Measuring the Development of ICT Skills for Personalized Learning

Authors

Measuring the Development of ICT Skills for Personalized Learning: Developing an Instrument for Dutch Primary Education

Kevin Ackermans[1], Marjoke Bakker[2], Pierre Gorissen[2], Gino Camp[1], Anne-Marieke van Loon[2], Marijke Kral[2].

[1]Open University of the Netherlands
[2]HAN University of Applied Sciences

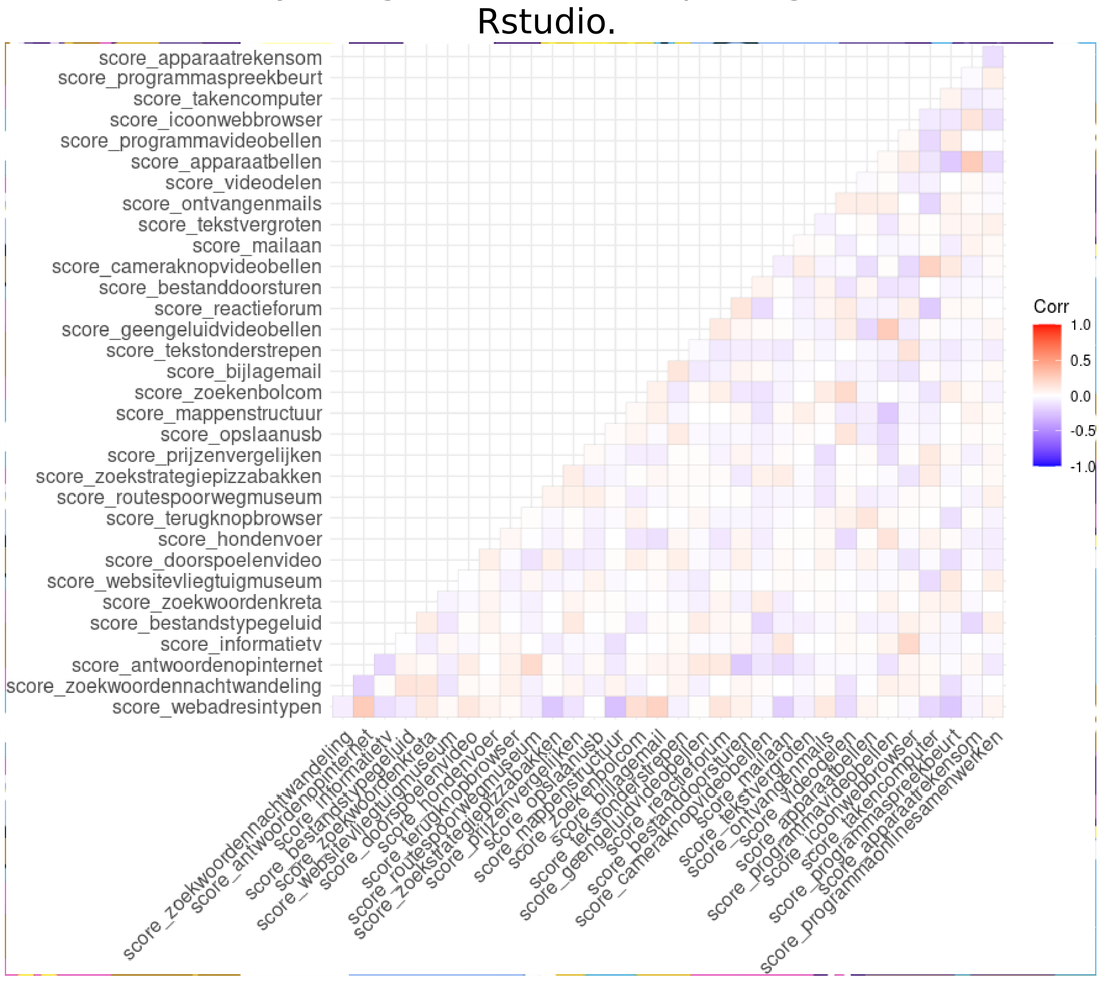
Research problem

Our study investigates the development and validation of a questionnaire for competencies learners need to learn in a personalized way using ICT.

Background: 9 Dutch schools for primary education collaborate to make personalized learning with ICT evidence-informed. At these nine iXperium schools, multidisciplinary design teams (consisting of primary school teachers and principals, teachers and students of the teacher-training program of a Dutch university of applied science, researchers from a Dutch university, and external ICT experts) design and research integrated interventions for PL with ICT. However, we had no way of measuring if ICT competences related to PL benefit from our interventions

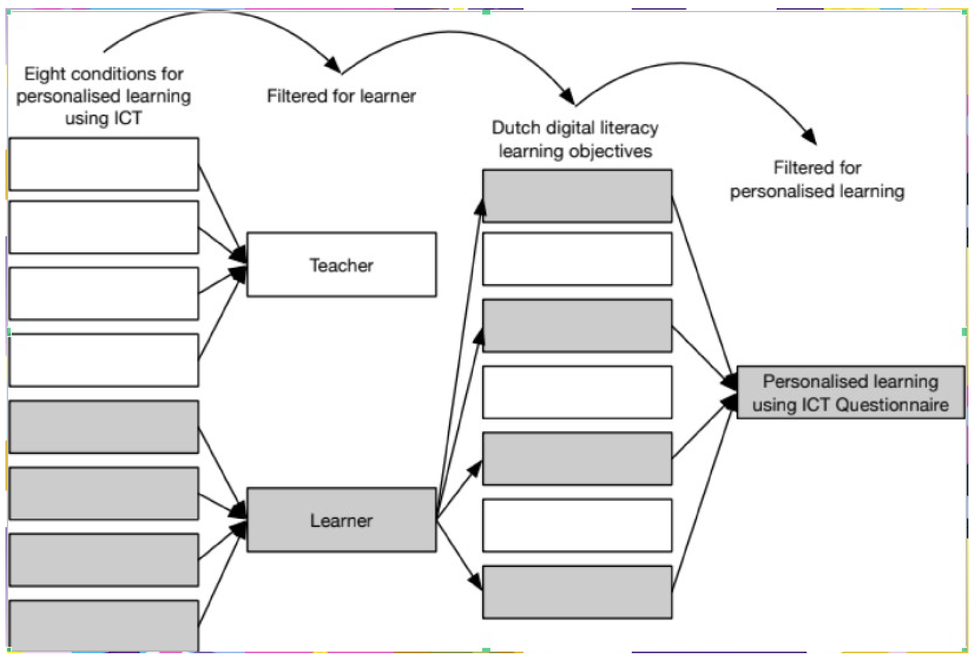
Analysis

Al scores on the questionnaire have been coded as ordered catagorical values 0 (wrong answer) or 1 (right answer) in SPSS version. The questionnaire scores are analyzed with a confirmatory factor analysis (CFA) using the “lavaan” package (version 0.6-8) in Rstudio (version 1.4.1717). We ran the CFA using the diagonally weighed least squared estimator because our values are categorical (0,1). One question showed a high variance and a high covariance with other questions (search on bol.com) and was omitted from all three clusterings. The CFA output from Lavaan is then used to calculate reliability using the “semtools” package (version 0.5-4) in Rstudio.



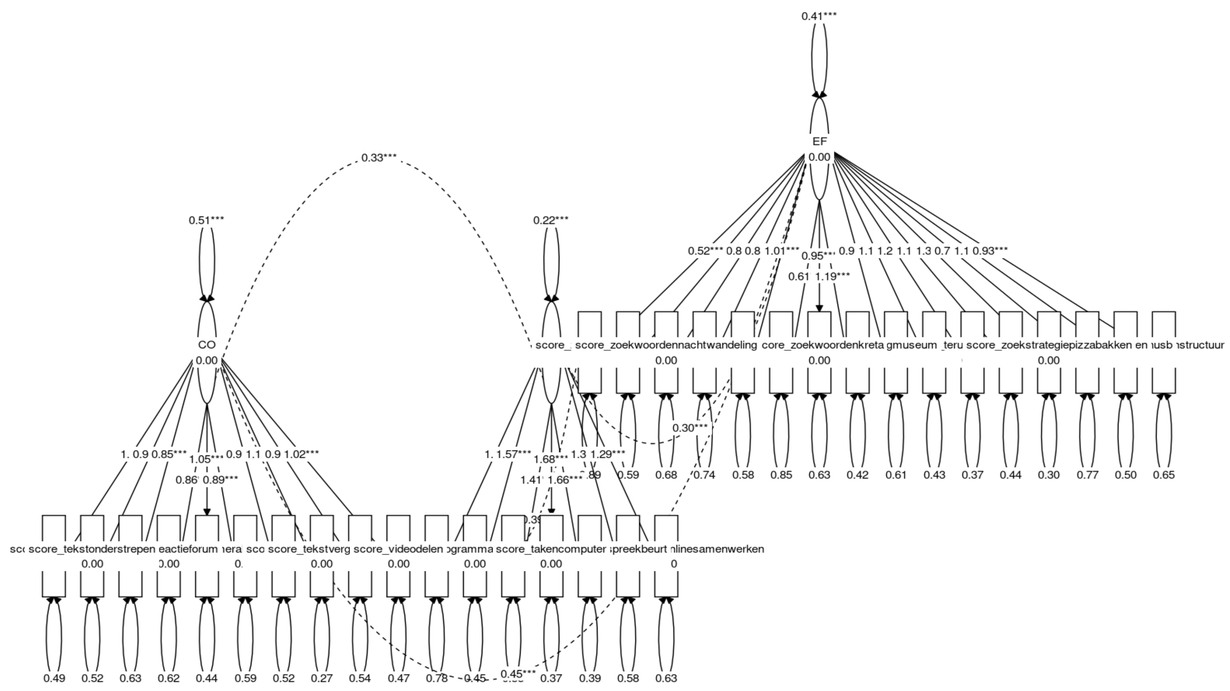
Method

We defined personalized learning conditions before filtering the twenty-four learning objectives needed to measure development in personalized learning using ICT. The final questionnaire consists of thirty-three questions to cover the learning objectives. The validity and reliability of our questionary are analyzed multiple steps. Cognitive validity is reported based on a pilot with three iterative rounds of interviews (*n*=25). Confirmatory factor analysis, coefficient Alpha and Omega (5) are reported after the first run of the questionnaire (*n*=800), and a test-retest alpha is reported after the second run of the questionnaire (*n*=800).



Cluster fit

Clustering 1 (*effective use of ICT*, *collaborative use of ICT* and *creative use of ICT*) resulted in a very close fit. The Comparative Fit Index and Tucker Lewis Index **(CFI, TLI) scored 0.991**. The Root Mean Square Error of Approximation (**RMSEA) scored 0.015**. Hu and Bentler (1999) suggested that an RMSEA smaller than .06 and a CFI and TLI larger than .95 indicate relatively good model–data fit in general. Chi square indicates a good fit at 0.01, as greater than 2 indicates poor fit (Byrne,1989). **SRMR** is a goodness of fit measure used to avoid misspecification and **scored 0.75**. A SRMR score below 0.08 is considered a good fit (Henseler et al. 2014). Clustering 2 scored worse compared to clustering 1on the goodness of fit value SRMR (0.141) and does not qualify to be a good fit as it is above 0.1 (Henseler et al. 2014). Clustering 3 did not meet the requirements of having a positive definite covariance matrix of latent variables and did not return reliable results in Lavaan.



Composite cluster-reliability

Using alpha to determine the reliability of our clusters shows a good (**>0.9**, effective and collaborative use of ICT) to best (**0.84**, creative use of ICT) score. Coefficient omega scores range from **0.63** (creative use of ICT) to **.8** (effective and collaborative use of ICT). This means that between 63% and 81% of the total score variance is can be explained from these clusters.

Reliability results in coefficient alpha and coefficient omega.

	Effective use of ICT	Collaborative use of ICT	Creactive use of ICT
alpha	0.9089847	0.9017492	0.8413378
omega	0.8125980	0.7961479	0.6325452
omega2	0.8125980	0.7961479	0.6325452
omega3	0.8184511	0.8014423	0.6498158
evar	0.4100301	0.4909205	0.4662705

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