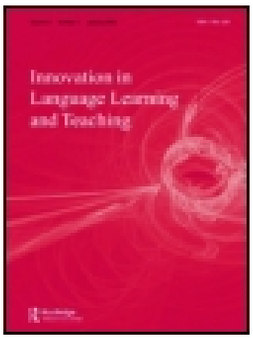

Routledge
Taylor & Francis Group

Innovation in Language Learning and Teaching

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rill20

# Preliminary development and validation of basic psychological needs fulfillment for ESP teachers in online instruction

Yudhi Arifani, Jumadi Jumadi, Agus Wardhono, Syaadiah Arifin & Hidayat Ma'ruf

**To cite this article:** Yudhi Arifani, Jumadi Jumadi, Agus Wardhono, Syaadiah Arifin & Hidayat Ma'ruf (2023): Preliminary development and validation of basic psychological needs fulfillment for ESP teachers in online instruction, Innovation in Language Learning and Teaching, DOI: 10.1080/17501229.2023.2185623

**To link to this article:** https://doi.org/10.1080/17501229.2023.2185623

Published online: 08 Mar 2023.

INNOVATION IN LANGUAGE LEARNING AND TEACHING
https://doi.org/10.1080/17501229.2023.2185623

Routledge
Taylor & Francis Group



# Preliminary development and validation of basic psychological needs fulfillment for ESP teachers in online instruction

Yudhi Arifani [a], Jumadi Jumadi [b], Agus Wardhono [c], Syaadiah Arifin [d] and Hidayat Ma'ruf [e]

[a]English Education, English Language Department, Universitas Muhammadiyah Gresik, Gresik, Jawa Timur, Indonesia; [b]Education Department, Universitas Lambung Mangkurat, Banjarmasin, Indonesia; [c]English Education, Universitas PGRI Ronggolawe Tuban, Tuban, Indonesia; [d]English Education Department, Universitas Muhammadiyah Prof Dr Hamka Fakultas Keguruan dan Ilmu Pendidikan, East Jakarta, Indonesia; [e]Psychology, Universitas Islam Negeri Antasari, Banjarmasin, Indonesia

**ABSTRACT**

The transition of traditional classroom teaching to online teaching platforms in English as a foreign or second language context has caused the shift of teachers' motivational factors. The present study aimed to develop a new motivational teaching instrument and provide indication for the scale's validity and reliability of English for Specific Purposes (ESP) teachers' basic psychological need fulfillment in online teaching (BPNOT), using samples of Indonesian novice and experienced ESP teachers across genders. The author employed four different development stages of BPNOT's scale using four different independent samples of ESP teachers in Indonesian EFL context (total $n = 566$). The first developmental stage was designed to develop items for the scale and to establish structure of factorial design utilizing a multivariate statistics of exploratory factor analysis (EFA) test. The second scale development was continued to determine the item scale factorial structure using confirmatory factor analysis (CFA) to confirm whether the construct was consistent or not. The third development stage estimated the test of invariance across gender and teaching experience. Finally, the last developmental stage aimed to revalidate the validity and reliability of the new scale over time. The findings of the preliminary scale validation revealed that the scale has acceptable psychometric features..

**ARTICLE HISTORY**
Received 18 November 2022
Accepted 26 January 2023

**KEYWORDS**
BPNOT; relatedness; competence; autonomy; motivational factor

## Introduction

Motivational orientations have become an increasingly popular topic in the field of education. The fulfillment of psychological need (BPN) framework proposed by Deci and Ryan (2000) becomes one of the most influential concepts that is relevant to motivational orientations. The theory of BPN postulates that the fulfillment of those three BPN categories will promote individuals' motivation, positive behavior, teaching and learning outcomes (Alamer and Al Khateeb 2021; Clément et al. 2020; Shirvan and Alamer 2022; van Roy and Zaman 2019). In the area of a foreign/second language, BPN as one of self-determination theories (SDT) postulates that some teachers may enjoy teaching because they find teaching English as a foreign/second language to be inherently motivating and interesting (internal motivation). Others, however, may enjoy teaching because they have external

**CONTACT** Yudhi Arifani yudhi_arif@umg.ac.id English Education, English Language Department, Universitas Muhammadiyah Gresik, Gresik 61121, Indonesia

motivation (i.e. career and promotion). In addition, SDT advocates a mechanism through which teachers can exhibit internal forms of motivation. Specifically, SDT theory recommends that three categories of BPN should be fulfilled among teachers for optimal teaching (Alamer and Al Khateeb 2021; Oga-Baldwin et al. 2017; Koenen, Spilt, and Kelchtermans 2022). In this case, teachers should fulfill their autonomy, competence, and relatedness at the same time. Fulfillment of basic psychological needs is considered to be one of the crucial precursors for elevating the quality of English as a foreign or second language (ESL/EFL) teaching and learning. The fulfillment of basic psychological needs and teaching quality depends on the quality of interaction with their relevant environments. Effective interaction among EFL/ESL teachers, students, and their relevant social context causes a positive effect on their emotional factors (Durksen et al. 2016; Hermessi 2022; Meihami and Husseini 2022), positive learning environment (Satar and Akcan 2018; Yang 2021) and EFL/ESL learning outcomes (Alamer 2022a; Alamer and Al Khateeb 2021; Zhou, Huebner, and Tian 2021).

This SDT theory has attracted educational researchers to scrutinize teachers' and learners' fulfillment of BPN. In the traditional, blended and online learning environments, BPN theories have been implemented to assess the fulfillment of teachers' and learners' basic needs adapted from BPN satisfaction at the work scale (Clément et al. 2020; Volodina, Lindner, and Retelsdorf 2019). Recent literature studies have acknowledged the greater importance of BPN in foreign or second language contexts (Alamer 2022a; Arifani et al. 2021; Noels, Lascano, and Saumure 2019; Oga-Baldwin et al. 2017). However, a scale to investigate the fulfillment of English Specific Purposes (ESP) teachers' basic needs that in line with the framework of BPN is not yet found in the existing literature. The purpose of the present study was thus to develop and validate a new scale assessing ESP teachers' basic needs fulfillment based on the existing framework of BPN.

English for specific purposes (ESP) is a branch of the EFL area that aims to facilitate learners with specific needs of English and content knowledge. Given that ESP students' needs fulfillment in learning ESP is closely linked to their ESP teachers and social outcomes, it seems imperative to evaluate and confirm psychological need fulfillment in ESP using BPN and second language learning theory (Alamer 2022a; Carreira 2012). Nevertheless, previous relevant studies on teachers' and students' motivational fulfillment in the educational and foreign or second language contexts have two limitations. First, previous research findings have often failed to distinguish the various contexts in which basic psychological need fulfillment can be promoted. Those predecessors have investigated basic psychological needs using a general SDT framework, which does not provide a specific theoretical framework for foreign language teaching (Arifani et al. 2021; Noels, Lascano, and Saumure 2019; Zhou, Huebner, and Tian 2021). For instance, teaching general English differs from teaching ESP. In teaching general English, the teachers generally have linear English education background to the specific English course they teach, but in teaching ESP the English teachers do not have a linear educational background to the ESP course because they are not prepared to be ESP teachers. In this case, they learn ESP while they are teaching ESP which is more complex than general English. Facilitating ESP students' specific content knowledge and specific English needs at the same time with 'non-linear English teachers' become big challenges for the EFL teachers. This situation becomes worse if the non-linear ESP teachers have to deal with online teaching because they need to be technologically literate and at the same time they have to learn to teach ESP.

Assessing ESP teachers' motivational fulfillment using universal BPN scale in language learning context (Alamer and Al Khateeb 2021; Deci and Ryan 2000; Dincer et al. 2019; McEown and Oga-Baldwin 2019; Oga-Baldwin et al. 2017; Noels, Lascano, and Saumure 2019; Shirvan and Alamer 2022), may thus obscure differing results of motivational fulfillments in specific contexts, including the ESP context. Therefore, to make the assessment of ESP teachers' need motivational fulfillment more specific than the above universal motivational need scale, we proposed the construct of 'a foreign/second language teaching framework and basic psychological needs' to assess ESP teachers' intrinsic need fulfillment during online teaching practices. Additionally, assessing teachers' motivational fulfillment using universal motivational scales makes it difficult to interpret the results of the previous studies (Alamer 2022a; Arifani et al. 2021). Thus, the availability of a specific motivational

scale to assess ESP teachers' need fulfillment in the online teaching context, which integrates all elements of motivational fulfillment in one specific scale, would be valuable for global ESP instructional design.

## Literature review

### *BPN validation in language learning*

To our understanding, recent studies which discuss the relevance of BPN in language learning can be classified into three categories: adaptation of BPN using reliability tests (Arifani et al. 2021), construct validation of BPN using SEM (Alamer and Al Khateeb 2021; Dincer et al. 2019; McEown and Oga-Baldwin 2019; Oga-Baldwin et al. 2017; Noels, Lascano, and Saumure 2019; Shirvan and Alamer 2022), and construct validation of BPN using ESEM (Alamer 2022b; Alamer and Marsh 2022). In the process of development and validation, researchers commonly employed either the traditional SEM or the novel ESEM or even compared both to find the most convincing analysis behind its strengths and limitations.

The example of the first category which tries to integrate BPN into EFL teacher professional development belongs to (Arifani et al. 2021). He adapted the SDT framework into a blended learning context using reliability measures of the three dimensions of BPN: relatedness (eight items), competence (six items) and autonomy (six items). During the validation phase, he adapted the BPN to different groups of in-service teachers. After obtaining acceptable alpha scores, he then utilized the instrument to the 180 surveyed participants without further SEM analysis. The Cronbach's alpha scores for the category of relatedness was 0.094, competence was 0.92, and autonomy was 0.92.

Under the second category, we found five researchers who employed traditional SEM for establishing more reliable psychometric analysis although there were some limitations regarding fit indices in the CFA and their constructs. A study by Dincer et al. (2019), for instance, has explored Turkish EFL learners' motivational processes using the SSMMD approach. In the development and validation phases, they used SEM and Mplus 7.0 for testing the hypothesis and establishing the validity of the conceptual model. Finally, they proposed 15 SSMMD items with ten variables of context, self, action and outcome. To explain how well the proposed model fits the data, the researchers used an exact fit chi-square test, RMSEA with CI, SRMR and CFI measures. The measures demonstrated good fit model with RMSEA and SRMR scores were below 0.08, and CFI was above 0.95.

Next, McEown and Oga-Baldwin (2019) scrutinized 515 Japanese elementary school pupils' motivation in learning English across time. Using six theoretical elements, they proposed 16 psychometric items to explain the correlation among variables. The results of the SEM measure indicated a positive relationship among motivation, perception of learning and engagement. The measure of internal reliability was acceptable (Cronbach's alpha = 0.94), RMSEA < 0.06, CFI > 0.95 and TLI > 0.95 also demonstrated good fit.

The third category discussed the development and validation of BPN in language learning using ESEM. This novel analysis tries to ameliorate the traditional SEM test which has its limitations regarding the validity of conceptual model or fit model. So far, we found two studies of BPN in language learning which discussed ESEM during the instrument development processes for establishing more astonishing validity. In an attempt to expand the construct validity of psychometric investigation in language learning, Alamer (2022b) explored the effectiveness of the exploratory structural equation modeling (ESEM) and bifactor ESEM (EFA and CFA) into a single framework. During item development and validation, he surveyed the 12 items BPN questionnaire to 367 Arabic undergraduate ESL learners (69% female). The results of analysis indicated that bifactor CFA could fit the data, but the CFA could not. He also provided the syntax of bifactor ESEM for further analysis and recommended further researchers to utilize the model.

In addition, Alamer and Marsh (2022) initiated the applicability of new ESEM in the development of L2 passion scale. They collected two sets of data using a dualistic model of passion. At the first

stage, they surveyed 220 L2 learners and compared the data between the CFA and the ESEM models. The results proved that ESEM outperformed CFA in terms of fit indices and correlation factors. Then, they replicated the results in another sample involving 272 L2 learners using Mplus syntax. The results also demonstrated the effectiveness of ESEM over CFA in terms of construct, discriminant and convergent validity of L2 passion such as $p < .001$, CFI = 0.93, TLI = 0.89, RMSEA = 0.07, RMSEA 90% and CFI/TLI $\geq$ 0.90, RMSEA $\leq$ 0.07 and SRMR $\leq$ 0.07.

All the above BPN validation and development research have been directed for language learning but none of them is dedicated for the ESP which have substantial differences regarding specific English and content knowledge from the EFL/ESL emphasis as it is discussed in the previous section. The presence of new ESEM for validation of BPN in language learning proposed by Alamer (2022b) and Alamer and Marsh (2022) has open new insights for the validation of psychometric scale in language learning because they granted the ESEM syntax for the readers replacing and proved their convincing results over the traditional SEM. However, previous researchers who employed SEM as the main basis of validation commonly applied one or two development phases. Consequently, the reliability of the developed psychometric is questionable. Another developmental study of BPN beyond the language-learning field still applied the traditional SEM with four phases that confirmed acceptable construct (Tian, Han, and Huebner 2014). Since ESEM is relatively new and not all researchers have the access for it, we proposed to develop BPN in ESP using four analysis phases employing the traditional SEM test to establish more reliable BPN constructs.

## The present study

Stemming to BPN theory, there are three categories of psychological needs for fulfillment for ESP teachers, namely: relatedness, competence and autonomy. The fulfillment of autonomy discusses ESP teachers' intrinsic and identified orientations which refer to the centrality of the active to the teacher's self. Intrinsic motivation refers to teacher's feeling of enjoyment from the involvement. It occurs when teaching ESP is perceived as an enjoyment process in and itself. Identified orientation belongs to the value that teachers attach to the teaching activities (Alamer and Al Khateeb 2021; Deci and Ryan 2000). Several studies reveal that teachers' endorsement of autonomous motivation is connected to increased amount of teaching practices overtime (Alamer and Al Khateeb 2021; Deci and Ryan 2000; Dincer et al. 2019), engagement with target communities (Alamer and Al Khateeb 2021; Oga-Baldwin et al. 2017; Noels, Lascano, and Saumure 2019; Shirvan and Alamer 2022). In this case, the concept of autonomy refers to perceived situations in which contexts and circumstances such as ESP teaching materials and teaching strategy offer choices that are personally preferable to them. The fulfillment of relatedness is achieved when ESP students have a sense of warmth and connection between themselves and broader ESP communities and events in social context. The fulfillment of competence refers to teachers' perceptions of teaching ability to perform specific English and content knowledge. In view of that, Alamer and Al Khateeb (2021) asserted that the framework of SDT could contribute to L2 teachers' motivation and pedagogical approach in online teaching. Stemming from Deci and Ryan's (2000) universal basic psychological needs framework, this developmental research aims to validate psychometrically valid and reliable measures of BPN fulfillment for the ESP teachers during their online teaching. Assuming that the shift of traditional teaching into online teaching platforms may influence teacher' motivational factors because of the comprehensive needs in online teaching platforms in terms of technology literacy, English and specific content knowledge needs (Alamer and Al Khateeb 2021; Soudien 2020; Tamim 2020).

Inspired by Tian, Han, and Huebner (2014), the author conducted four study cycles following Tian, Han, and Huebner's (2014) developmental models using four different cohorts of ESP teachers in Indonesia as the samples of the study. The first stage was intended to develop initial definitions to formulate the construct and to establish factor structure of BPN items utilizing exploratory factor analysis (EFA) measures. The second development stage was designed to validate the BPN scale structure and to estimate its validity (convergence and divergence) and internal consistency

reliability using the same EFA measures. The third study was then continued to verify the BPN's invariance across participants' teaching experience and their genders. Finally, the last study cycle tested the estimated item validity and reliability of the BPN instrument.

The samples from the four different groups of participants involved in the four developmental studies were taken from 40 universities from four different provinces in East Java, Central Java, Banten and West Java Indonesia. These universities were selected because of the long establishment of ongoing research relationships between those universities and the first author's institution. The university education authorities from participating institutions in the present study were rationally representative and comparable concerning ESP teaching experience, year of ESP teaching and ESP teachers' education background. Most of them held an undergraduate degree from the English education department where they were prepared to be English teachers at secondary schools. The first-time teaching ESP, they did not have any ESP background because did not get any ESP courses during their education program. In those universities, the ESP program was used as a stepping stone and training venue for their EFL graduates to enhance their teaching qualities before they became English teachers in secondary schools Therefore, most of them were non-permanent teachers. Additionally, the ESP programs were also taught as additional courses for all majors except the English department during the first year of enrollment using online learning approaches. Each sample group who participated in one of the four studies was not allowed to take part in the following developmental research stages.

## Study 1. BPN development for ESP teachers' online teaching

Previous studies on motivational factors have not applied a specific theoretical framework to ESP teachers' basic needs in online teaching, we utilized a bottom-up approach to explain the estimated factors of ESP teachers' psychological fulfillment. Thus, the purposes of this initial step were: (a) to draw item range scores to verify the scopes of the ESP teachers' basic psychological needs in online teaching and (b) to estimate the number of factorial structures of the ESP teachers' BPN in online teaching following the EFA procedures.

Since there has been the lacuna of specific scale to evaluate ESP teachers' basic psychological needs satisfaction in online learning contexts, the author referred to the original SDT Scale (Deci and Ryan 2000) BPN in language learning context using MALL (Alamer and Al Khateeb 2021), which are widely employed to assess individuals' need fulfillment in language learning, but they are not designed for ESP context. A set of 36 BPN items were initially constructed based on the three BPN frameworks. Twelve item questions were then constructed to denote each basic psychological framework. Contextual and participants' demographic information such as face to face, online platforms, teachers' teaching experience, gender, and age were discussed during initial BPN item development. First, all original items were developed and constructed based on the classification of participants' ages and gender of the ESP teachers. Second, the BPN items were also reflected in the ESP teachers' teaching experiences. After item formulation was accomplished, the early development of BPN item pool was justified by six independent university lecturers. The first referees hold a PhD degree in Psychology, and the second group of experts was senior ESP researchers with the same doctoral specialization. The six referees assessed the content of item validity, understandability and clarity of the BPN scale. Following this procedure, nine inappropriate items of the initial pool were discarded to avoid biased interpretations. Then, 21 items were generated and configured with 6-point Likert scales from 1 as 'strongly disagree' to 6 as 'strongly agree'. The sample of each BPN category was 'It is interesting for my ESP students to independently evaluate their specific content knowledge and English skills during online learning' (autonomy), 'I engage my ESP students with specific content teachers, relevant ESP stakeholders using online platforms' (relatedness), 'I feel my ESP students are competent to express their ideas in relevant ESP communities during online learning' (competence). Finally, the author analyzed the psychometric feature of this BPN using the first sample group.

## Method

### Participants

This convenience sample involved 127 ESP teachers (55.12% females): 69 from social sciences (economics, psychology, law and education departments), 58 from science (engineering and medical department). ESP teaching experiences 39% ≥5 years and 61% ≤5years. The average of the ESP teachers' ages was 25–45 ($M = 35.09$, $SD = 1.67$).

### Procedure

Approval letters from each ESP program coordinator and a university research center were obtained. All research samples were selected based on a voluntary basis. Since most of them were members of the Indonesian researcher in the English education association (I-READ), the survey was administered through emails and participants' WhatsApp (WA) groups. Therefore, the initial BPN scale containing 21 questions was distributed in their emails. Reminder notification to fill the survey timely was also conducted via WA groups.

## Results

### Exploratory factor analysis

An exploratory factor analysis (EFA) is administered to elaborate the factor structure of the 21-item BPN instrument using SPSS 20.0. Homogeneity of variance coefficient indicates significant value, $X^2 = 5284.90$, $df = 300$, $p < .001$, and the Kaiser–Meyer–Olkin statistic (KMO = 0.92) shows greater value than 0.50. It indicates that the Bartlett sphericity test is applicable for EFA calculation. The principal axis factoring method is also applied using Kappa parameter = 4. The beginning path analysis forms a five-factor loading referring to the acceptable criteria. However, the component analysis shows that the three BPN factors are also suitable. The author then discards the nine BPN question items below 0.40, more than one factor, or less than 3% of the variance. A total of 21 BPN items are coded into I-1 to I-21. The scores of KMO and Bartlett tests are = 0.85 and $X^2 = 2890.00$, $df = 62$, $p < .001$. The second path analysis test using EFA indicates strong three-factor solutions. Each factor includes five BPN items with factor loadings ranging from 0.51 to 0.82 (see Table 1); the scalar number of the three factors are 4.76, 1.99 and 1.32, respectively, and the overall scale values are 58.51% of the variance.

Afterwards, the three BPN factors are then categorized as 'The need for autonomy for online ESP teaching', 'The need for relatedness for online ESP teaching' and 'The need for competence for online ESP teaching'. The variance scores of the three BPN factors of autonomy (34.24%), relatedness (15.03%) and competence (9.24%), respectively. Meanwhile, the correlation scores of the revised BPN items range from 0.52 to 0.79 ($p < .01$). The revised item-subscale correlations and the rotated solution of the BPN ESP online teaching are presented in Table 1.

### Intercorrelations across data set

The intercorrelation coefficients across the three BPN data sets indicate moderate degree. The coefficient scores between 'autonomy' and 'competence', 'autonomy' and 'relatedness', and 'relatedness' and 'competence' are ($r = 0.56$), ($r = 0.57$) and ($r = 0.51$). The first factor (Autonomy) estimates 34.24% of the variance ($SD = 6.79$, kurtosis = 0.769, skewness = −0.821) with Cronbach alpha value of 0.76. The second factor (Relatedness) estimates 15.03% of the variance ($M = 11.56$, $SD = 4.70$, kurtosis = 0.746, skewness = −0.650) with alpha value of 0.79. The third factor (Competence) 9.24% of the variance ($M = 13.36$, $SD = 3.91$, kurtosis = 0.389, skewness = −0.562) with alpha value of 0.77. Therefore, the correlation patterns across BPN factors are interrelated and distinctive.

**Table 1.** Correlation values of the revised BPNOT factor loadings.

| | Items | (A) | (R) | (C) | $r_{tt}$ |
|---|---|---|---|---|---|
| R-2 | I feel I am very friendly to my ESP students during online teaching, [I-1] | 0.82 | 0.09 | −0.35 | 0.70 |
| R-20 | I have good understanding about my ESP students' problem of ESP learning during online teaching, [I-2] | 0.80 | −0.35 | 0.04 | 0.66 |
| R-22 | I am willing to cooperate and with my ESP students during online teaching, [I-3] | 0.79 | 0.04 | 0.12 | 0.58 |
| R-13 | I feel I have involved my students to help and cooperate with others while learning ESP using online media, [I-4] | 0.78 | 00.3 | 0.01 | 0.62 |
| R-9 | I feel I have connected my students to relevant ESP stakeholder, content teacher, and relevant ESP communities [I-5] | 0.76 | 0.01 | 00.3 | 0.66 |
| R-7 | I feel I have involved relevant ESP experts/stakeholders during online learning, [I-6] | 0.74 | −0.04 | 0.06 | 0.70 |
| R-19 | I am competent enough collaborate to other ESP teachers or ESP communities to provide teaching feedback during online teaching, [I-7] | 0.72 | −0.01 | −0.23 | 0.59 |
| R-16 | I care about my students' learning progress in both specific content knowledge and English during online learning, [I-8] | 0.71 | −0.01 | −0.22 | 0.64 |
| C-27 | I feel I am capable to give my ESP students positive feedback dealing with their specific content tasks and English during online teaching, [I-9] | −0.02 | 0.82 | | 0.57 |
| C-12 | I am capable to teach specific content knowledge and English in the ESP course during online teaching, [I-10] | −0.06 | 0.80 | −0.31 | 0.66 |
| C-5 | I feel I teach my students relevant English skills for their future careers both specific content knowledge and English during online teaching, [I-11] | −0.23 | 0.78 | 0.02 | 0.69 |
| C-11 | I feel I achieve my ESP teaching goals in online teaching, [I-12] | −0.29 | 0.76 | 0.11 | 0.76 |
| C-4 | I feel I teach my students' competent to express their idea in relevant ESP communities during online learning, [I-13] | 0.11 | 0.74 | 0.19 | 0.70 |
| C-6 | I feel I teach my students new specific content knowledge and English skills during online teaching, [I-14] | 0.09 | 0.72 | −0.13 | 0.72 |
| A-14 | I have a freedom to determine my own pace of ESP teaching in online learning, [I-15] | 0.08 | 0.68 | −0.03 | 0.76 |
| A-29 | I have a freedom to choose ESP tasks during online teaching activities, [I-16] | 0.31 | −0.05 | 0.76 | 0.64 |
| A-20 | I give my ESP students freedom to express their ideas both specific content knowledge and English skills during online learning, [I-17] | −0.11 | −0.01 | 0.74 | 0.62 |
| A-3 | I allow my students choose how we learn ESP using online learning, [I-18] | 0.09 | 0.19 | 0.72 | 0.51 |
| A-8 | I have freedom to choose relevant learning tasks to be done while ESP teaching ESP, [I-19] | 0.08 | 0.09 | 0.71 | 0.69 |
| A-1 | I identify my ESP students' learning needs for both specific content knowledge and English skills during online learning, [I-20] | −0.13 | −0.30 | 0.68 | 0.59 |
| A-15 | I let students freely practice their specific content knowledge and English skills during online learning, [I-21] | 0.12 | 0.21 | 0.64 | 0.68 |
| % of variance | | 34.24 | 15.03% | 9.24% | |
| Cumulative % | | 58.51% | | | |

Note. (A) refers to Autonomy = the need for autonomy during ESP online teaching; (R) refers to relatedness = the need for relatedness during ESP online teaching; (C) refers to competence = the need for competence during ESP online teaching; $r_{tt}$ = item-subscale value-revised correlation coefficient 1, A-2, etc., refers to autonomy item number during temporary design; I-1 to I-21 and the bold scores refer to the recoded items the highest loadings scores.

## Study 2. Multidimensional, validity and reliability of BPN model

This second study aims to assess the multidimensional model of the BPN items using CFA test and measure its validity and reliability of the ESP teachers' basic psychological needs for the online teaching scale (BPNOT) items. To assess the multidimensional BPN structure, we estimate the scale structure attained in the previous study applying the CFA test. Stemming from the BPN framework, it is assumed that the three BPN factor structures fit the data. Furthermore, to achieve the second aim, it is also assumed that all BPNOT models indicate satisfactory scores of reliabilities and multidimensional coefficients.

### *Method*

#### *Participants*

The surveyed samples involved 139 ESP teachers (56.8% females): 80 from social sciences (economics, psychology, law and education departments), 59 from science (engineering and medical department). Their ESP teaching experiences are between 39% ≥5 years and 61% ≤5 years, and

their average ages are from 26 to 43 ($M = 33.05$, $SD = 1.69$). The participants in the study 2 were different from the participant in the study 1. They were drawn from different population because the study involved samples from different provinces.

### *Instruments*

The preliminary model of BPNOT generated from the first study is then reflected in the ESP teachers' demographic questions like gender and year of teaching experience.

### *Validity estimates for autonomy dimension of BPNOT*

Autonomy in the classroom frameworks (Niemiec and Ryan 2009) was applied as the validity indicator for this dimension. In this stage, study participants were invited to rate each BPN item statement like 'It is interesting for my ESP students to independently evaluate their specific content knowledge and English skills during online learning', according to their online ESP teaching. These question items were constructed after we had a panel discussion between the authors, ESP researchers and psychology lecturers. Finally, the authors use the same Likert's scale to verify the validity of the autonomy dimension. The alpha coefficients of this dimension were 0.71. It indicated greater connectedness if it was compared to previous findings with alpha coefficient was only 0.68 (Tian, Han, and Huebner 2014). If it is compared to the two previous studies by Alamer (2022b) and Alamer and Marsh (2022), the reliability coefficient of the current finding indicated smaller coefficients value, but the construct of autonomy was still valid and acceptable.

### *Validity estimates for the relatedness dimension of BPNOT*

Relatedness in the classroom learning frameworks (Niemiec and Ryan 2009) was applied as the indicator of validity of this dimension. This dimension involved eight questions. The questions aimed to address how the ESP engaged their students to wider ESP environments and events (e.g. 'I engage my ESP students to specific content teachers, relevant ESP stakeholders using online platforms'). The participants were also invited to rate the questions using the same Likert's scale. Their answers from the eight questions were then calculated to verify the connectedness alpha coefficient scores. The score of alpha coefficients of this dimension was 0.78 in the current study indicating greater connectedness if it was compared to previous findings in which alpha score was only 0.69 (Tian, Han, and Huebner 2014), but if it is compared to the findings by Alamer (2022b) and Alamer and Marsh (2022), the reliability coefficient of the current finding is below their alpha score. Therefore, this second dimension was valid and acceptable although it has smaller score than the other two previous studies using ESEM analysis.

### *Validity estimates for competence dimension of BPNOT*

For ESP students' learning improvement or scholastic learning was assumed to be the key criterion for the competence category. As a result, the Scholastic Competence subscale (Tian, Han, and Huebner 2014) was employed as the validity indicator for this third dimension.

Under the umbrella of scholastic learning, the competence subscale was designed to assess how well ESP learners learn English skills and specific content knowledge at the same time. This subscale had seven items; each item contained a positive and negative description (e.g. 'My ESP students are competent to express their idea in relevant ESP communities during online learning' BUT 'My ESP students are not competent to express their idea in relevant ESP communities during online learning'). The participant was assigned to decide on either positive or negative representation. Next, they were invited to fill the questions by ticking the box with 'Really true' or 'Sort of true'. Each item was estimated using a four-point Likert scale. The coefficient scores of this BPN dimension were gained by the mean of the seven items. The good internal consistency of the competence subscale from the previous study was 0.72 (Tian, Han, and Huebner 2014). This study indicated Cronbach's alpha competence subscale value was 0.76. Consequently, this competence subscale performed better internal consistency.

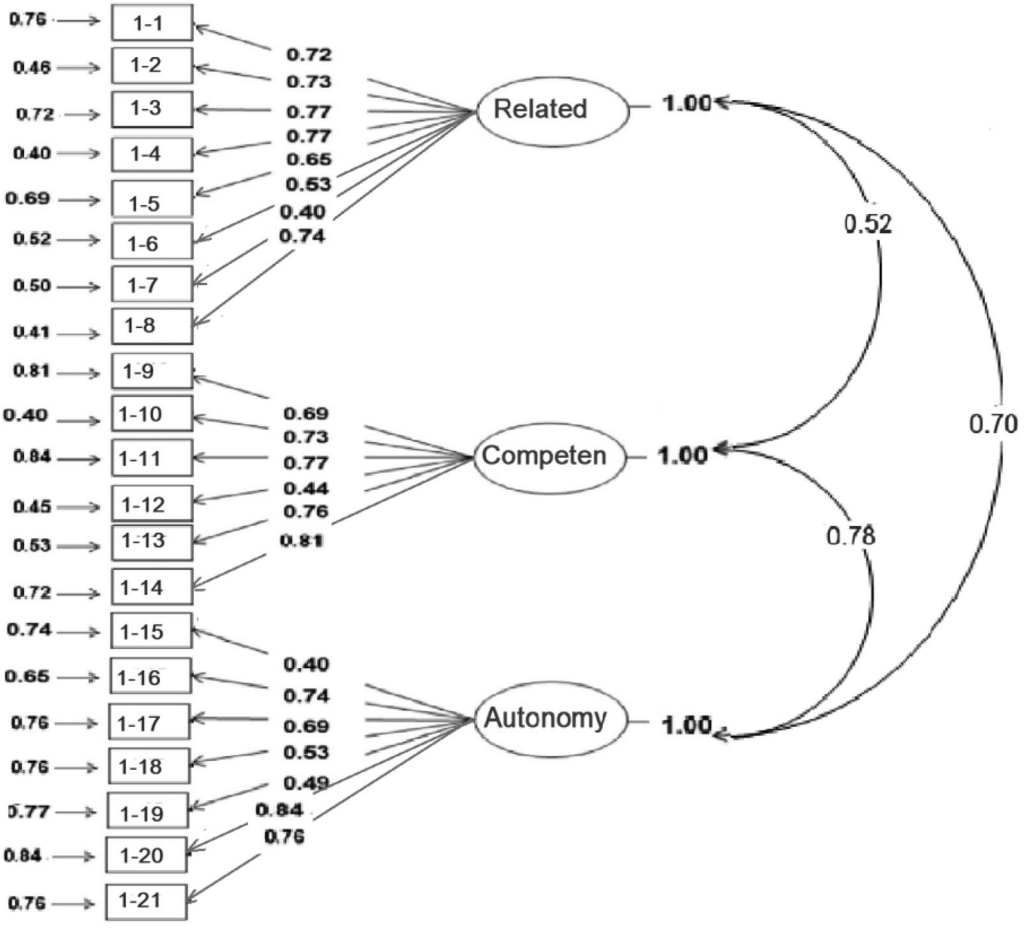


**Figure 1.** Confirmatory factor analysis of the BPNOT.

### *Procedure*

Study 2 applied the same procedure used in Study 1.

## *Results*

### *Confirmatory factor analysis*

A CFA using LISREL software is administered to estimate the construct validity of the BPNOT. Four fit indices, namely the non-normed comparative fit index (NNFI, CFI > 0.95), the root mean square error of approximation (RMSEA < 0.06) and the standardized root mean squared residual (SRMR < 0.06) are estimated to calculate the fit of the data goodness models. Previous studies indicate acceptable goodness of fit using CFA above 0.90, RMSEA and SRMR below 0.06 (Alamer 2022b; Costa et al. 2018; Tian, Han, and Huebner 2014). This present analysis reports that the 21 items of the scale with three-factor models indicate better good fit than the previous studies with: $X^2 = 166.12$ ($df = 87$), $p < .01$; CFI = 0.98; NNFI = 0.97; RMSEA = 0.054, 90% CI [0.042, 0.067]; SRMR = 0.048. All items indicate high and significant factor loadings ($p < .001$), ranging from 0.40 to 0.84 (see Figure 1).

### *Reliability*

In this stage, the reliability tests of the scale are justified using the Guttman split-half and Cronbach's alpha scores. The two tests are illustrated in Table 2.

**Table 2.** Reliability measure of the BPNOT.

| Category | Guttman split-half reliability | Cronbach's alpha coefficient |
|---|---|---|
| Autonomy | 0.79 | 0.84 |
| Relatedness | 0.67 | 0.80 |
| Competence | 0.69 | 0.79 |

Table 2 indicates acceptable reliability coefficients of the three BPNOT categories, autonomy, relatedness and competence. The estimation results indicate acceptable reliability coefficients of the scale, based on the previous studies' standards (Alamer 2022b; Alamer and Marsh 2022; Sellbom and Tellegen 2019).

### *Validity of the BPNOT*

The results of convergent validity are applied to estimate the degree of correlation between each need scale with the corresponding criterion measure. Meanwhile, the results of divergent validity are used to estimate the correlation degree between each needs scale with criteria for other need scales. The validity scores are presented in Table 3.

Table 3 describes acceptable validity coefficients of the three scale categories, autonomy, relatedness and competence. The estimation results indicate acceptable validity coefficients of the three scales of autonomy, relatedness and competence for both convergent and divergent values.

## Study 3. Invariance analysis across teaching experience and gender

This study aimed to test three domains, namely the CFA models using the third sample group to verify the results of the second study, invariance coefficients between female vs. male ESP teachers, and invariance coefficients across teaching experiences. In this stage, the author estimated the invariance tests to characterize the construct validity and to provide evidence about construct-irrelevant invariance (Alamer and Al Khateeb 2021; Dincer et al. 2019; McEown and Oga-Baldwin 2019; Oga-Baldwin et al. 2017; Noels, Lascano, and Saumure 2019; Vandenberg and Lance 2000; Wisniewski et al. 2020).

The preliminary procedure of the invariance test aimed to estimate whether the factor structure was equal across teaching experience and gender. Then, the CFA tests were applied to each sample group independently. A multigroup invariance was also administered using pattern of loadings, metric invariance and item intercepts across groups (Duggan, Garcia-Barrera, and Müller 2018). The configural invariance test is applied to estimate the predicted factor loadings by verifying whether the same items are associated with the same factor loadings between two different groups of participants (Tian, Han, and Huebner 2014). Metric invariance tests are then applied to interpret the fairness of the coefficient results. If the loading coefficients do not show an acceptable model of the invariance, factors and items tests are conducted. Finally, scalar invariance is administered to predict the equivalence of intercepts across groups of participants (Tian, Han, and Huebner 2014). The use of CFI tests ($\Delta CFI \leq 0.01$) to estimate the variance was also recommended in numerous previous studies (e.g. Alamer 2022a; Alamer and Marsh 2022; Costa et al. 2018; Wong 2019).

**Table 3.** Divergent and convergent validity of the BPNOT.

| Category | Autonomy | Relatedness scale | Competence scale |
|---|---|---|---|
| Autonomy | **0.652**** | 0.271** | 0.230** |
| Relatedness | 0.325** | **0.613**** | 0.412** |
| Competence | 0.331** | 0.421** | **0.641**** |

Note. **$p < .01$. The bold scores indicate convergent validity coefficients.

## Method

### Participants

This sample involved 151 ESP teachers (52.20% females): 83 from social sciences (economics, psychology, law and education departments) and 68 from science (engineering and medical department). ESP teaching experiences 38% ≥5 years and 62% ≤5years. The participants' ages were between 25 and 40 years ($M = 32.07$, $SD = 1.79$).

### Instruments

Study 3 applied the BPNOT instrument derived from the first study.

### Procedure

Study 3 also applied the same procedures as Study 1.

## Results

### Validation structure of the BPNOT

In the third study, the authors estimate the three-factor models in Study 1 using the data from the third group of participants or sample 3. The fit model analysis scores using LISREL program are acceptable: where $X^2 = 352.10$ ($df = 84$), $p < .01$; CFI and NNFI = 0.94; RMSEA = 0.061, 19% CI [0.051, 0.076]; SRMR = 0.051. As a result, all the three latent variables (loadings) are also significant ($p < .001$). The scores of CFA coefficients from 0.41 to 0.79 illustrate that all items have acceptable factor loadings. The third validation study verified the second validation results in the second study.

### The estimation of invariance

As an initial stage to assess the invariance between genders and length of teaching experiences, the authors administer four CFA tests discretely to prove the fit adequacy model for females and males and low and high-experienced teachers. The good fit model of the partial scalar invariance model is presented in Table 4.

Table 4 illustrates the results of multigroup invariance estimates using CFA tests to validate the fit model for different genders between males and females. First, the multigroup scores for males and females simultaneously indicate $X^2 = 153.73$ and 172.57 ($df = 84$ and 84), $p < 0.01$; NNFI = 94 and 94, CFI = 0.92 and 0.92, RMSEA = 0.62, 90% CI [0.048, 0.063] and 0.65, 90% CI [0.052, 0.062]; SRMR = 0.060 and 0.63. Meanwhile, the multigroup invariance scores for different years of teaching experience between low and high-experienced ESP teachers are $X^2 = 170.06$ and 178.21 ($df = 84$ and 84), $p < 0.01$; NNFI = 96 and 92, CFI = 0.94 and 0.94, RMSEA = 0.68, 90% CI [0.053, 0.071] and 0.62, 90% CI [0.051, 0.064]; SRMR = 0.52 and 0.53.

Having accomplished the four CFA tests, the author conducts a multiple-group analysis to indicate the differences across gender and teaching experience. The results of CFI tests across gender were 0.00 within the cutoff score limit of $\Delta CFI \leq 0.01$. According to the recommendation of the

**Table 4.** Invariance analysis across gender and teaching experience.

| Invariance model | $X^2$ | *df* | $\Delta X^2$ ($\Delta df$) | CFI | ΔCFI | RMSEA (09% CI) | SRMR | | NNFI |
|---|---|---|---|---|---|---|---|---|---|
| Gender | | | | | | | M | F | |
| Phase 1: Pattern | 414.22 | 186 | | 0.94 | | 0.062 (0.053–0.071) | 0.065 | 0.060 | 0.94 |
| Phase 2: Metric | 342.41 | 192 | 6.52(14) | 0.94 | 0.00 | 0.058 (0.048–0.063) | 0.059 | 0.061 | 0.94 |
| Phase 3: Scalar | 396.27 | 206 | 19.43 (18) | 0.94 | 0.00 | 0.060 (0.053–0.071) | 0.062 | 0.062 | 0.94 |
| Age | | | | | | | Low | High | |
| Phase 1: Pattern | 3670.74 | 186 | | 0.94 | | 0.063 (0.058–0.071) | 0.065 | 0.052 | 0.96 |
| Phase 2: Metric | 375.44 | 206 | 7.7 (14) | 0.94 | 0.00 | 0.058 (0.050–0.063) | 0.053 | 0.053 | 0.96 |
| Phase 3: Scalar | 527.38 | 192 | 151.94 (18) | 0.92 | 0.00 | 0.073 (0.062–0.075) | 0.065 | 0.071 | 0.92 |
| Partial scalar | 428.17 | 195 | 26.18 (10) | 0.94 | 0.00 | 0.053 (0.049–0.063) | 0.057 | 0.057 | 0.94 |

**Table 5.** The descriptive statistics of BPNOT based on gender and teaching experience.

| | Gender | | | | Year | | | | Factor | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | <5 (low) | | >5 (high) | | | | |
| | ($n = 62$) | | ($n = 79$) | | ($n = 93$) | | ($n = 58$) | | | | |
| Scale | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | Gender F (1, 643) | Year F (1, 643) | Gender by year F (1, 643) |
| Autonomy | 3.98 | 1.16 | 4.10 | 1.03 | 4.04 | 0.92 | 4.76 | 0.86 | 0.03 | 39.82** | 0.02 |
| Relatedness | 4.40 | 0.92 | 4.04 | 0.86 | 4.19 | 0.92 | 4.92 | 0.92 | 2.39 | 1.22 | 1.12 |
| Competence | 3.92 | 0.96 | 4.41 | 0.48 | 4.71 | 0.74 | 4.17 | 0.17 | 0.92 | 2.43 | 2.26 |

**$P < .01$.

previous study, these results indicated a satisfactory model of scalar invariance (Costa et al. 2018). Moreover, the difference between the metric and the scalar invariance models across teaching experiences was $\Delta CFI \leq 0.00$, which was within the tiered levels of 0.01. Interestingly, the CFA test results for the two different teaching experience groups also support scalar invariance since the score of ΔCFI is the same 0.00. Using these test–retest procedures, partial scalar invariance between low and high teaching experience groups are reserved after releasing the constant mean value of all BPNOT items from item number 1–21.

### *Gender and teaching experience differences*

To test the differences between gender and teaching experiences, descriptive statistics were estimated. Means and standard of deviation are reported across gender and year of teaching. A MANOVA was applied to estimate the descriptive statistics. The result of the analysis is described in Table 5.

Table 5 illustrates the scores of the descriptive statistics. The analysis result indicates that the length of teaching experience has a statistically significant effect on interaction, but the main effect of gender is not significant (Wilks' $F_{year}$ (4, 122) = 31.12, $p < .001$; Wilks' $F_{gender}$ (4, 122) = 0.72).

## Study 4. Predictive validity and reliability of the BPNOT

The fourth developmental study was designed to probe the predictive validity and reliability of the BPNOT scale. Previous studies have proved that universal BPN fulfillment is positively interrelated to students' motivational, autonomous and relatedness dimensions: The higher their fulfillments of motivational dimensions, the more motivated they are (Alamer 2022b; Alamer and Al Khateeb 2021; Costa et al. 2018). Thus, in the last developmental study, the authors used motivational factor in MALL learning by Alamer and Al Khateeb (2021) to estimate the criterion-related validity of the scale.

### *Method*

#### *Participants*

This sample involved 149 ESP teachers (51.05% females): 89 from social sciences (economics, psychology, law and education departments) and 60 from science (engineering and medical department). ESP teaching experiences 41% ≥5 years and 59% ≤5 years. The ESP teachers' teaching experiences were between 27 and 42 ($M = 34.03$, $SD = 1.72$).

#### *Instruments*

The BPNOT from the first developmental stage and the motivational factor in language learning using mobile-assisted language learning (MALL) initiated by Alamer and Al Khateeb (2021), were administered in this phase. This motivational factor in language learning using mobile-assisted language learning (MALL) Alamer and Al Khateeb (2021) assesses the affective and affective

components of online teaching satisfaction. It is a 22-item ACRAII MALL instrument with five dimensions: autonomy, competence, relatedness, intrinsic and identified orientations of online learning were applied to reflect the targeted validity. This scale was primarily designed to assess EFL learners and then adapted to the teaching of ESP.

The scale adaptation became teachers' autonomy category, which refers to teachers' subjective, cognitive and technological evaluation of online ESP teaching using internal standards of technological use. This autonomy motivation scale has four questions (e.g. 'I have a freedom to decide my own ESP teaching in online context', 'I have freedom to choose ESP tasks to be implemented in ESP teaching'), which teachers' rate on a five-point Likert scale, 'strongly disagree', 'disagree', 'neutral', 'agree' and 'strongly agree'. The respondents rated their answers by ticking agree or disagree columns (Likert 1932). Higher scores suggest a higher positive online teaching attitude and satisfaction. Positive online teaching attitudes refer to a high frequency of positive emotions experienced online teaching. Conversely, negative attitudes refer to negative emotions experienced during online teaching. The internal reliability of the previous motivational scale was 0.95, its targeted reliability score after the second test was 0.82 (Alamer and Al Khateeb 2021). Meanwhile, the alpha scores of the scale are 0.95, 0.97, 0.90, 0.96 and 0.91 for the four subscales: Appreciation, Responsiveness, Proficiency, the scores for each scale category were within the coverage of the scale index. This method has also been implemented widely by previous researchers (Alamer and Marsh 2022; Alamer and Al Khateeb 2021; Weinstein and Ryan 2010).

### *Procedure*

The procedures of the data collection at this final developmental study were similar to previous phases. The volunteers were also different from the previous developmental stages. The participants were also members of the I-READ association. The survey was administered through emails and participants' WhatsApp groups. The study participants submitted the first and the second piloted BPNOT questionnaires in January and February 2022 across four-week intervals.

## *Results*

### *Reliability scores across intervals*

Test–retest procedures at the last developmental phase are estimated using the Pearson Product Moment test. The test results across four-week intervals show that the alpha coefficient of the three BPNOT dimensions is 0.73, 0.71 and 0.74.

### *Predictive validity*

The predictive validity is estimated using a multilevel test. It is administered to define the position of the three dimensions of the BPNOT for ESP online teaching. The three need constructs of the BPNOT (Time 1) are treated as independent variable, and online teaching satisfaction (Time 2) constructs are treated as the dependent variable. The results of the predictive variable are shown in Table 6.

Table 6 illustrates the correlations among the three BPNOT dimensions indicate positive correlation with ESP online teaching satisfaction ($r = 0.52$, $p < .01$), ($r = 0.78$, $p < .01$), ($r = 0.39$, $p < .01$) with 31% gain of multilevel regression. The second criterion variable also indicated a confident elevation in the regression scores. Finally, the multilevel regression scores demonstrated that all BPNOT dimensions scores show significant correlation to online teaching satisfaction.

## Discussion, conclusion and recommendation

A number of studies advocate that teachers' motivational factors contribute to a positive classroom atmosphere and students' learning outcome (Alamer 2022a; Alamer and Marsh 2022; Arifani et al. 2021; Kaufmann, Sellnow, and Frisby 2016; Tian, Han, and Huebner 2014; Wong 2019). As formerly acknowledged, however, most of them have scrutinized motivational factors in traditional and

**Table 6.** Multilevel regression test of BPNOT.

| Model | *B* | *SE* | β | $R^2$ | $\Delta R^2$ | |
|---|---|---|---|---|---|---|
| *Phase 1* | | | | 0.02 | 0.02 | F (3, 237) = 0.79 |
| Constant | 6.24 | 0.91 | | | | |
| Gender | −0.41 | 0.36 | 0.06 | | | |
| Year of teaching | 0.01 | 0.08 | 0.02 | | | |
| *Phase 2* | | | | 0.31 | 0.33 | F (6, 213) = 27.21*** |
| Constant | −1.33 | 0.82 | | | | |
| Gender | −0.31 | 0.32 | −0.06 | | | |
| Year of teaching | −0.02 | 0.08 | −0.02 | | | |
| Autonomy | 0.52 | 0.24 | 0.32** | | | |
| Relatedness | 0.78 | 0.31 | 0.31*** | | | |
| Competence | 0.39 | 0.31 | 0.22* | | | |

*$p < .05$, **$p < .01$, ***$p < .001$.

blended classroom platforms using universal motivational scales (e.g. Clément et al. 2020; Cutri, Mena, and Whiting 2020; Deci and Ryan 2000; Dincer et al. 2019; McEown and Oga-Baldwin 2019) in broader EFL context but they are not applicable to ESP online teaching and learning. Teaching ESP within the EFL contexts involves more comprehensive efforts because it involves specific content knowledge and 'unideal ESP teachers' educational background' and much less is understood about how ESP teachers' motivational factors are fulfilled in online platforms. Thus, this four-developmental study proposed preliminary validation as an attempt to fill this lacuna in the ESP and EFL literature.

The first study constructs a conceptual model for ESP teachers' motivational fulfillment during online teaching and operational definition of this scale. ESP teachers' motivational fulfillment may be labeled as a perceived fulfillment of autonomy, competence and relatedness dimensions during online class. Created from previous studies, this conceptual model and operational definition incorporates constructs from the universal motivational needs in traditional and blended instructions (see Alamer 2022b; Alamer and Marsh 2022; Arifani et al. 2021; Tian, Han, and Huebner 2014; Alamer and Al Khateeb 2021; Wong 2019), as well as online teaching constructs from the first stage of this present developmental study. Two important implications are drawn from the first sample-group questionnaire analyses. First, the online ESP teachers confirmed much of what Deci and Ryan (2000) claim about autonomy, connectedness and competence fulfillment during online teaching. ESP teachers mention that most of the questionnaire items are in line with what they trust to foster their online ESP courses. Second, the ESP teachers also confirm the extending of items in both Deci and Ryan (2000) and Alamer and Al Khateeb (2021) to theoretical frameworks on basic psychological needs to include online teaching contexts. The first stage of this developmental study confirms several elements of basic psychological fulfillment proposed in previous studies and extends them to also elucidate ESP teachers' perceptions about their ESP learners' fulfillment of autonomy, connectedness and competence in an online instruction.

The second stage of this study reports initial validation of the newly developed basic psychological fulfillment scale for ESP teachers in online instruction. The BPNOT is a three-factor scale, which is constructed to assess ESP teachers' fulfillment of psychological needs and ESP online course. Third, scores of divergent and convergent validities also indicate acceptable coefficients. This result is corroborated by previous studies (Alamer 2022b; Alamer and Marsh 2022; Tian, Han, and Huebner 2014; Wong 2019). These previous findings demonstrated that fulfillment of the psychological factors became a positive precursor of an individual's motivation (Alamer and Marsh 2022; Clément et al. 2020; Noels, Lascano, and Saumure 2019; Shirvan and Alamer 2022; Volodina, Lindner, and Retelsdorf 2019). Fourth, the estimation of invariance of the scale was generally acceptable. The analysis results of the four studies from study 1 to study 4 cumulatively provide substantial evidence of the reliability and validity of the BPNOT with ESP teachers across the different universities. However, the study indicates that the three scalar invariance subscales were acceptable across different teaching experiences (low and high). The 21-item of BPNOT is highly consistent with an alpha coefficient of 0.81.

In addition, the validity scores of the scale significantly support the convergent validity of the instrument. The validity analysis also supports that BPNOT is a theoretically accepted scale. Based on this preliminary analysis, we can conclude that BPNOT is a valid and reliable scale for assessing the diverse dimensions of ESP teachers' psychological fulfillment in online instruction. Thus, the BPNOT contributes to existing psychometric scales and body of knowledge in online instruction (Alamer 2022a; Alamer and Marsh 2022; Arifani et al. 2021; Kaufmann, Sellnow, and Frisby 2016; Noels, Lascano, and Saumure 2019; Shirvan and Alamer 2022; Tian, Han, and Huebner 2014; Wong 2019). Practically, the scale could help ESP teachers, program coordinators and policymakers in promoting motivational factors through this BPNOT scale. For instance, ESP teachers who realize that their students' connectedness needs are not being fulfilled during online teaching can develop their future plans to enhance connections between the ESP students and ESP practitioners, communities and stakeholders in online instruction. This relatedness fulfillment, in turn, may encourage more positive learning outcomes, such as increasing ESP students' specific content knowledge and English skills from their engagement with relevant ESP communities through online platforms.

## Conclusion

To sum up, this four-phase study has created and proposed a newly psychometric ESP online teaching scale using self-determination theory and online teaching attitude. This scale indicates that the role of teachers is critical to the fulfillment of a positive atmosphere in online instruction. As in the case in face-to-face and blended instructions, an online classroom atmosphere is achieved when the teachers demonstrate high fulfillment of psychological factors. The findings provide initial evidence of psychometric constructs of BPNOT which may be utilized by all ESP teachers in online class. Although the development and validation of this BPNOT scale is compelling, this initial study also has its limitations. The samples from three different provinces in Indonesia may be relatively small and do not represent the bigger populations of Indonesian ESP teachers in general. Further studies are needed to assess the issue of generalizability of the findings to broader national or international context. Second, the survey data are collected through ESP teacher's self-reports, which potentially cause inconsistency of variance issues. Third, this research did not compare the results of EFA and CFA with ESEM. The construct validity and correlational factor of the BPNOT might be different from the results of the ESEM measures. Therefore, further BPNOT researchers can conduct more comprehensive multimethod analysis procedure using ESEM measures to compare the analysis results.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Notes on contributors

***Yudhi Arifani*** is an Associate Professor in English Education. His research interests involve EFL teacher professional development, psychology of teaching and learning, and CALL teacher pedagogy.

***Jumadi Jumadi*** is a Professor in the Faculty of Education. His major research interests involve English for Specific Purposes (ESP) and motivational factors. Faculty of Education, Universitas Lambung Mangkurat, Indonesia.

***Agus Wardhono*** is a Professor in English language and education. His major research interests involve CALL teaching and learning and English for Specific Purposes (ESP). English Language Education Department, Universitas Ronggolawe Tuban, Indonesia.

***Syaadiah Arifin*** is an Associate Professor in English Education. Her research interests involve EFL teaching and learning. English Department, Universitas Muhammadiyah Prof. Dr Hamka Jakarta, Indonesia.

***Hidayat Ma'ruf*** is an Associate Professor at Psychology Department, UIN Antasari Banjasmasin, Indonesia. His research interest involves motivational factor and teacher professional development.

## ORCID

*Yudhi Arifani* http://orcid.org/0000-0003-4615-8439
*Jumadi Jumadi* http://orcid.org/0000-0002-4088-2541
*Agus Wardhono* http://orcid.org/0000-0003-0372-2597
*Syaadiah Arifin* http://orcid.org/0000-0002-1710-0257
*Hidayat Ma'ruf* http://orcid.org/0000-0002-8071-4198

## References

Alamer, A. 2022a. "Basic Psychological Needs, Motivational Orientations, Effort, and Vocabulary Knowledge: A Comprehensive Model." *Studies in Second Language Acquisition* 44 (1): 164–184. doi:10.1017/S027226312100005X.

Alamer, A. 2022b. "Exploratory Structural Equation Modeling (ESEM) and Bifactor ESEM for Construct Validation Purposes: Guidelines and Applied Example." *Research Methods in Applied Linguistics* 1 (1): 1–13. doi:10.1016/j.rmal.2022.100005.

Alamer, A., and A. Al Khateeb. 2021. "Effects of Using the WhatsApp Application on Language Learners' Motivation: A Controlled Investigation Using Structural Equation Modelling." *Computer Assisted Language Learning*, 1–27. doi:10.1080/09588221.2021.1903042.

Alamer, A., and H. Marsh. 2022. "Exploratory Structural Equation Modeling in Second Language Research: An Applied Example Using the Dualistic Model of Passion." *Studies in Second Language Acquisition*, 1–24. doi:10.1017/S0272263121000863.

Arifani, Y., R. Mindari, N. Hidayat, and A. S. Wicaksono. 2021. "Basic Psychological Needs of In-service EFL Teachers in Blended Professional Training: Voices of Teachers and Students." *Interactive Learning Environment* 29 (4): 1–14. doi:10.1080/10494820.2021.1943691.

Carreira, J. M. 2012. "Motivational Orientations and Psychological Needs in EFL Learning among Elementary School Students in Japan." *System* 40 (2): 191–202. doi:10.1016/j.system.2012.02.001.

Clément, L., C. Fernet, A. J. S. Morin, and S. Austin. 2020. "In Whom College Teachers Trust? On the Role of Specific Trust Referents and Basic Psychological Needs in Optimal Functioning at Work." *Higher Education* 80 (3): 511–530. doi:10.1007/s10734-019-00496-z.

Costa, S., S. Ingoglia, C. Inguglia, F. Liga, A. Lo Coco, and R. Larcan. 2018. "Psychometric Evaluation of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) in Italy." *Measurement and Evaluation in Counseling and Development* 51 (3): 193–206. doi:10.1080/07481756.2017.1347021.

Cutri, R. M., J. Mena, and E. F. Whiting. 2020. "Faculty Readiness for Online Crisis Teaching: Transitioning to Online Teaching During the COVID-19 Pandemic." *European Journal of Teacher Education* 43 (4): 523–541. doi:10.1080/02619768.2020.1815702.

Deci, E. L., and R. M. Ryan. 2000. "The 'What' and 'Why' of Goal Pursuits: Human Needs and the Self-Determination of Behavior." *Psychological Inquiry* 11 (4): 227–268. doi:10.1207/S15327965PLI1104_01.

Dincer, A., S. Yeşilyurt, K. A. Noels, and D. I. Vargas Lascano. 2019. "Self-determination and Classroom Engagement of EFL Learners: A Mixed-Methods Study of the Self-System Model of Motivational Development." *Sage Open* 9 (2): 2158244019853913. doi:10.1177/215824401985391.

Duggan, E. C., M. A. Garcia-Barrera, and U. Müller. 2018. "Derivation, Replication, and Validity Analyses of a Screener for the Behavioral Assessment of Executive Functions in Young Adults." *Assessment* 25 (7): 867–884. doi:10.1177/2F1073191116670511.

Durksen, T. L., M.-W. Chu, Z. F. Ahmad, A. I. Radil, and L. M. Daniels. 2016. "Motivation in a MOOC: A Probabilistic Analysis of Online Learners' Basic Psychological Needs." *Social Psychology of Education* 19 (2): 241–260. doi:10.1007/s11218-015-9331-9.

Hermessi, T. 2022. "Motivation for Learning EFL in Tunisia: An Eclectic Theoretical Approach and a Structural Equation Modeling Approach." *Innovation in Language Learning and Teaching*, 1–19. doi:10.1080/17501229.2021.2012477.

Kaufmann, R., D. D. Sellnow, and B. N. Frisby. 2016. "The Development and Validation of the Online Learning Climate Scale (OLCS)." *Communication Education* 65 (3): 307–321. doi:10.1080/03634523.2015.1101778.

Koenen, A.-K., J. L. Spilt, and G. Kelchtermans. 2022. "Understanding Teachers' Experiences of Classroom Relationships." *Teaching and Teacher Education* 109: 103573. doi:10.1016/j.tate.2021.103573.

Likert, R. 1932. "A Technique for the Measurement of Attitudes." *Archives of Psychology* 22 (140): 55.

McEown, M. S., and W. Q. Oga-Baldwin. 2019. "Self-determination for All Language Learners: New Applications for Formal Language Education." *System* 86: 1–11. doi:10.1016/j.system.2019.102124.

Meihami, H., and F. Husseini. 2022. "A Self-Determination Theory Into the Psychological Needs of CALL: Probing EFL Teachers' Autobiographical Narratives." *Education and Information Technologies*, 1–23. doi:10.1007/s10639-022-10964-2.

Niemiec, C. P., and R. M. Ryan. 2009. "Autonomy, Competence, and Relatedness in the Classroom: Applying Self-Determination Theory to Educational Practice." *Theory and Research in Education* 7 (2): 133–144. doi:10.1177/2F1477878509104318.

Noels, K. A., D. I. V. Lascano, and K. Saumure. 2019. "The Development of Self-determination Across the Language Course: Trajectories of Motivational Change and the Dynamic Interplay of Psychological Needs, Orientations, and Engagement." *Studies in Second Language Acquisition* 41 (4): 821–851. doi:10.1017/S0272263118000189.

Oga-Baldwin, W. Q., Y. Nakata, P. Parker, and R. M. Ryan. 2017. "Motivating Young Language Learners: A Longitudinal Model of Self-Determined Motivation in Elementary School Foreign Language Classes." *Contemporary Educational Psychology* 49: 140–150. doi:10.1016/j.cedpsych.2017.01.010.

Satar, H. M., and S. Akcan. 2018. "Pre-service EFL Teachers' Online Participation, Interaction, and Social Presence." *Language Learning & Technology* 22 (1): 157–183. doi:10125/44586.

Sellbom, M., and A. Tellegen. 2019. "Factor Analysis in Psychological Assessment Research: Common Pitfalls and Recommendations." *Psychological Assessment* 31 (12): 1428. doi:10.1037/pas0000623.

Shirvan, M. E., and A. Alamer. 2022. "Modeling the Interplay of EFL Learners' Basic Psychological Needs, Grit and L2 Achievement." *Journal of Multilingual and Multicultural Development*, 1–17. doi:10.1080/01434632.2022.2075002.

Soudien, C. 2020. "Complexities of Difference and Their Significance for Managing Inequality in Learning: Lessons from the COVID-19 Crisis." *Prospects* 49 (1): 59–67. doi:10.1007/s11125-020-09486-x.

Tamim, S. R. 2020. "Analyzing the Complexities of Online Education Systems: A Systems Thinking Perspective." *TechTrends* 64 (5): 740–750. doi:10.1007/s11528-020-00538-9.

Tian, L., M. Han, and E. S. Huebner. 2014. "Preliminary Development of the Adolescent Students' Basic Psychological Needs at School Scale." *Journal of Adolescence* 37 (3): 257–267. doi:10.1016/j.adolescence.2014.01.005.

Vandenberg, R. J., and C. E. Lance. 2000. "A Review and Synthesis of the Measurement Invariance Literature: Suggestions, Practices, and Recommendations for Organizational Research." *Organizational Research Methods* 3 (1): 4–70. doi:10.1177/2F109442810031002.

van Roy, R., and B. Zaman. 2019. "Unravelling the Ambivalent Motivational Power of Gamification: A Basic Psychological Needs Perspective." *International Journal of Human-Computer Studies* 127: 38–50. doi:10.1016/j.ijhcs.2018.04.009.

Volodina, A., C. Lindner, and J. Retelsdorf. 2019. "Personality Traits and Basic Psychological Need Satisfaction: Their Relationship to Apprentices' Life Satisfaction and Their Satisfaction with Vocational Education and Training." *International Journal of Educational Research* 93: 197–209. doi:10.1016/j.ijer.2018.11.003.

Weinstein, N., and R. M. Ryan. 2010. "When Helping Helps: Autonomous Motivation for Prosocial Behavior and its Influence on Well-Being for the Helper and Recipient." *Journal of Personality and Social Psychology* 98: 222–244. doi:10.1037/a0016984.

Wisniewski, B., K. Zierer, M. Dresel, and M. Daumiller. 2020. "Obtaining Secondary Students' Perceptions of Instructional Quality: Two-Level Structure and Measurement Invariance." *Learning and Instruction* 66: 101303. doi:10.1016/j.learninstruc.2020.101303.

Wong, R. 2019. "Basis Psychological Needs of Students in Blended Learning." *Interactive Learning Environments*, 1–15. doi:10.1080/10494820.2019.1703010.

Yang, X. 2021. "How Can EFL Teachers Make Their Questions More Interactive with Students? Interpersonal Patterns of Teacher Questions." *System* 99: 102509. doi:10.1016/j.system.2021.102509.

Zhou, J., E. S. Huebner, and L. Tian. 2021. "The Reciprocal Relations among Basic Psychological Need Satisfaction at School, Positivity and Academic Achievement in Chinese Early Adolescents." *Learning and Instruction* 71: 101370. doi:10.1016/j.learninstruc.2020.101370.