AUTHOR	Kalle Konttinen
TITLE	A self-efficacy scale for measuring student progress in translation company simulations
YEAR	2021
DOI	10.1556/084.2021.00004
VERSION	Author's accepted manuscript
CITATION	Konttinen, Kalle. " A self-efficacy scale for measuring student progress in translation company simulations", Across Languages and Cultures 22, 1 (2021): 64-81, accessed Sep 20, 2021, https://doi.org/10.1556/084.2021.00004

A SELF-EFFICACY SCALE FOR MEASURING STUDENT PROGRESS IN TRANSLATION COMPANY SIMULATIONS

Kalle Konttinen

School of Languages and Translation Studies,

University of Turku, FI-20014 Turun yliopisto, Finland

Phone: +358 29 450 5000

E-mail: kalle.konttinen@utu.fi

Abstract: Applying factor analysis on survey data, this paper develops a concise scale of translation service provision self-efficacy aimed for diagnosing learning needs and assessing progress in pedagogical translation company simulations. First, a model of translation service provision activities based on the translation service provision standard ISO 17100 and a business process model of translation service is constructed and operationalized as a draft scale. The draft scale is then tested in an international survey (n = 380) conducted in connection with translation company simulation courses in university-level translator education. Exploratory factor analysis is used to identify dimensions and adequate items for a concise scale that comprises two four-item subscales: a project management self-efficacy subscale and a translation-production self-efficacy subscale. The scale is validated through confirmatory factor analysis. It is expected to be useful as a light-weight measurement instrument for frequent testing or as a compact part of more extensive scales.

Keywords: translation service provision, self-efficacy, translation company simulation, student progress measurement

1. INTRODUCTION

Simulation of working life tasks and collaboration in teams are pedagogical methods to bridge the gap between competences developed in translator education and the skills requirements in professional translation service provision. Changes in the translation market, characterized by Dunne (2012) as industrialization of translation, create incentives to widen the scope of translator education to include a variety of translation-related tasks like project management and quality assurance (Biel 2011). Collaborative translation company simulations (see, for example, van Egdom et al. 2020; Konttinen et al. 2017) where students set up and run their own translation companies have emerged as a promising method for preparing translation students for successful careers in the translation industry.

Along with their advantages, translation company simulations present challenges for monitoring and assessing the learning process. Robinson et al. (2016:338) suggest that "[i]t is no longer sufficient to assess the product alone even though the challenge of assessing the process is much more demanding since our attention as assessors needs to focus on far less tangible factors". Also, pausing the simulation for classroom assessment would disrupt the flow and illusion of running a 'real-life' translation company, and collaborative tasks cannot be readily split between individuals for assessment as the essence of collaboration lies in the interchange. Thus, alternative non-intrusive methods for measuring progress are needed. One viable avenue is provided by surveys based on the construct of self-efficacy (Bandura 1977:3). When concise enough, such surveys can be administered as part of the day-to-day activities of a student translation company. Besides brevity, a fundamental requirement for self-efficacy questionnaires is that they represent critical dimensions in the skill set needed for translation service provision.

The present study develops a concise scale for measuring self-efficacy in translation service provision. While self-efficacy can be seen as a predictor of performance, the focus here is on scale design, and connections between self-efficacy and performance are not explored. Within translation studies, self-efficacy scales have been designed for interpreting by Lee (2014) and for translation by Bolaños-Medina and Núñez (2018). While there are similarities in the methods used for scale development between the present study and the previous ones, the scope of the present scale is broader as it covers a wide range of translation service provision tasks. Also, the planned number of items is smaller as the aim is to design a light-weight measuring tool.

Section 2 discusses the self-efficacy construct and reviews relevant work on self-efficacy scales within translation studies. Section 3 constructs a model of translation service provision and operationalizes it into questionnaire items. Section 4 introduces the methods, exploratory and confirmatory factor analysis, and the data. Section 5 presents the results, and Section 6 concludes with a summary of the results.

2. SELF-EFFICACY

2.1. The Self-Efficacy Concept

Self-efficacy refers to "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura 1997:3). Bandura's Social Cognitive Theory (Bandura 1977, 1997) presents self-efficacy as a central mechanism in human agency

and self-regulation and maintains that expectations of personal efficacy influence a person's decisions on whether to commit themselves to an activity, the level of effort they spend, and their persistence in the face of adversity.

While it is an ingredient in all the core features of personal agency – intentionality, forethought, self-reactiveness, and self-reflectiveness – self-efficacy is especially closely associated with self-reflectiveness, "[t]he metacognitive capability to reflect upon oneself and the adequacy of one's thoughts and actions" (Bandura 2001:10). As a product of self-reflection, self-efficacy entails two components: first, a self-reflective belief in one's capability to perform a task, and second, the object of that belief, the actual capability. Importantly, self-efficacy beliefs are judgments of what one's capability can bring about in the face of specific opportunities and constraints (Bandura 2001:3).

The capabilities that can become objects of self-efficacy beliefs include regulating one's motivation, thought processes, performance level and emotional states, or altering environmental conditions (Bandura 2006:311). For the present purpose of studying self-efficacy within translator education, self-efficacy is understood to refer to a person's belief in their ability to carry out specialist tasks in the domain of translation service provision. Thus, self-efficacy is here conceptualized as a person's subjective beliefs about their translation service provision competence. It will be apparent that assessments of self-efficacy cannot substitute external assessments of a person's competence. However, as self-efficacy beliefs are informed by diverse internal factors not immediately accessible to external assessment, it is precisely the subjective quality of the self-efficacy construct that renders it a valuable complement to the concept of competence.

2.2. Previous Work on Self-Efficacy Scales in Translation Studies

The construct of self-efficacy has been widely used for studies in education, sports, and health, but it is only in the past ten years that it has received extensive attention within translation studies. A similar concept has, however, been used in translation studies under the term self-confidence (for discussions of self-efficacy and self-confidence, see Bolaños-Medina 2014; Haro-Soler 2017). Bolaños-Medina and Núñez (2018) provide a critical analysis of previous efforts to construct domain-specific self-efficacy scales. For brevity, the present discussion of self-efficacy in translation studies is limited to the development of self-efficacy scales using exploratory or confirmatory factor analysis.

Lee (2014) constructs and validates a domain-specific self-reporting scale for measuring interpreting self-efficacy (ISE). Employing analysis of internal consistency reliability and exploratory factor analysis on a sample of survey responses by 413 undergraduate students majoring in consecutive interpreting, a preliminary scale of 61 items was refined into 21 items. Three self-efficacy subscales were identified: self-confidence, self-regulatory efficacy, and preference for task difficulty. The construct validity of the ISE scale was examined using correlations between the subscales in the ISE and the subscales in the Academic Self-Efficacy (ASE) scale by Kim and Park (2001).

Interestingly, Lee (2014:188) states that the "ASE scale served as a 'skeleton' (factor structure) for the […] ISE scale", thus already creating expectations as to which underlying dimensions would be detected in the exploratory factor analysis. This contrasts with the approach in the present study, where domain-specific tasks are used as item topics without assuming an underlying factor structure based on general self-efficacy.

Bolaños-Medina and Núñez (2018) use the standard step-by-step procedure presented in Bandura (2006) to develop a domain-specific scale for translators' self-efficacy. They employ exploratory and confirmatory factor analysis and correlation analysis on the results of a survey with undergraduate students (n = 74) and present a scale with a five-factor structure consisting of the factors communicative and pragmatic competence, self-evaluation and learning, problem-solving, client-related issues, and strategic competence. One of the strengths of the study lies in the thorough documentation of the steps used for developing the scale. One of the weaknesses of the study may be the small number of responses in relation to the large number of draft scale items (52) analysed in the exploratory factor analysis before refining the scale into a 20-item instrument.

In another study, Núñez and Bolaños-Medina (2018) use the problem-solving subscale developed in Bolaños-Medina and Núñez (2018) to study the connections between competence, intrinsic motivation towards accomplishment, and self-perceived problem-solving efficacy. In their conclusion, they point to a critical challenge in constructing domain-specific self-efficacy scales: While mimicking the structure of a general self-efficacy scale can provide a starting point for designing a domain-specific instrument, crucial information may be lost if the items are not adequately designed to measure domain-specific aspects. If self-efficacy is conceptualized as a phenomenon linked to specific capabilities required for a task, it may be more useful to start scale development by defining the tasks. The present study opts for this latter route.

3. A MODEL OF TRANSLATION SERVICE PROVISION

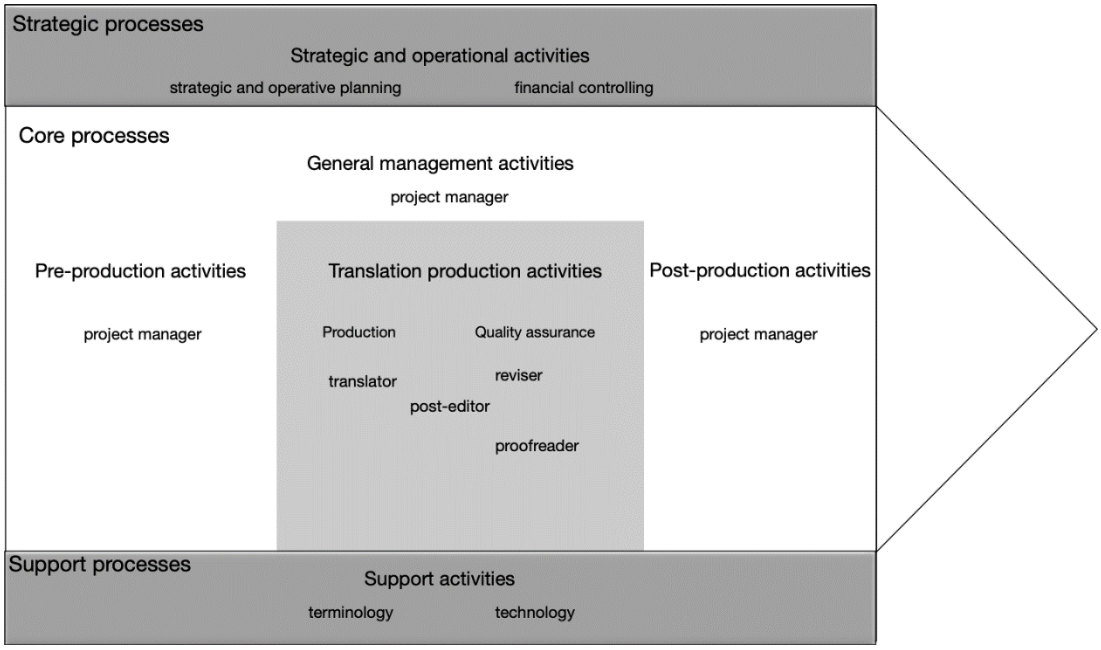
According to Bandura (1997:43), the design of a self-efficacy scale needs to "draw on conceptual analysis and expert knowledge of what it takes to succeed in a given pursuit". For this purpose, a model of translation service provision was constructed to furnish topics for questionnaire items and to supply categories for understanding the relationships between the items.

The process model of translation service provision laid out in the standard Translation Services – Requirements for translation services (ISO 17100 2015) was chosen as the primary source as it has the status of a translation industry consensus model. As many business processes that are relevant for pedagogical translation company simulations, for example, general management activities and financial controlling, are not covered by the ISO 17100, the workflow model was supplemented by Hofmann's (2012) business process model of translation service provision. Hofmann's model divides business processes into three main groups: strategic processes, core translation processes, and support processes. As for the strategy processes, they include strategic and operative planning as well as financial controlling. The core processes comprise translation production and sales, and interestingly, also innovation, the development of new services and production processes. Finally, the support processes consist of quality assurance, terminology, finances, content management, technology, and human resources management.

The business process model describes a set of cyclical processes in the production system of a translating organization. The workflow model of the ISO 17100, again, represents the translation process as a series of linear production steps. The standard also includes definitions of the principal task roles in the translation service provision process: client, translator, reviser, reviewer, proofreader, and project manager.

Figure 1

A model of translation service provision



The model of translation service provision (Figure 1) is an abstract representation of the production system, the production process, and the operating agents. As such, it is a conglomerate of three distinct perspectives: a functional representation of the translating organization as a system, a linear representation of the activities in the workflow of a translation project, and a task-role based representation of the agents in the translation service provision process.

The model consists of three vertical layers that represent the systemic categories of strategic and operational processes, core processes, and support processes. The layer of strategic processes includes strategic and operative planning, and financial controlling. The layer of core processes is divided horizontally into the three sequential stages of pre-production activities, translation production activities, and post-production activities, supplemented with a general category that comprises activities taking place during all three stages. The arrow-formed shape of the core processes signifies the linearity of translation processes, as opposed to the cyclical nature of strategic and support processes.

The activity post-editing that is increasingly central also in translator education (Konttinen et al. 2021), represented in Figure 1 by the role of post-editor, is included as a translation production activity, in spite of its current absence from the ISO 17100 production model. Its placement in the middle of production and quality assurance activities signifies the dual character of post-editing as a production step, akin to translation, and as a quality assurance step, akin to revision and proofreading. In distinction to Hofmann's model but in accordance with the ISO 17100, quality assurance is conceptualized as part of the production

process, not as a support process. It should be noted that the model is selective in that it includes activities that are likely to require extensive training and pedagogical support. Thus, for example, the quality assurance step final verification, where technical checks are carried out before sending the files to the client is not included in the model. Review is not included in the present model as it was expected to be mainly sourced externally due to its nature as a task for a subject field specialist. The layer of support processes consists of terminology tasks and technology-related tasks, the two support activities in Hofmann's model considered to be most closely associated with translation provision. Finally, five principal task roles – project manager, translator, reviser, post-editor, and proofreader – are placed in the layer of core activities to represent both the roles and their tasks.

4. METHODS AND DATA

Hinkin (1998:106) outlines steps for developing a scale for measuring abstract constructs: 1) item generation, 2) questionnaire administration, 3) initial item reduction, 4) confirmatory factor analysis, 5) convergent/discriminatory validity, and 6) replication. In the present study, the first four steps are carried out. They establish content validity and internal consistency reliability of the scale, as well as "a certain degree of construct validity" (Hinkin 1998:115). Exploratory factor analysis (EFA) informs item reduction and confirmatory factor analysis (CFA) tests the validity of the construct. In factor analysis, correlations among observed variables (for example, the respondents' scores on the survey items) are used to identify underlying factors expected to influence the behaviour of the variables.

4.1. Item Generation and the Response Scale

For the preliminary scale (Table 1), 27 items considered relevant for pedagogical translation company simulations were generated based on the categories and activities in the model of translation service provision. To ensure face validity, "the sense that every question on a survey is related to the construct of interest" (Mellinger and Hanson 2017: 29), some adjustments and additions were made based on the expertise of a group of translation teachers and scholars who organize pedagogical translation company simulations in the International Network of Simulated Translation Bureaus (INSTB; see below).

The item codes in Table 1 refer to the categories in the model of translation service provision self-efficacy (Figure 1). Thus, the codes with STRATOP refer to strategic and operational activities, those with CORGEN to general project management activities,

CORPRE to core pre-production activities, CORPRO to core production activities, CORPOS to core post-production activities, and finally, SUPPOR to support activities. For brevity, only the item codes and short task descriptions are used to identify the items.

The items are positively worded short statements of the respondent's own ability to carry out a specific task. As the scale was designed to be used in international surveys, the items were formulated in English, one of the working languages in all INSTB translation company simulations. Domain-specific terminology of translation service provision was used as the scale is aimed for a population with some degree of familiarity with the domain.

Table 1

Items in the preliminary scale

Code	Item
STRATOP1	I would be able to set up a translation organization (e.g., a translation company/department).
STRATOP2	I am able to lead a translation organization (e.g., a translation company/department).
CORGEN1	I am able to work as a project manager in translation projects.
CORGEN2	I am able to carry out the various tasks that need to be dealt with when managing translation projects.
CORGEN3	I am able to monitor a project and track its evolution.
CORGEN4	I am able to manage a translation project so that it will be finished on time.
CORGEN5	I am able to communicate in a clear manner with other members of my translation organization.
CORPRE1	I am able to communicate in a professional manner with clients (e.g., to answer a request for a quote).
CORPRE2	I can analyse any type of (translation-related) project.
CORPRE3	I am able to verify the information on the purchase orders I receive.
CORPRE4	I can assess the risks of a translation project.
CORPRE5	I am able to assess the workload of a translation project and to schedule the project.
CORPRE6	I know how to calculate the gross margin of a project.
CORPRE7	I am able to set the price for a translation project.
CORPRO1	I am able to work as a translator in a translation project.
CORPRO2	I am able to work as a post-editor in a translation project.
CORPRO3	I am able to revise translations in a translation project.
CORPRO4	I am able to work as a proofreader in a translation project.
CORPRO5	I am able to assess the quality of a translated text.
CORPOS1	I am able to take care of the billing of a translation project.
CORPOS2	I am able to keep account of the receivables and payables of a translation company.
CORPOS3	I know how to handle customer feedback.
CORPOS4	I can take care of project archiving.
SUPPOR1	I am able to work as a terminologist in a translation project.
SUPPOR2	I am able to work with a translation management system.
SUPPOR3	I am able to work with a computer-assisted translation tool (e.g., SDL Trados, Memsource).

SUPPOR4	I am able to work as IT support in a translation project.

A 5-point Likert-type response scale was used for the self-efficacy statements, with an 'I don't know' option as the lowest category on a horizontal scale. The scale was presented in the following form, from left to right: 'I don't know' (0); 'I strongly disagree' (1); 'I disagree' (2); 'I agree' (3); 'I strongly agree' (4).

In the analysis stage, the scoring of the 'I don't know' option required a decision to be made. Its placement as the leftmost option at the low end of the scale, with the value zero, signalled that an 'I don't know' response is a reflection of uncertainty about one's capability to carry out the activity. This interpretation of 'I don't know' may be considered controversial as such a response could also be understood to indicate confusion about the meaning of the item. However, as all the translation company simulation courses that participated in the survey rely on a common set of course design principles based on the ISO 17100 standard, the respondents were expected to be familiar with the terminology and concepts that the items referred to.

4.2. The Data

The data was collected as part of a survey on soft skills and translation-specific professional skills by members of the INSTB network (http://www.instb.eu; for the pedagogical approach, see, van Egdom et al. 2020; Konttinen et al. 2017). The survey was conducted in the autumn term 2017, spring term 2018, and spring term 2019, using the online survey tool Webropol. Apart from some background information items, the questionnaire consisted of 100 Likert-type items, with 73 items on transferable skills and 27 items on work skills. Only the work skills items are reported here.

The questionnaire was administered to students in eight universities, both before and after translation company simulation courses (TCS). All in all, 416 responses were collected. After cleaning the data for careless responses (Meade and Craig 2012) and removing multivariate outliers based on Mahalanobis Distance (Tinsley and Brown 2000:13), 380 responses were retained for the analysis (Table 2)[1].

Table 2

Breakdown of survey data

University	Before TCS	After TCS	Total

KU Leuven / Campus Antwerp	8	14	22
University of Lille	34	35	69
Universiteit Gent	38	9	47
University of Exeter	3	0	3
University of Turku	16	19	35
Swansea University	26	29	55
Vrije Universiteit Brussel	24	50	74
Zuyd Hogeschool	42	33	75
Total	191	189	380

The median age of the respondents was 22 years. The level of study for 27% was the fourth year of BA studies, for 56% the first year of MA studies, for 11% the second year of MA studies, and for 6% a level higher than BA3 but not specified. The sample represents a population of translation students in the final years of translator education taking part in a translation company simulation course. The inclusion of responses from the same persons both before and after a translation company simulation creates a sample where one half is only somewhat familiar with the processes of translation service provision, while the other half has practical experience in the domain.

4.3. Suitability of the Data for EFA and CFA

To avoid overfitting the CFA model by using the same data for both EFA and CFA, the data set was randomly split into an EFA set with 285 responses and a CFA set with 95 responses. In factor analysis, the absolute number of observations and the observation-to-item ratio, are essential concerns. While recommendations for adequate sample size vary (Hinkin 1998), the sample sizes in the present study exceed most suggestions. As a rule of thumb, item-to-response ratios of 1:10 have been suggested as adequate (Osborne and Costello 2004). With 27 items in the EFA, a minimum of 270 responses are needed to fulfil this requirement. As for the CFA, the sample size of 95 responses exceeds the recommendation if the number of items in the model stays below ten.

A Shapiro-Wilk-test carried out for the complete data set indicated that the data violates the assumption of univariate normality. However, West et al. (1995) point out that the Shapiro-Wilk-test may be unreliable for large samples ($n > 300$) and suggest using absolute values (skewness < 2; kurtosis < 7) as reference points for determining substantial non-normality. The univariate skewness and kurtosis for all items except for the item CORPRO1: “translation” (skewness = -1.933; kurtosis = 5.815) remain well below these threshold values. For

CORPRO1, the high values may be due to a ceiling-effect (Taylor 2010) caused by the relative familiarity of translation in the translator student population when compared with other activities of translation service provision.

The multivariate normality of the complete data set was assessed using the software FACTOR (Ferrando and Lorenzo-Seva 2017; Baglin 2014). The Mardia's kurtosis multivariate coefficient (44.116; $p < 0.001$) pointed to the absence of multivariate normality, requiring the use of factoring methods that are less sensitive to distortion due to multivariate nonnormality (see below).

5. RESULTS

The results of scale development through EFA are reported first, identifying the underlying dimensions in the data and discussing the removal of items. Based on the results of the EFA, a preliminary concise scale of translation service provision self-efficacy is set up. Next, CFA is used to validate the preliminary scale.

After initial testing of EFA with standard estimators like maximum likelihood and principal axis factoring on Pearson correlations in SPSS Statistics 25 software, the decision was made to analyse the ordinal categorical data using polychoric correlations (Baglin 2014:2) and robust Diagonally Weighted Least Squares (RDWLS), an extraction method less sensitive to distortion due to multivariate nonnormality than maximum likelihood (Yang-Wallentin et al. 2010). Direct oblimin rotation was used to allow the subscales to correlate. The EFA was conducted using the software FACTOR.

The factorability of the data was checked with the Kaiser-Meyer-Olkin test and Bartlett's test of sphericity. The KMO was very good, .911. The result of Bartlett's test of sphericity was 3088.8; $df = 351$; $p < .001$. Thus, the data was considered suitable for factor analysis.

The Kaiser's eigenvalue > 1.0 criterion pointed to a four-factor solution, while a parallel analysis based on minimum rank factor analysis (Timmerman and Lorenzo-Seva 2011) suggested two as the optimal number of factors. The feasibility of the two-factor solution was supported by a scree plot with a pronounced inflexion point at the second factor. The four-factor solution was analysed first, followed by an analysis of the two-factor solution. Sections 5.1 and 5.2 consist of a discussion of the factor structure. Section 5.3 presents the resulting model of translation service provision self-efficacy and discusses its validation.

5.1 Four-factor Solution

The four-factor solution (Table 3), with a cumulative proportion of explained variance .594, uncovered four dimensions that were named (using PM for project management and TP for translation production) *Strategic and operational PM*, *Practical PM*, *Financial PM*, and *Translation production* (*TP*). Viewed through the model of translation service provision, the core of the dimension Strategic and operational PM consists of activities that presuppose a global perspective on translation projects and translation company operations. Practical PM includes concrete day-to-day tasks of a project manager. The dimension Financial PM, again, covers financial and economic aspects of translation projects. Finally, TP consists of activities that form the core of translation service production, the job of work of creating, assessing, and improving translations.

Table 3

Pattern matrix factor loadings in the four-factor solution (loadings > .35 in bold)

Item	Strategic and operational PM	Practical PM	Financial PM	TP
STRATOP1	**.820**	.001	-.007	.017
STRATOP2	**.642**	.193	.136	-.045
CORGEN1	.338	**.374**	.228	-.012
CORGEN2	.179	**.559**	.095	.088
CORGEN3	.275	**.547**	.087	-.006
CORGEN4	.007	**.630**	.103	.143
CORGEN5	-.131	**.486**	-.074	.320
CORPRE1	-.077	**.510**	.063	.239
CORPRE2	**.486**	.061	.059	.300
CORPRE3	.177	.034	**.458**	.143
CORPRE4	-.073	.169	**.489**	.112
CORPRE5	.022	**.625**	.159	.014
CORPRE6	-.019	.077	**.668**	-.077
CORPRE7	.024	.019	**.726**	.127
CORPRO1	-.088	-.019	.074	**.743**
CORPRO2	.164	.028	.125	**.566**
CORPRO3	.095	.096	-.168	**.858**
CORPRO4	.011	.045	.081	**.787**
CORPRO5	.001	.201	.028	**.696**
CORPOS1	.078	.034	**.766**	.023
CORPOS2	.116	.199	**.690**	-.218
CORPOS3	.056	**.576**	.028	.091
CORPOS4	.311	.301	.301	-.036

SUPPOR1	**.359**	.148	.188	.304
SUPPOR2	.108	.065	**.381**	.161
SUPPOR3	-.130	-.116	**.421**	**.472**
SUPPOR4	.325	-.184	.317	.250

With .35 as the cut-off point for factor loadings in the pattern matrix, the dimension *Strategic and operational PM* includes three theoretically well-fitting items: STRATOP1: "set up organization"; STRATOP2: "lead organization"; and CORPRE2: "analyse any type of project". One further item, SUPPOR1: "terminology work", displays a loading above cut-off, but its connection with strategic and operational processes is not clear.

The dimension *Practical PM* consists of the theoretically well-fitting items CORGEN1: "manage projects"; CORGEN2: "carry out various project management tasks"; CORGEN3: "monitor project"; CORGEN4: "manage project timeline"; CORGEN5: "team communication"; CORPRE1: "client communication"; CORPRE5: "assess workload", and CORPOS3: "customer feedback".

The dimension *Financial PM* includes the theoretically well-fitting items CORPRE3: "verify purchase order"; CORPRE4: "assess risks"; CORPRE6: "calculate gross margin"; CORPRE7: "set price"; CORPOS1: "take care of billing", and CORPOS2: "keep account of receivables and payables". The item SUPPOR2: "translation management system", loads on the dimension as well. Although some translation management systems include functionalities for financial controlling, the connection to the factor Financial PM is not as clear as that of the other items. The same applies to the item SUPPOR3: "CAT tools" that loads on both the Financial PM and the TP factor.

Finally, the translation production dimension *TP* is comprised of the well-fitting items CORPRO1: "translation"; CORPRO2: "post-editing"; CORPRO3: "revision"; CORPRO4: "proofreading"; CORPRO5: "quality assessment", as well as a translation technology item SUPPOR3: "CAT tools", albeit with a lower loading than the other items and a comparable loading on the Financial PM factor as well.

Two items, CORPOS4: "archiving" and SUPPOR4: "IT support", do not seem to be drawn to any of the above dimensions. However, CORPOS4 shows a medium-level loading below cut-off on all PM factors.

The inter-factor correlations between the dimension *TP* and the project management dimensions *Strategic and operational PM* and *Financial PM* are relatively low (.211 and .267, respectively), but the correlation between *TP* and *Practical PM* is higher, .431. On the other

hand, the inter-factor correlations between the three management-related dimensions are high, ranging from .490 to .591.

While the four-factor solution appeared feasible, the two-factor solution was investigated next as the aim was to develop a concise scale with only a few items.

5.2. Two-factor Solution

Apart from enforcing the use of two dimensions, the two-factor solution was generated with the same settings as the four-factor solution. The cumulative proportion of explained variance based on eigenvalues for a two-factor solution was .497. The inter-factor correlation between the factors was .412.

Table 4

Pattern matrix factor loadings in the two-factor solution (loadings > .6 in bold)

Item	PM	TP
STRATOP1	**.698**	-.070
STRATOP2	**.808**	-.065
CORGEN1	**.745**	.051
CORGEN2	.595	.239
CORGEN3	**.670**	.129
CORGEN4	.496	.335
CORGEN5	.102	.499
CORPRE1	.300	.407
CORPRE2	.486	.269
CORPRE3	.591	.102
CORPRE4	.495	.137
CORPRE5	.568	.196
CORPRE6	**.667**	-.105
CORPRE7	**.702**	.075
CORPRO1	-.083	**.755**
CORPRO2	.226	.559
CORPRO3	-.090	**.908**
CORPRO4	.045	**.809**
CORPRO5	.095	**.771**
CORPOS1	**.805**	-.034
CORPOS2	**.895**	-.227
CORPOS3	.437	.266
CORPOS4	**.747**	.001

SUPPOR1	.363	.210
SUPPOR2	.478	.143
SUPPOR3	.167	.425
SUPPOR4	.436	.137

As one of the aims of the EFA was to reduce the number of items, a high cut-off point .6 was chosen (Table 4). The factor loadings in the pattern matrix present a simple structure for both dimensions. Based on the loadings, the dimensions represent two principal functions in a translating organization, *management* and *production*.

A comparison with the dimensions in the four-factor solution shows that the subscale *translation production* (TP) remains for the most part unchanged, while the three subscales *Strategic and operational PM*, *Practical PM*, and *Financial PM* fuse into a single *project management* (PM) dimension.

First, thirteen items with loadings below the cut-off were removed from the PM dimension, leaving nine items. From the subdimension Strategic and operational PM, the items STRATOP1: “set up organization” and STRATOP2: “lead organization” are the strongest candidates with high factor loadings on the PM factor, and they were chosen to be included in the scale.

In the subdimension Practical PM, CORGEN1: “manage projects” loads strongly on the PM factor, while CORGEN3: “monitor project” shows a slightly lower loading. As the practical tasks in this dimension are best represented by the more abstract item CORGEN1, it was chosen for the scale.

The dimension Financial PM is represented by four items: CORPRE6: “calculate gross margin”; CORPRE7: “set price”; CORPOS1: “take care of billing”; and CORPOS2: “keep account of receivables and payables”. While the items have strong loadings on the project management factor, they also constitute a uniform subdimension in a highly specific field. On the strategic and operational level, they can be seen to be partially covered by the item STRATOP1: “set up organization” that reflects a comprehensive business process view on a translating organization. To represent practical financial tasks, CORPOS2: “keep account of receivables and payables” was included in the subscale.

Interestingly, the item CORPOS4: “archiving”, which loads relatively weakly but evenly on the PM dimensions in the four-factor solution, rises above the cut-off in the two-factor solution, possibly due to its clear identity as something other than a translation-related activity. However, as it did not have a clear profile in the four-factor solution and is not one of the

central activities in the translation service provision process, it was not considered for the concise scale.

The translation production subscale consists of four items above cut-off and one item, CORPRO2: “post-editing”, close to the cut-off. The five TP items represent tasks connected with producing translations (CORPRO1, CORPRO2) and tasks connected with quality assurance and quality assessment (CORPRO3, CORPRO4, CORPRO5). CORPRO2 was not included in the TP subscale, as its loading on the TP factor was below the cut-off value and as it also loads on the PM factor. However, it may be a relevant item in the future as post-editing has potential to be established as one of the central activities in translator education.

To summarize the result of the EFA, for the PM subscale, the items STRATOP1: “set up organization”; STRATOP2: “lead organization”; CORGEN1: “manage projects”; and CORPOS2: “keep account of receivables and payables” were chosen to represent a general managerial view on a translating organization and translation projects. For the TP subscale, the items CORPRO1: “translation”, CORPRO3: “revision”, CORPRO4: “proofreading”; and CORPRO5: “quality assessment” were chosen to represent the core of translation production.

The internal consistency of the concise scale was tested by calculating Cronbach’s coefficient alpha for the total scale and its subscales. The Cronbach’s alphas of the scales were above the level of the minimum acceptable value of .70 discussed in Mellinger and Hanson (2016). The alpha for the whole concise scale was .74, for the PM subscale .84, and the TP subscale .79. Based on the alpha-if-item-deleted scores, the reliability could not be improved by removing items.

5.3. Confirmatory Factor Analysis

The CFA was conducted with lavaan version 0.6-4 (Rosseel 2012). For ordinal data, lavaan employs the WLSMV estimator that uses diagonally weighted least squares (DWLS) to estimate model parameters but the full weight matrix to compute robust standard errors and a mean- and variance-adjusted test statistic (Rosseel 2019:29). The estimation method is suited for ordinal data and robust to violation of multivariate normality (Bryant and Jöreskog 2016).

The fit of the scale was assessed using Chi-square and the absolute and relative fit indices CFI, TLI, RMSEA, SRMR, and WRMR. Both the DWLS test statistic and the robust mean- and variance-adjusted statistic are reported, even as no rule-of-thumb recommendations for the robust variants were found. Based on the results in the present study, the robust statistics set a higher bar for goodness-of-fit.

Schreiber (2008:90) recommends that "[t]he TLI and CFI values, for categorical data, should be greater than or equal to 0.95 and [for] the RMSEA, the value should be less than or equal to .06". For SRMR, the criterion < .08 is used, suggested for continuous data, for example, by Hu and Bentler (1999) but criticized by (Yu 2002) when used for categorical outcomes. For WRMR, the criterion < .90 is used, cited for continuous and categorical data by Schreiber et al. (2006:327).

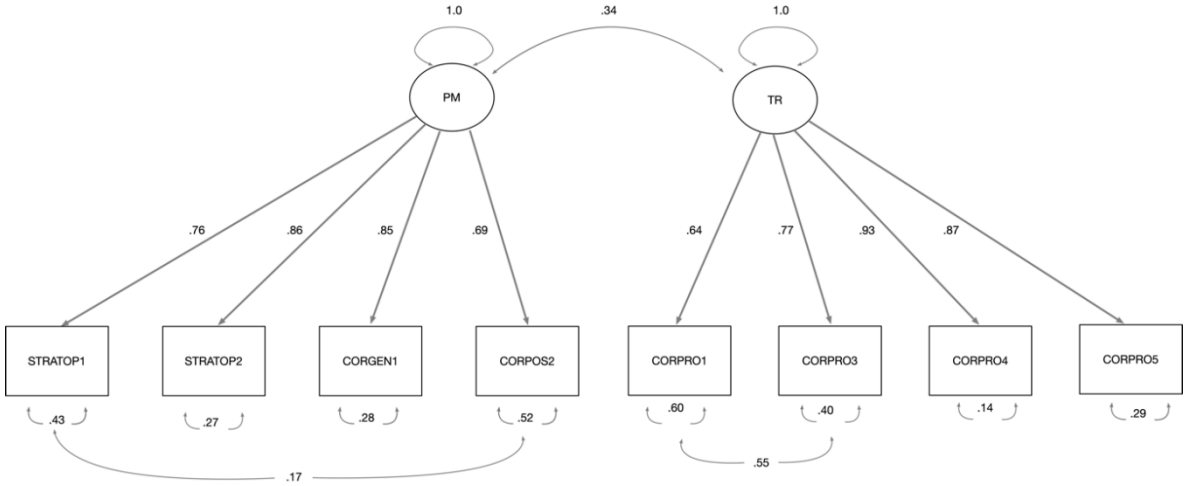
The statistic for Chi-square (27.229, df = 19, p < .099; robust 40.776, df = 19, p < .003) was non-significant for the DWLS statistic, suggesting good model fit, while the robust statistic pointed to relatively poor fit. The fit indices CFI and TLI (.995; robust .975 and .992; robust .964, respectively) were above the recommended minimum levels, and SRMR and WRMR (.068; robust .068 and .679; robust .679, respectively) were below the recommended maximum levels, indicating good fit. However, RMSEA (.068; robust .110) was above the maximum criterion for the robust statistic.

With many of the goodness-of-fit measures already at acceptable levels, the fit of the concise model was considered reasonably good. However, based on modification indices, the model could be further improved by setting the unique variances between STRATOP1 and CORPOS2, and CORPRO1 and CORPRO3, respectively, to covary. The modifications are consistent with the model of translation service provision, as a connection between the ability to set up a translating organization and the ability to keep account of receivables and payables was considered likely. Also, a link between the ability to translate and the ability to revise translations was considered feasible.

For the modified model (Figure 2), the statistic for Chi-square (17.422, df = 17, p < .426; robust 28.892, df = 17, p < .036) was non-significant for both statistics, suggesting good model fit. The fit indices CFI and TLI (1.0; robust .986 and 1.0; robust .975, respectively) were well above the recommended minimum levels, and SRMR and WRMR (.056; robust .056 and .543; robust .543, respectively) were below the recommended maximum levels, indicating good fit. While the robust statistic for RMSEA (.016; robust .086) was slightly above the maximum criterion, taken together, the statistics indicated very good model fit.

Figure 2

The concise model, with standardized loadings



The standardized inter-factor correlation between the latent constructs PM and TP was .336. The standardized factor loadings of the items were high, ranging from .635 to .926, and the unique standardized variances of the items ranged from .142 to .597. With all the criteria for goodness-of-fit at acceptable levels, no further modifications to the model were considered necessary.

6. CONCLUSION

This study designed and validated a concise model for measuring translation provision self-efficacy. The model comprises two complementary domains of self-efficacy, translation management and translation production. Translation management self-efficacy is manifested by four indicator variables: a comprehensive understanding of the operations of a translating organization (STRATOP1), ability to lead (STRATOP2), ability to manage translation projects (CORGEN1), and ability to keep account of finances (CORPOS2). Translation production self-efficacy is measured through the indicator variables translation (CORPRO1), revision (CORPRO3), proofreading (CORPRO4), and quality assessment (CORPRO5).

The construct of self-efficacy provides a complement to the concept of competence. In a manner not accessible to external evaluations of competence, self-efficacy opens a view into subjective aspects of an individual's capability to perform tasks. The domain-specific self-efficacy construct can be used to gauge students' progress in translation company simulations, and also more widely in translator education.

Notes

1 The data sets used for the EFA and CFA are available as csv files at DOI 10.17605/OSF.IO/8UYWN

References

Baglin, J. 2014. Improving Your Exploratory Factor Analysis for Ordinal Data: A Demonstration Using Factor. *Practical Assessment, Research & Evaluation* Vol. 19. No. 5. 2–15.

Bandura, A. 1977. Self-Efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological review* Vol. 84. No. 2. 191–215.

Bandura, A. 1997. *Self-Efficacy: The Exercise of Control*. New York: W.H. Freeman.

Bandura, A. 2001. Social Cognitive Theory: An Agentic Perspective. *Annual Review of Psychology* Vol. 52. No. 1. 1–26.

Bandura, A. 2006. Guide for Constructing Self-Efficacy Scales. In: Pajares, F., Urdan, T. (eds) *Self-Efficacy Beliefs of Adolescents*. Greenwich: Information Age Publishing. 307–337.

Biel, Ł. 2011. Training Translators or Translation Service Providers? EN 15038:2006 Standard of Translation Services and its Training Implications. *The Journal of Specialised Translation* No. 16. 61–76.

Bolaños-Medina, A. 2014. Self-Efficacy in Translation. *Translation and Interpreting Studies* Vol. 9. No. 2. 197–218.

Bolaños-Medina, A., Núñez, J. L. 2018. A Preliminary Scale for Assessing Translators' Self-Efficacy. *Across Languages and Cultures* Vol. 19. No. 1. 53–78.

Bryant, F., Jöreskog, K. 2016. Confirmatory Factor Analysis of Ordinal Data Using Full-information Adaptive Quadrature. *Australian & New Zealand Journal of Statistics* Vol. 58. No. 2. 173–196.

Dunne, K. 2012. The Industrialization of Translation: Causes, Consequences and Challenges. *Translation Spaces* Vol. 1. No. 1. 143–168.

van Egdom, G.-W., Konttinen, K., Vandepitte, S., Fernandez-Parra, M., Loock, R., Bindels, J. 2020. Empowering Translators Through Entrepreneurship in Simulated Translation Bureaus. *Hermes* Vol. 60. 81–95.

Ferrando, P. J., Lorenzo-Seva, U. 2017. Program Factor at 10: Origins, Development and Future Directions. *Psicothema* Vol. 29. No. 2. 236–240.

Haro-Soler, M. D. M. 2017. Self-Confidence and Its Role in Translator Training: The Students' Perspective. In: Lacruz, I., Jääskeläinen, R. (eds) *Innovation and Expansion in Translation Process Research*. Amsterdam: John Benjamins. 131–160.

Hinkin, T. R. 1998. A Brief Tutorial on the Development of Measures for Use in Survey Questionnaires. *Organizational Research Methods* Vol. 1. No. 1. 104–121.

Hofmann, S. 2012. *Prozessgestütztes Übersetzen: Vom funktionsorientierten Übersetzungsprozess zum Geschäftsprozessmodell für die Dienstleistung Übersetzen*. Lichtenberg: Harland Media.

Hu, L., Bentler, P. 1999. Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Structural Equation Modeling: A Multidisciplinary Journal* Vol. 6. No. 1. 1–55.

Kim, A.-Y., Park, I.-Y. 2001. Construction and Validation of Academic Self-Efficacy Scale. *The Journal of Educational Research* Vol. 39. No. 1. 95–123.

Konttinen, K., Veivo, O., Holopainen, T., Salmi, L. 2017. Multilingual Translation Workshop: Developing Professionals in a Simulated Translation Market. *MikaEL* Vol. 10. 150–164.

Konttinen, K., Salmi, L., Koponen, M. 2021. Revision and Post-Editing Competences in Translator Education. In: Koponen, M., Mossop, B., Robert, I.S., Scocchera, G. *Translation Revision and Post-Editing: Industry Practices and Cognitive Processes*. New York: Routledge. 187–202.

Lee, S.-B. 2014. An Interpreting Self-Efficacy (ISE) Scale for Undergraduate Students Majoring in Consecutive Interpreting: Construction and Preliminary Validation. *The Interpreter and Translator Trainer* Vol. 8. No. 2. 183–203.

Mellinger, C.D., Hanson, T.A. 2017. *Quantitative Research Methods in Translation and Interpreting Studies*. Abingdon: Routledge.

Meade, A., Craig, B. 2012. Identifying Careless Responses in Survey Data. *Psychological Methods* Vol. 17. No. 3. 437–455.

Núñez, J., Bolaños-Medina, A. 2018. Predictors of Problem-Solving in Translation: Implications for Translator Training. *The Interpreter and Translator Trainer* Vol. 12. No. 3. 282–298.

Osborne, J., Costello, A. 2004. Sample Size and Subject to Item Ratio in Principal Components Analysis. *Practical Assessment, Research & Evaluation* Vol. 9. No. 11. 1–9.

Robinson, B., Olvera-Lobo, M. D., Gutiérrez-Artacho, J. 2016. After Bologna: Learner- and Competence-Centred Translator Training for "Digital Natives". In: Martín De León, C., González-Ruiz, V. (eds) *From the Lab to the Classroom and Back Again*. Bern: Peter Lang. 325–359.

Rosseel, Y. 2012. Lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*. Vol. 48. No. 2. 1–36.

Rosseel, Y. 2019. The lavaan tutorial. http://lavaan.ugent.be/tutorial/tutorial.pdf. (Consulted on 20 November 2019).

Schreiber, J. 2008. Core Reporting Practices in Structural Equation Modeling. *Research in Social and Administrative Pharmacy* Vol. 4. No. 2. 83–97.

Schreiber, J., Nora, A., Stage, F., Barlow, E., King, J. 2006. Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *The Journal of Educational Research* Vol. 99. No. 6. 323–338.

Taylor, T. 2010. Ceiling Effect. In: Salkind, N. (ed) *Encyclopedia of Research Design*. Thousand Oaks: Sage. 133–135.

Timmerman, M., Lorenzo-Seva, U. 2011. Dimensionality Assessment of Ordered Polytomous Items with Parallel Analysis. *Psychological Methods* Vol. 16. No. 2. 209–220.

Tinsley, H., Brown, S. 2000. Multivariate Statistics and Mathematical Modeling. In: Tinsley, H., Brown, S. (eds) *Handbook of Applied Multivariate Statistics and Mathematical Modeling*. San Diego: Elsevier. 3–36.

West, S., Finch, J., Curran, P. 1995. Structural Equation Models with Nonnormal Variables: Problems and Remedies. In: Hoyle, R. (ed) *Structural Equation Modeling: Concepts, Issues, and Applications*. Thousand Oaks: Sage. 56–75.

Yang-Wallentin, F., Jöreskog, K., Luo, H. 2010. Confirmatory Factor Analysis of Ordinal Variables with Misspecified Models. *Structural Equation Modeling: A Multidisciplinary Journal.* Vol. 17. No. 3. 392–423.

Yu, C. Y. 2002. Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes. Doctoral dissertation. Los Angeles: University of California.