 | 5.73 |
| | Stimulated | More | 38.10 | 47.06 | 5.41 |
| | Happy | Definitely more | 75.00 | 26.47 | 5.39 |
| | Disappointed | Definitely less | 69.23 | 26.47 | 5.18 |
| | Amused | More | 38.89 | 41.18 | 5.03 |
| | Enthusiastic | More | 41.94 | 38.24 | 5.01 |
| | Sad | Neither less nor more | 92.27 | 72.47 | 10.83 |
| | Angry | Neither less nor more | 88.89 | 77.73 | 10.29 |
| | Frustrated | Neither less nor more | 91.89 | 68.83 | 10.17 |
| | Gratified | Neither less nor more | 87.85 | 76.11 | 9.63 |
| | Disappointed | Neither less nor more | 89.39 | 71.66 | 9.61 |
| | Inadequate | Neither less nor more | 83.53 | 86.23 | 9.39 |
| | Proud | Neither less nor more | 81.85 | 89.47 | 9.21 |
| | Pessimistic | Neither less nor more | 89.94 | 65.18 | 8.97 |
| | Happy | Neither less nor more | 91.88 | 59.51 | 8.94 |
| | Disoriented | Neither less nor more | 90.63 | 58.70 | 8.41 |
| | Guilty | Neither less nor more | 79.51 | 91.09 | 8.35 |
| | Scared | Neither less nor more | 83.48 | 11.13 | 8.07 |
| Cluster 3 | Satisfied | Neither less nor more | 91.03 | 53.44 | 7.92 |
| Not significantly affected | Enthusiastic | Neither less nor more | 90.91 | 52.63 | 7.79 |
| (N=247, 68.2%) | Optimistic | Neither less nor more | 89.17 | 30.08 | 7.68 |
| | Valued | Neither less nor more | 81.20 | 82.19 | 7.68 |
| | Amused | Neither less nor more | 84.92 | 08.42 | 7.50 |
| | Sectuded | Neither less nor more | 80.16 | 83.40 | 7.36 |
| | Effective | Neither less nor more | 90.91 | 44.53 | 6.87 |
| | Stressed | Neither less nor more | 87.42 | 00.00 | 6.76 |
| | Accepted | Neither less nor more | 76.71 | 90.69 | 6.72 |
| | Anxious | Neither less nor more | 85.98 | 57.09 | 6.66 |
| | Supported | Neither less nor more | 80.91 | 72.06 | 6.31 |
| | Stimulated | Neither less nor more | 88.28 | 45.75 | 6.24 |
| | Despised | Neither less nor more | 75.00 | 93.52 | 6.22 |
| | Respected | Neither less nor more | 75.50 | 91.09 | 6.06 |
| | weicome | iventher less nor more | 16.11 | 10.14 | 0.42 |

 \dots). The *test value* of a modality measures its distance from the centre of the factorial axis. High *test values*, in absolute value, indicate a significant contribution of the corresponding modality to the factorial axis.

We also report two indices that represent exclusivity (*Modal/Class*) and omogeneity (*Class/Modal*) of a given cluster. In particular, *Modal/Class* indicates the frequency of a modality in a given cluster over the total frequency of the same modality. For instance, in the first row of Table VII, the frequency 95.5% indicates that almost all the responses to the item *Satisfied*, characterized by the modality *definitely less*, are present in this cluster.

Class/Modal indicates the frequency of a modality with respect of all the cases in the cluster. For instance, in the

first row of Table VII the percentage 51.8% indicates that the modality *definitely less* of the item *Satisfied* is present in about half the cases of the cluster. For the sake of clarity, we only report modalities with test values corresponding to p < 0.001.

TABLE VIII. Main modalities of the three clusters identified for Attitude toward physics before emergency remote instruction.

| | Item | Modality | Modal/Class (%) | Class/Modal (%) | Test values |
|--------------------|---|-------------------|--------------------|--------------------|----------------|
| | PHYSICISTS – I trust them a lot | Completely | 73.10 | 61.99 | 8.07 |
| | PHYSICS – We need to understand it because it has important effects on our lives | Completely | 75.40 | 55.56 | 7.85 |
| | PHYSICS – Is relevant for our country's progress | Completely | 69.03 | 62.57 | 7.16 |
| | PHYSICS – I am interested in working in a field that requires a deep knowledge | Completely | 74.55 | 47.95 | 6.85 |
| | PHYSICISTS – Are important for the development of today's society | Completely | 69.85 | 55.56 | 6.64 |
| Cluster 1 | PHYSICS – I am interested in pursuing a career based on it | Completely | 70.43 | 41.31 | 5.97 |
| Cluster 1 | PHYSICS - 1 am enthusiastic when studying it | Completely | 66.04 | 51.40 48 E4 | 5.42 |
| (N = 171 47 2%) | PHYSICS - In rates - I prefer it to other subjects | Completely | 67.27 | 48.04 | 1.06 |
| (11=171, 47.270) | PHYSICS - Is relevant for technological progress | Completely | 62 50 | 43.27 | 4.50 |
| | PHYSICIST - Can do many inducemental skins | Completely | 62.00 | 55.56 | 4.30 |
| | PHYSICS – Its relevance lies in its usefulness in solving practical problems | Completely | 63 72 | 42 11 | 4.13 |
| | PHYSICISTS - I trust them a lot | To some extent | 55.95 | 59.49 | 7.99 |
| | PHYSICS – Is relevant for our country's progress | To some extent | 53.85 | 44.30 | 6.26 |
| | PHYSICS – We need to understand it because it has important effects on our lives | To some extent | 51.39 | 46.84 | 6.20 |
| | PHYSICISTS – Our society can do without them | To a small extent | 50.68 | 46.84 | 6.11 |
| | PHYSICS – I am enthusiastic when studying it | To a small extent | 74.07 | 25.32 | 5.90 |
| | PHYSICS – What is taught in lectures can be applied to daily life | To a small extent | 49.32 | 45.57 | 5.83 |
| | PHYSICS – I find it interesting | To some extent | 70.00 | 26.58 | 5.78 |
| | PHYSICS – I am interested in working in a field that requires a deep knowledge | To some extent | 46.91 | 48.10 | 5.73 |
| Cluster 2 | PHYSICS - I am interested in working in a field that requires a deep knowledge | To a small extent | 71.43 | 25.32 | 5.72 |
| Blurred discipline | PHYSICS – Is relevant for technological progress | To some extent | 73.08 | 24.05 | 5.66 |
| (N=79, 21.8%) | PHYSICISTS – Are important for the development of today's society | To some extent | 46.25 | 46.84 | 5.53 |
| (,, | PHYSICISTS – Our society cannot trust them | To a small extent | 44.32 | 49.37 | 5.46 |
| | PHYSICS – I am interested in doing research | Not at all | 76.19 | 20.25 | 5.30 |
| | PHYSICS – I am interested in pursuing a career based on it | To some extent | 46.38 | 40.51 | 5.02 |
| | PHYSICS – It arouses my curiosity | To some extent | 64.29 | 22.78 | 4.90 |
| | PHYSICIS – we need to understand it because it has important effects on our lives | To a small extent | 13.68 | 17.72 | 4.11 |
| | PHYSICISTS – Can solve many of the problems of today's society | To a small extent | 49.00 | 12.02 | 4.07 |
| | PHYSICS I profes it to other subjects | To a small extent | 60.00 | 13.92 | 4.00 |
| | PHYSICIS = T preter it to other subjects PHYSICIS = In today's sociaty have a lot of ich opportunities | To a small extent | 49.02 | 22.78 | 4.55 |
| | PHYSICS – What I learn in lectures affects and is relevant for daily life | To a small extent | 38.10 | 50.63 | 4.50 |
| | PHYSICS – I am enthusiastic when studying it | To some extent | 37.38 | 50.63 | 4.37 |
| | PHYSICS – I am interested in doing research | To a small extent | 47.17 | 31.65 | 4.35 |
| | PHYSICS – What I learn in lectures affects and is relevant for daily life | Not at all | 65.00 | 16.46 | 4.08 |
| | PHYSICS – I am interested in pursuing a career based on it | Not at all | 76.92 | 12.66 | 4.06 |
| - | PHYSICISTS – Are important for the development of today's society | Completely | 66.18 | 80.36 | 11.25 |
| | PHYSICS – We need to understand it because it has important effects on our lives | Completely | 64.54 | 81.25 | 11.08 |
| | PHYSICS – It is relevant for our country's progress | Completely | 66.67 | 76.79 | 10.85 |
| | PHYSICISTS – I trust them a lot | Completely | 65.04 | 71.43 | 9.90 |
| | PHYSICS – It is relevant for technological progress | Completely | 47.51 | 93.75 | 9.14 |
| | PHYSICS – I find it interesting | Completely | 47.06 | 92.86 | 8.84 |
| | PHYSICS – I am interested in working in a field that requires a deep knowledge | Completely | 58.82 | 71.43 | 8.78 |
| | PHYSICS – 1 am enthusiastic when studying it | Completely | 69.23 | 56.25 | 8.78 |
| Cluster 3 | PHYSICISTS – Can do many jobs | Completely | 66.67 | 57.14 | 8.50 |
| Niche discipline | PHYSICISIS – Can solve many of the problems of today's society | Completely | 88.64 | 34.82 | 8.42 |
| (N=112, 31.0%) | DUVCICS - It arouses my curiosity | Completely | 41.11 | 89.29 72.21 | 0.29 |
| | PHYSICS – I am interested in pursuing a career based on it | Completely | 54.07 | 73.21 | 8.15 |
| | ens to people | Completely | 75.00 | 40.18 | 7.64 |
| | ena to people PHVSICS – I prefer it to other subjects | Completely | 58 77 | 59.82 | 7.52 |
| | PHYSICS – What I learn in lectures affects and is relevant for daily life | Completely | 90.91 | 26.79 | 7.42 |
| | PHYSICS – What is taught in lectures can be applied to daily life | Completely | 78.00 | 34.82 | 7.30 |
| | PHYSICISTS – In today's society have a lot of job opportunities | Completely | 87.10 | 24.11 | 6.64 |
| | PHYSICS – I am interested in doing research | Completely | 53.13 | 60.71 | 6.57 |
| | PHYSICISTS – Their research is bad for the environment (R) | Not at all | 41.92 | 85.71 | 6.08 |
| | PHYSICS – Relevance lies in its usefulness in solving practical problems | Completely | 71.74 | 29.46 | 5.98 |
| | PHYSICS – I prefer it to other subjects | Completely | 51.33 | 51.79 | 5.44 |
| | PHYSICISTS – Many companies are hiring them | Completely | 83.33 | 17.86 | 5.30 |
| | PHYSICISTS – Their jobs are well-paid and rewarding | Completely | 82.61 | 16.96 | 5.09 |
| | PHYSICS – Requires too many mathematical skills | Completely | 46.43 | 58.04 | 4.91 |
| | PHYSICISTS – In today's society are in high demand | Completely | 81.82 | 16.07 | 4.88 |
| | PHYSICS – The exam questions are important because they concern daily life | Completely | 92.86 | 11.61 | 4.67 |
| | PHYSICISTS – Our society cannot trust them (R) | Not at all | 37.70 | 84.82 | 4.24 |
| | PHYSICS – It is difficult to learn | Not at all | 90.91 | 8.93 | 3.90 |
| | PHYSICISTS – Are held in high esteem in today's society | Completely | 90.91 | 8.93 | 3.90 |
| | PHYSICISTS – Are regarded very highly in today's society | Completely | 100.00 | 7.14 | 3.81 |

TABLE IX. Main modalities of the three clusters identified for Attitude toward physics after emergency remote instruction.

| | Item | Modality | Modal/Class (%) | Class/Modal | Test values |
|--|--|-------------------|--------------------|-------------|----------------|
| Cluster 1 Accepted discipline (N=180, 49.7%) | PHYSICISTS – I trust them a lot | Completely | 78.36 | 58.33 | 8.42 |
| | PHYSICS – We need to understand it because it has important effects on our lives | Completely | 73.95 | 48.89 | 6.43 |
| | PHYSICS – I am enthusiastic when studying it | Completely | 70.37 | 52.78 | 6.01 |
| | PHYSICS – Is relevant for our country's progress | Completely | 68.71 | 56.11 | 5.92 |
| | PHYSICS - I am interested in working in a field that requires a deep knowledge | Completely | 73.27 | 41.11 | 5.53 |
| | PHYSICISTS – Can do many jobs | Completely | 66.20 | 52.22 | 4.96 |
| | PHYSICS – I prefer it to other subjects | Completely | 66.10 | 43.33 | 4.25 |
| | PHYSICISTS – Can solve many of the problems of today's society | Completely | 65.57 | 44.44 | 4.21 |
| | PHYSICISTS – Are important for the development of today's society | Completely | 64.62 | 46.67 | 4.15 |
| | PHYSICS – Requires too many mathematical skills | Completely | 63.01 | 51.11 | 4.07 |
| Cluster 2 Blurred discipline (N=101, 27.9%) | PHYSICISTS – I trust them a lot | To some extent | 62.96 | 50.50 | 7.53 |
| | PHYSICS – What is taught in lectures can be applied to daily life | To a small extent | 63.64 | 48.51 | 7.41 |
| | PHYSICS - I find it interesting | To some extent | 85.29 | 28.71 | 6.00 |
| | PHYSICS - I am entrusiastic when studying it | To a small extent | 79.49 | 30.69 | 6.99 |
| | PHYSICS – is relevant for our country's progress | To some extent | 64.18 | 41.08 | 6.91 |
| | PHYSICS – We need to understand it because it has important effects on our lives | To some extent | 76.19 | 31.68 | 6.82 |
| | PHYSICISTS – Are important for the development of today's society | To some extent | 60.53 | 45.54 | 6.69 |
| | PHYSICS – What I learn in lectures affects and is relevant for daily life | To a small extent | 52.94 | 53.47 | 6.34 |
| | PHYSICS – The exam questions are important because they concern daily life | To a small extent | 45.45 | 59.41 | 5.46 |
| | PHYSICS – I am interested in working in a field that requires a deep knowledge | To some extent | 52.38 | 43.56 | 5.38 |
| | PHYSICISTS – Can solve many of the problems of today's society | To a small extent | 56.67 | 33.66 | 5.04 |
| | PHYSICS – I am interested in doing research | To a small extent | 58.18 | 31.68 | 5.02 |
| | PHYSICISTS – Can do many jobs | To a small extent | 74.07 | 19.80 | 5.01 |
| | PHYSICS - I am interested in working in a field that requires a deep knowledge | To a small extent | 70.00 | 20.79 | 4.85 |
| | PHYSICISTS – I trust them a lot | To a small extent | 83.33 | 14.85 | 4.80 |
| | PHYSICISTS – Can do many jobs | To some extent | 48.86 | 42.57 | 4.76 |
| | PHYSICS – I am interested in doing research | Not at all | 68.97 | 19.80 | 4.63 |
| | PHYSICS – I prefer it to other subjects | To some extent | 47.78 | 42.57 | 4.58 |
| | PHYSICS – Is relevant for technological progress | To some extent | 73.91 | 16.83 | 4.54 |
| | PHYSICS – We need to understand it because it has important effects on our lives | To a small extent | 78.95 | 14.85 | 4.53 |
| | PHYSICS – Is relevant for technological progress | Completely | 45.63 | 46.53 | 4.51 |
| | PHYSICS – 1 am enthusiastic when studying it | To some extent | 44.44 | 47.52 | 4.36 |
| | PHYSICISTS – Our society cannot trust them | To a small extent | 48.72 | 37.62 | 4.34 |
| | PHYSICISTS – In today's society are in high demand | To a small extent | 44.04 | 47.02 | 4.20 |
| | PHYSICISTS – In today's society have a lot of job opportunities | To a small extent | 52 73 | 28 71 | 4.11 |
| | PHYSICS - I find it interesting | Completely | 43.69 | 44.55 | 4.01 |
| | PHYSICS – We need to understand it because it has important effects on our lives | Completely | 48.03 | 90.12 | 10.16 |
| Cluster 3 Niche discipline (N=81, 22.4%) | PHYSICS – It is relevant for our country's progress | Completely | 50.00 | 85.19 | 9.85 |
| | PHYSICISTS-I trust them a lot | Completely | 52.03 | 79.01 | 9.45 |
| | PHYSICS – I am enthusiastic when studying it | Completely | 64.86 | 59.26 | 9.01 |
| | PHYSICISTS Are important for the development of today's society | Completely | 45.58 | 82.72 | 8.73 |
| | PHYSICS – What I learn in lectures affects and is relevant for daily life | Completely | 88.24 | 37.04 | 8.57 |
| | PHYSICS – I am interested in working in a field that requires a deep knowledge | Completely | 46.72 | 79.01 | 8.53 |
| | PHYSICISTS – Can solve many of the problems of today's society | Completely | 70.91 | 48.15 | 8.42 |
| | PHYSICS – What is taught in lectures can be applied to daily life | Completely | 71.15 | 45.68 | 8.16 |
| | PHYSICS – I find it interesting | Completely | 35.32 | 95.06 | 7.88 |
| | PHYSICS – I am interested in pursuing a career based on it | Completely | 43.97 | 76.54 | 7.73 |
| | PHYSICISTS – Can do many jobs | Completely | 49.51 | 62.96 | 7.38 |
| | PHYSICS – Using the knowledge learned at university, I can explain natural phenom- | | | | |
| | ena to people | Completely | 60.32 | 46.91 | 7.20 |
| | PHYSICS – I prefer it to other subjects | Completely | 46.09 | 65.43 | 7.05 |
| | PHYSICS – It is relevant for technological progress | Completely | 32.62 | 93.83 | 6.76 |
| | PHYSICS – It arouses my curiosity | Completely | 34.65 | 86.42 | 6.48 |
| | DUVCICE The rest constitution of the rest because the second daily life | Completely | 100.00 | 28.40 | 6.10 |
| | PHISICS - The exam questions are important because they concern daily me | Completely | 42.15 | 62.06 | 6.19 |
| | PHYSICISTS - In today's society are in high demand | Completely | 42.15 | 20.99 | 5.70 |
| | PHYSICISTS - Their research is had for the environment (B) | Not at all | 30.90 | 20.35 | 5 44 |
| | PHYSICS – Belevance lies in its usefulness in solving practical problems | Completely | 54 00 | 33.33 | 5.18 |
| | PHYSICS – It is more demanding than other subjects | Completely | 39.17 | 58.02 | 5,14 |
| | PHYSICISTS – Their jobs are well-paid and rewarding | Completely | 75.00 | 18.52 | 4.96 |
| | PHYSICS – It is difficult to learn | Not at all | 90.00 | 11.11 | 4.31 |
| | PHYSICS – It is necessary to know too much to learn it well | Not at all | 59.26 | 19.75 | 4.15 |
| | PHYSICS – Contents are too abstract | Not at all | 42.25 | 37.04 | 4.12 |
| | PHYSICS – Requires too many mathematical skills | Completely | 33.56 | 61.73 | 4.12 |
| - | | | | | |