# *Supplementary Material*

**The Relation between Teachers’ Emphasis on the Development of Students’ Digital Information and Communication Skills and Computer Self-Efficacy: The Moderating Roles of Age and Gender**

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1. **Item wordings and labels of the TEDDICS and CSE scales**

A1) Teachers’ emphasis on developing students’ digital information and communication skills (TEDDICS) scale (Jung & Carstens, 2015, 140; Norwegian adaption)

|  |  |
| --- | --- |
| *Item Wording* | *Label* |
| *In your teaching of the reference class in this school year how much emphasis have you given to developing the following ICT-based capabilities in your students?*  *(0 = No emphasis, 1 = Little emphasis, 2 = Some emphasis, 3 = Strong emphasis)* | |
| **Accessing digital information** |  |
| Accessing digital information efficiently | IT1G12A |
| Exploring a range of digital resources while searching for information | IT1G12J |
| Providing references for digital information sources | IT1G12K |
| **Evaluating digital information** |  |
| Evaluating the relevance of digital information | IT1G12B |
| Evaluating the credibility of digital information | IT1G12D |
| Validating the accuracy of digital information | IT1G12E |
| Evaluating own strategies of digital information search | IT1G12H |
| **Sharing and communicating digital information** |  |
| Displaying digital information for a given audience and a specific purpose | IT1G12C |
| Sharing digital information with others | IT1G12F |
| Using computer software to make digital products (for presentations, documents, pictures, and diagrams) | IT1G12G |
| Providing digital feedback on the work of others | IT1G12I |
| Understanding the consequences of making digital information available for everyone on the internet | IT1G12L |

A2) Teachers’ computer self-efficacy (CSE) scale (Jung & Carstens, 2015, 135; Norwegian adaption)

|  |  |
| --- | --- |
| *Item Wording* | *Label* |
| *How well can you do the following tasks on a computer by yourself?*  *(0 = I do not think I can do this, 1 = I could work out how to do this, 2 = I know how to do this)* | |
| **Self-efficacy in basic operational skills** |  |
| Producing a letter using a word-processing program | IT1G07A |
| E-mailing a file as an attachment | IT1G07B |
| Storing your digital photos on a computer | IT1G07C |
| Filing digital documents in folders and sub-folders | IT1G07D |
| Producing presentations with simple animation functions (e.g. [Microsoft PowerPoint®]), | IT1G07H |
| Using the Internet for online purchases and payments | IT1G07I |
| **Self-efficacy in advanced operational and collaborative skills** |  |
| Using a spreadsheet program (e.g. [CALC, Microsoft Excel®]) for analysing data | IT1G07F |
| Contributing to a discussion forum/user group on the Internet (e.g. a wiki or a blog) | IT1G07G |
| Collaborating with others using shared resources such as [Google Docs®] | IT1G07M |
| Installing software | IT1G07N |
| **Self-efficacy in using computers for instructional purposes** |  |
| Using a spreadsheet program (e.g. [CALC, Microsoft Excel®]) for keeping records (e.g., student data) | IT1G07E |
| Preparing lessons that involve students’ use of ICT | IT1G07J |
| Finding useful teaching resources on the Internet | IT1G07K |
| Assessing student learning | IT1G07L |

1. **M*plus* sample code of the measurement and moderation models**

B1) Measurement invariance testing of the correlated-traits CFA model describing teachers’ computer self-efficacy across gender

TITLE: Measurement invariance testing of CSE across gender

DATA: FILE IS icils2013nor.dat;

VARIABLE: NAMES ARE IDTEACH IDSCHOOL TEACHWT IT1G07A IT1G07B

IT1G07C IT1G07D IT1G07E IT1G07F IT1G07G IT1G07H

IT1G07I IT1G07J IT1G07K IT1G07M IT1G07N IT1G12A

IT1G12B IT1G12C IT1G12D IT1G12E IT1G12F IT1G12G

IT1G12H IT1G12I IT1G12J IT1G12K IT1G12L AGE GENDER;

! Item labeling:

! IT1G07A-N: Computer self-efficacy

! IT1G12A-L: TEDDICS

USEVARIABLES ARE IT1G07A-IT1G07N;

CATEGORICAL ARE IT1G07A-IT1G07N;

CLUSTER = IDSCHOOL;

! School ID as the cluster variable to adjust

! standard errors and chi-square statistics

IDVARIABLE = IDTEACH;

! Specify teacher IDs

WEIGHT = TEACHWT;

! Total weights to account for sampling bias

MISSING ARE ALL(-99);

! Missing values are specified as -99

GROUPING IS GENDER (1=Female 0=Male);

! Specify the grouping variable

ANALYSIS: TYPE = COMPLEX;

ESTIMATOR = WLSMV;

PARAMETERIZATION = THETA;

! WLSMV estimator for categorical data with less

! than 4 response categories

MODEL = CONFIGURAL METRIC SCALAR;

! Model different invariance assumptions

MODEL:

! Measurement model of CSE

! Self-efficacy in basic operational skills

s1 BY

IT1G07A

IT1G07B

IT1G07C

IT1G07D

IT1G07H

IT1G07I;

! Self-efficacy in advanced operational and

! collaboration skills

s2 BY

IT1G07F

IT1G07G

IT1G07M

IT1G07N;

! Self-efficacy in using computers for instructional

! purposes

s3 BY

IT1G07E

IT1G07J

IT1G07K

IT1G07L;

OUTPUT: stdyx;

B2) Model describing the age moderation of the relation between TEDDICS (Accessing digital information) and CSE (Basic operational ICT skills)

TITLE: Age moderation model

DATA: FILE IS icils2013nor.dat;

VARIABLE: NAMES ARE IDTEACH IDSCHOOL TEACHWT IT1G07A IT1G07B

IT1G07C IT1G07D IT1G07E IT1G07F IT1G07G IT1G07H

IT1G07I IT1G07J IT1G07K IT1G07M IT1G07N IT1G12A

IT1G12B IT1G12C IT1G12D IT1G12E IT1G12F IT1G12G

IT1G12H IT1G12I IT1G12J IT1G12K IT1G12L AGE GENDER;

! Item labeling:

! IT1G07A-N: Computer self-efficacy

! IT1G12A-L: TEDDICS

USEVARIABLES ARE IT1G07A IT1G07B IT1G07C IT1G07D IT1G07H IT1G07I IT1G12A IT1G12J IT1G12K ZAGE;

CATEGORICAL ARE IT1G07A IT1G07B IT1G07C IT1G07D IT1G07H IT1G07I IT1G12A IT1G12J IT1G12K;

CLUSTER = IDSCHOOL;

! School ID as the cluster variable to adjust

! standard errors and chi-square statistics

IDVARIABLE = IDTEACH;

! Specify teacher IDs

WEIGHT = TEACHWT;

! Total weights to account for sampling bias

MISSING ARE ALL(-99);

! Missing values are specified as -99

ANALYSIS: TYPE = COMPLEX;

ESTIMATOR = MLR;

PROCESSORS = 4;

TYPE = RANDOM;

INTEGRATION = MONTECARLO(500);

! This option is necessary to specify the interaction

! between a latent variable and a manifest variable.

! Montecarlo integration with 500 integration points

MODEL: ! Measurement model of the TEDDICS scale

! Accessing digital information

e1 BY

IT1G12A

IT1G12J

IT1G12K;

! Measurement model of the CSE scale

! Self-efficacy in basic operational ICT skills

s1 BY

IT1G07A

IT1G07B

IT1G07C

IT1G07D

IT1G07H

IT1G07I;

! Define the interaction term

INTER | s1 XWITH ZAGE;

! Regression model to test for moderation

e1 ON s1 ZAGE INTER;

OUTPUT: cinterval;

1. **Additional results**

C1) Results of the Wald χ2 test for disentangling gender differences among factor correlations

|  |  |  |  |
| --- | --- | --- | --- |
|  | *TEDDICS factors* | | |
| *Constructs*  Wald χ2 test | *Accessing digital information* | *Evaluating digital information* | *Sharing & communicating digital information* |
| CSE: Basic operational skills | χ2 (1) = 0.21, *p* = .65 | χ2 (1) = 0.04, *p* = .85 | χ2 (1) = 0.27, *p* = .61 |
| CSE: Advanced operational and collaboration skills | χ2 (1) = 3.58, *p* = .06 | χ2 (1) = 1.47, *p* = .23 | χ2 (1) = 0.02, *p* = .89 |
| CSE: Instructional purposes | χ2 (1) = 2.82, *p* = .09 | χ2 (1) = 0.28, *p* = .60 | χ2 (1) = 6.03, *p* = .01 |

*Note.* CSE = Computer self-efficacy.

C2) Information criteria of the regression models testing the moderation effects of teachers’ age on the relation between TEDDICS and CSE (see Table 5)

|  |  |  |  |
| --- | --- | --- | --- |
|  | *TEDDICS factors (dependent variables)* | | |
| *Predictors*  *Information criteria* | *Accessing digital information* | *Evaluating digital information* | *Sharing & communicating digital information* |
| Age, CSE: Basic operational skills, and Age × CSE | AIC = 9455, BIC = 9619 | AIC = 10266, BIC = 10450 | AIC = 14187, BIC = 14391 |
| Age, CSE: Advanced operational and collaboration skills, and Age × CSE | AIC = 13964, BIC = 14098 | AIC = 14817, BIC = 14971 | AIC = 18712, BIC = 18886 |
| Age, CSE: Instructional purposes, and Age × CSE | AIC = 9720, BIC = 9854 | AIC = 10533, BIC = 10687 | AIC = 14463, BIC = 14637 |

*Note.* AIC = Akaike’s Information Criterion, BIC = Bayesian Information Criterion.

C3) Information criteria of the regression models testing the moderation effects of teachers’ age and gender on the relation between TEDDICS and CSE (see Table 6)

|  |  |  |  |
| --- | --- | --- | --- |
|  | *TEDDICS factors (dependent variables)* | | |
| *Predictors*  *Information criteria* | *Accessing digital information* | *Evaluating digital information* | *Sharing & communicating digital information* |
| Age, Gender, CSE: Basic operational skills, and their interactions | AIC = 9457, BIC = 9641 | AIC = 11110, BIC = 11314 | AIC = 14226, BIC = 14449 |
| Age, Gender, CSE: Advanced operational and collaboration skills, and their interactions | AIC = 13950, BIC = 14104 | AIC = 14805, BIC = 14979 | AIC = 18710, BIC = 18904 |
| Age, Gender, CSE: Instructional purposes, and their interactions | AIC = 9726, BIC = 9880 | AIC = 10546, BIC = 10720 | AIC = 14464, BIC = 14658 |

*Note.* AIC = Akaike’s Information Criterion, BIC = Bayesian Information Criterion.

1. **References**

Jung, M., & Carstens, R. (Eds.). (2015). *ICILS 2013 user guide for the international database*. Amsterdam: IEA. doi:10.15478/uuid:73a9f018-7b64-4299-affc-dc33fe57f3e1