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Teachers' professional development needs: a critical analysis of TALIS through structural equation modelling

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ABSTRACT

This paper aims to contribute to TALIS corpus of critical research literature by exploring teachers' voice through structural equation modelling, to challenge teachers' professional development needs based on TALIS 2018. 153,674 teachers from 48 countries were included in the analysis. Shaped by TALIS technical framework and instrumental conception of teaching and the role of teachers, teachers' professional development needs were grouped into three dimensions: what to teach (content, pedagogical and curricular knowledge), how to teach (teaching and assessment knowledge) and who to teach (contextual knowledge). To allow for a more holistic understanding of teaching and learning and teachers' development, we propose re-thinking TALIS 2024 conceptual framework, to move forward from technical questions about teaching and effectiveness. Transformative pedagogies might be better aligned with the current school reality and might be considered as a new framework to update TALIS survey, and embrace teachers' professional development needs, and related plans, from an expanded perspective.

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KEYWORDS
Teacher education; teacher professional learning; educational research; teaching practice; teaching profession

Introduction

More than 50 years of research on teachers' professional development needs, reinforce the value of teachers' voice and its impact in shaping models of in-service training (Lawrence 1975). Examples from Turkey (Yilmaz and Bikmaz 2021), China (Gong, MacPhail, and Guberman 2023), England, Ireland, Scotland (Czerniawski, Guberman, and MacPhail 2017); Israel, Japan, Australia, Spain, Belgium, Slovenia (Van der Klink et al. 2017), and Sweden (Karlberg and Bezzina 2022) confirm the significance and longevity of this research topic, yet the professionalisation trajectories and educational policies might differ between countries. Whilst there is solid evidence that advocates for professional development as a key strategy for improving teaching practice and the learning of students (Doğan and Yurtseven 2018; Tannehill et al. 2021), there are few professional development plans designed and tailored to teachers' needs and realities (Feiman-Nemser 2010). Moreover, most professional development programmes support instrumental conceptions of teaching and the role of teachers, and forms of professional

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learning that constraint the possibility of more authentic types of professional learning and consequently, teacher development (Hardy 2018; Mockler 2022). As Keay, Carse, and Jess (2019) highlights, good teacher professional learning is contextualised and connected to teachers' problems of practice, curiosities and prior knowledge. In the same vein, innovative professional development should entail re-thinking time, embedding active learning, relevance to practice, collaboration, coaching, feedback, and reflection (Caena and Vuorikari 2022). Unfortunately, despite the importance of teacher voice, as the literature acknowledge 'numbers' collected from surveys are commonly used as tools for educational governance and data-driven decision-making (Mandinach and Gummer 2015). That is the case, for instance, for some professional development programmes that are informed and designed using data from international surveys on teachers (e.g. Teaching and Learning International Survey – TALIS).

The problem is when data (quantitative or qualitative) from those surveys, such as TALIS, that do not report information on its psychometric properties, is used to inform policy decision-making and relevant aspects of teachers' professionalism, including professional development needs (Mandinach and Gummer 2015). Psychometric information of surveys would allow the educational and research community to be aware for instance of the survey validity and reliability scores. Currently, no study has been found concerned about whether TALIS items gather valid and reliable information on teachers' professional development needs. Thus, given the influence of TALIS data to inform policy decision-making and pedagogical practice (Sørensen 2017), an up to date and reliable understanding of teachers' perception about their professionalism may shed further guidance to align their professional learning needs, with the design and plans of professional development programmes (Darling-Hammond and Hyler 2020; Dogan and Adams 2020; Nordgren et al. 2021; Zhang, Shi, and Lin 2020). Having outlined the rationale, in the present study we hope to further explore TALIS's view of ideal professional development as portrayed in the teachers' professional development needs survey items. In doing so, structural equation modelling will be used to verify the dimensions that TALIS' items are grouped (if any). With this aim, in the next sections we provide a rationale for the methodology used in this study. Then, we present some critical research done on TALIS to justify the purpose of the present study. Finally, we present the latest findings on teachers' professional knowledge and its relationship with models of professional development as a theoretical framework to explore and discuss our findings on TALIS data for teachers' professional learning needs.

Psychometric properties as a measure of a survey quality and its implications

According to literature on questionnaire design, validation and usage (Carretero-Dios and Pérez 2005; DeVellis and Thorpe 2022; Furr 2022; NCME, AERA 2014), the validity and reliability of an instrument are based on two aspects: (1) the theoretical framework used to frame the survey construct, dimensions and items, and (2) satisfactory psychometric properties. On the one hand, the theoretical framework grounds the construct to assess, its dimensions (factors) and the items of the questionnaire (DeVellis and Thorpe 2022). The construct is the operational and conceptual specification of what is to be measured. In other words, it is the semantic definition of the concept to evaluate. Such a definition would facilitate the process to detect the operational dimensions of the construct from

a theoretical perspective (Carretero-Dios and Pérez 2005). The questionnaire items are the functional expression of the dimensions to be assessed. Each dimension is defined by a set of several items, as a measure to collect the extremes of the dimension with evidence of reliability. Thus, items must have their origin in each dimension from a theoretical point of view (NCME, AERA 2014).

On the other hand, psychometric data are defined as outcome measures of the statistical analysis of the items, the dimensionality of the instrument (internal structure) and the reliability of the instrument (Carretero-Dios and Pérez 2005; DeVellis and Thorpe 2022; Furr 2022; NCME, AERA 2014). First, the statistical analysis of the items reports whether the items maximise the variance of the questionnaire, have high discriminatory power, high standard deviation, and mean response scores around the midpoint of the scale (Furr 2022). The aim is that items of the same dimension correlate with each other. Second, the dimensionality study of the instrument (internal structure) allows us to check whether the items are grouped to support the proposed theoretical dimensions (DeVellis and Thorpe 2022; Furr 2022). This is done by means of exploratory and confirmatory factor analysis through structural equation modelling. Finally, the estimation of the reliability of the instrument makes it possible to know the internal consistency of the items clustered in each dimension by means of reliability coefficients (DeVellis and Thorpe 2022).

In summary, the psychometric properties are a statistical representation of the theoretical framework of the instrument, because the goal of psychometric data and factorial structure is to estimate the degree to which the questionnaire's items and dimensions (factors), structure the construct to be evaluated and in which the practical measures will be based (Furr 2022). The structural equation modelling as a representative measure of the psychometric analysis allows the exploration and confirmation of the dimensions that make operative the construct to assess (Mettert et al. 2020). Hence, psychometric data are crucial to ensure that a questionnaire evaluates exactly what it is intended to measure (Carretero-Dios and Pérez 2005; DeVellis and Thorpe 2022; Furr 2022; NCME, AERA 2014), and questionnaires that lack psychometric data or good psychometric properties provide questionable results on which to build effective programmes (Hair et al. 2018).

As evidenced above, structural equation modelling is a comprehensive and flexible statistical technique for testing complex relationships between variables, including both observed and latent, with multiple pathways in various research fields, such as education (Wang, Hefetz, and Liberman 2017). Sun and Xia (2018), for instance, used structural equation modelling to analyse TALIS 2013 data in attempts to examine whether, and to what extent, teacher perceived distributed leadership is associated with teacher self-efficacy and their job satisfaction. Additionally, Chen et al. (2020) explored the relationship between teacher self-efficacy and teacher teaching practice in junior high schools using TALIS 2018 survey database through structural equation modelling including two constructs (classroom management efficacy and instruction efficacy). Based on the data of TALIS 2018, Xie et al. (2023) also examined through structural equation modelling, the effect of collaboration forms (i.e. professional collaboration, and exchange and coordination) on teaching practices (i.e. clarity of instruction, cognitive activation, and classroom assessment).

In relation to the present study, teachers' responses to TALIS and their reliability and validity will depend on the psychometric properties of the questionnaire. The work of Sorensen and Robertson (2018) further justify the rationale of the selected methodology

for the present study, as they critically pointed out how the TALIS items addressing pedagogy and teacher professionalism are 'so simplistic that survey responses cannot question or contradict these policy preferences' (p. 23). If TALIS does not present psychometric data, the results reported by TALIS will potentially have no practical value or at least its findings should be cautiously considered in particular if they are to inform policy that guides teachers' pedagogical practices and professional development needs (Keay, Carse, and Jess 2019; Mandinach and Gummer 2015).

Literature review

Teachers' professional development needs. A TALIS perspective

The Organisation for Economic Co-operation and Development (OECD) organises TALIS to study principals' and teachers' working conditions, beliefs, and attitudes, as well as the larger school environment, including teachers' professional development needs (Liu and Liao 2019; Veletić and Olsen 2021). Due to the high number of participating countries, TALIS is the largest ongoing large-scale survey of teachers, school leaders and their learning environments about teaching and pedagogical approaches that aims to impact current educational practice (Ainley and Carstens 2018). Initiated in 2008 by the OECD, they distributed the survey in five-year cycles. Forty-eight countries or education systems participated in the most recent cycle in 2018 (Zhang et al. forthcoming). TALIS programme focuses on teachers' work and school leadership and is aimed at generating knowledge about teachers (Benoliel and Berkovich 2021), being the first international survey to focus on the working conditions of teachers and the learning environment in schools:

> The 2018 framework addresses enduring themes and priorities related to professional characteristics and pedagogical practices at the institutional and individual levels: teachers' educational background and initial preparation; their professional development, instructional and professional practices; self-efficacy and job satisfaction; and issues of school leadership, feedback systems, and school climate. It also addresses emerging policy and research interests related to innovation and teaching in diverse environments and settings. (OECD 2018, 4)

Specifically, for the community of teacher education, TALIS includes indicators based on teachers' perceptions about their needs and the requirements of educational curriculums (Ainley and Carstens 2018) and defines professional development as activities designed to develop an individual's skills, knowledge, and expertise as a teacher (OECD 2019). Most of TALIS studies have tended to explore its outcomes without a critical lens or analysis (e.g. Barrera-Pedemonte 2016; Jensen et al. 2012). However, there are key studies that critically analysed standardised surveys, mainly TALIS 2008 and 2013, either to challenge OECD conceptualisation of the ideal teacher through the notion of teacher professionalism (Berkovich and Benoliel 2020a), or by focusing on TALIS' teacher self-efficacy items framed by a societal orientation of education (Benoliel and Berkovich 2021), or by a critical discourse analysis of OECD effective teaching (Berkovich and Benoliel 2020b). The political construction of TALIS and the (dis)engagement of the main policy actors involved has also been critically explored in-depth drawing on critical realism (Sørensen 2017) and the notion of ordinalization (Sørensen 2021; Sørensen and Robertson 2020). Most of these studies highlight a conservative and biased representation of teachers and teaching

(Berkovich and Benoliel 2019) that is trying to sell the brand of *Quality Teacher*^{TM}, by focusing and developing the form and content of their pedagogical practice through TALIS (Sorensen and Robertson 2018). TALIS items and questions profile teachers as powerful figures of authority and knowledge but also as 'professionals'. In other words, teachers as workers that need to be up to date in relation to latest knowledge and innovate teaching pedagogies (Ainley and Carstens 2018). There are, however, alternative conceptions of teachers' knowledge and models for professional development.

Teachers' professional knowledge and models of professional development

Exploring philosophical and educational literature and its contribution to professional learning, Winch, Oancea and Orchard (2015) identified three interconnected and complementary aspects of teachers' professional knowledge: (i) situated understanding/tacit/intuitive knowledge (know-how); (ii) technical knowledge (technical know-how); and (iii) critical reflection (scholarship). Each of these types of knowledge is linked with different conceptions of teaching, that consider teaching as a craft and/or teaching as the application of technical protocols. Intuitive knowledge has been also identified in the literature as practical or craft knowledge (Meijer 2010) or wisdom of practice (Leinhardt 1990). In exploring practical knowledge for teachers, Allas, Leijen and Toom (2020) developed a theory-based framework consisting in six types of practical or craft knowledge that they aligned with the quality of teacher knowledge. It included recalls and appraisals aim to understand specific situations and form the base of narrative knowledge. Rules and practical principles and artefacts constitute inferential knowledge which aims to guide teachers' activities and support them in making changes to their practices. Practical and theoretical reasoning are parts of reasoned knowledge and focus on constructing theories of action based on personal practical experiences.

Winch, Oancea and Orchard (2015) proposed an alternative to the above conceptions of teaching (craft and technical), which combines the three aspects of knowledge by advocating for a holistic conception of teaching and teachers (Figure 1). Good teachers under this perspective are valued because they have: (i) practical understanding and know-how (what to teach); (ii) a good conceptual understanding of education and teaching (how to teach); and (iii) the ability to understand, interpret and form critical judgements on empirical research and its relevance to their particular situation (why and when to teach). In the same vein, Calderón and MacPhail (2023) defined a "transformative or holistic teacher" as a teacher (i) with a solid knowledge on instructional and pedagogical skills (what to teach), (ii) able to make decisions on the extent to which research-based considerations are relevant to inform how, what and why they teach (what, how and why to teach), (iii) with a clear understanding of the importance of teaching experience and practice (how and where to teach), (iv) that considers how they shape themselves as a person and learner (who to teach) and (v) with a disposition to enact critical agendas (why and who to teach).

Consistently, Hordern and Tatto (2018) discussed the interdependencies between forms of educational knowledge and conceptions of teachers and teaching, drawing on Bernsteinian sociology of knowledge, and pointed out that the technical conceptions of teaching (teachers as technicians) are prevalent in most educational systems, supported by quantitatively driven rankings and indicators (e.g. TALIS). In a previous study, also

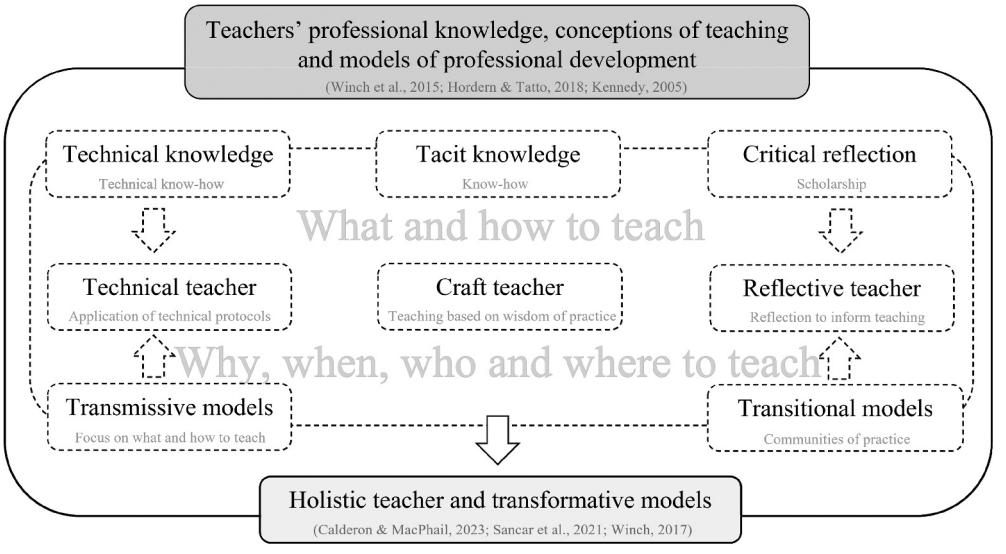

Figure 1. A summary of teachers' professional knowledge, conceptions of teaching and models of professional development.

drawing on Bernstein vertical and horizontal discourses, Hordern (2015) advocated for the constitution of specialised teaching knowledge for practice, that mainly relies on subject knowledge, pedagogical/educational research knowledge, (re)contextualised or filtered based on government, professional bodies, school policies, but also based for and in teaching practice contexts (what, how, who and where to teach). The author firmly stressed, however, that both conceptions of teaching (technical and/or craft) tend to disempower teachers from their own development, in favour of policy-makers, curriculum authorities and/or dominant voices dictating the professional learning national and international agendas (Hordern 2015).

Currently, teachers' competency frameworks are gaining traction as essential to promote teacher learning and innovative professional development. LifeComp framework is one example that advocate for process and organisational innovation where teachers adopt new working methods, but they also innovate by co-planning and co-creating activities in a learning organisation, as well as interacting with external stakeholders (Caena and Vuorikari 2022). These forms of knowledge and aligned conceptions of teaching and teachers must be embedded in the teacher education continuum, including professional development, to allow teachers to become proficient in the practices associated with the associated knowledge (Hordern and Tatto 2018). Kennedy's (2005) framework for professional development presented three models, which could be aligned with Winch, Oancea and Orchard (2015) conception of teachers and teaching. She defined (i) transmissive models, based on technical aspects rather than issues relating to values, beliefs and attitudes that support professional autonomy (what and how to teach); (ii) transitional models, focused on support through mentoring and communities of practice (why and when to teach); and (iii) transformative models, that promote an awareness of the different contexts and realities to succeed in

teachers' pedagogical and professional endeavours, to increase their capacity for professional autonomy and agency (who and where to teach) (Gisbert-Cervera and Caena 2022).

Traditionally, professional development programmes have always been more focused on technical models of teachers as knowledge transmitters that provide correct answers to their students (what to teach, Opfer 2016). Among the OECD countries, the most common contents that are included in courses of teacher education are about subject-matter (what to teach), and teaching techniques (how to teach, Musset 2010). In searching elements to achieve transformative models, a considerable number of empirical studies have led researchers to analyse key elements to effective teacher professional development (Britt and Wæge 2016; MacPhail et al. 2019; Vieluf et al. 2012; Zhang et al. forthcoming). These studies advocated that it is crucial to create models examining the outset and learning goals identified by teachers and plan teacher development activities aligned with those learning goals (Cordingley 2015; De Paor and Murphy 2018; Guskey 2002; Sancar, Atal, and Deryakulu 2021). Put differently, professional development is most effective when the learning is based on teachers' contextual needs (who and where to teach, Caena and Vuorikari 2022; Darling-Hammond, Hyler, and Gardner 2017).

In summary, if we aim to explore teachers' professional development needs through a transformative and integrative framework (Calderón and MacPhail 2023; Sancar, Atal, and Deryakulu 2021; Winch 2017), that involves the mix of different kinds of knowledge and the way they are related, we should go beyond the what to teach (content knowledge, pedagogical content knowledge and curriculum knowledge) and how to teach (teaching and assessment knowledge) aspects, and focus also on the why and when of teach (research and experience informing reflective practice and professional judgements), and who and where to teach (contextual knowledge) aspects.

Prompted by Benoliel and Berkovich (2021) and their purpose to show how TALIS acts and is used as an epistemological 'tool' that legitimises and/or undermines specific educational goals and a nuanced notion of ideal teachers, and Berkovich and Benoliel (2020b) and their purpose to challenge TALIS version of effective teaching, the present study aims to contribute to the critical analysis of TALIS, by exploring teachers' voice, to challenge the reality of teachers' professional development needs based on TALIS 2018. Drawing on the new transformative and integrative framework for teachers' professional development (Calderón and MacPhail 2023; Sancar, Atal, and Deryakulu 2021; Winch 2017) we hope to further explore TALIS's view of ideal professional development and ideal teachers, as portrayed in the teachers' professional development needs survey items, by using structural equation modelling as analytical framework to data analysis. Two research questions guided the study: (1) What conception of teachers are portrayed by TALIS 2018 based on their professional development needs? and (2) Is TALIS 2018 design, shaping teachers' understanding of their professional learning needs?

Method

Data source and sample

For this study, public data from TALIS 2018 was used. The sample consists of the international sample (code INTT3) of TALIS survey (OECD 2019), with a total of 153,674 middle-school teachers (code BTGINTT3) being 47,551 males (30.90%) and 106,123 females (69.10%). For the 2018 survey, a representative sample of 4,000 teachers and their school principals from 200 schools were randomly selected in each country. TALIS 2018 main components represent more than 8 million teachers in 48 participating countries and economies. The items used for this study were those related to teachers' professional development needs (TALIS 2018 teacher questionnaire, question 27, p. 14–15): A. Knowledge and understanding of my subject field(s); B. Pedagogical competences in teaching my subject field(s); C. Knowledge of the curriculum; D. Student assessment practices; E. ICT (information and communication technology) skills for teaching; F. Student behaviour and classroom management; G: School management and administration; H. Approaches to individualised learning; I. Teaching students with special needs; J. Teaching in a multicultural or multilingual setting; K. Teaching cross-curricular skills (e.g. creativity, critical thinking, problem solving); L. Analysis and use of student assessments; M. Teacher-parent/guardian cooperation; and N. Communicating with people from different cultures or countries. A Likert scale response options from 1 (*No need at present*) to 4 (*High level of need*) was used. As the data analysed were of public domain, it is not necessary to obtain the approval of the Ethics Committee in Research of the University (American Psychological Association [APA] 2020; Stevens, O'Donnell, and Williams 2015).

Data analysis

The dimensionality of the instrument was explored using the Kaiser–Meyer–Olkin (KMO) sampling measure and Bartlett's sphericity test. The dimensions of teachers' professional development needs in the model based on TALIS 2018 were analysed via a structural equation modelling approach, following the advanced methodological proposal by Kline (2015). In the first step (measurement model), the bidirectional associations among the different variables were inspected by exploratory factor analysis. In the second step, the bidirectional associations among the different variables were inspected by confirmatory factor analysis. Normality and linearity were also calculated, using the skewness and kurtosis values of the dimensions. The following indicators of the fit of the structural equation model was calculated: the chi-square ratio of the degree of freedom (χ^2/df), the Tucker-Lewis index (*TLI*), the comparative fit index (*CFI*), the normed fit index (*NFI*), the Root Mean Square Error of Approximation (*RMSEA*) and the Standardised Root Mean Square Residual (*SRMR*). To perform this multivariate analysis, the maximum likelihood method was applied with the bootstrapping procedure with 5000 iterations, given the violation of multivariate normality assumption (Mardia's coefficient ¼ 397.05, $p < .001$, Kline 2015). The level of significance was $p < .005$. Predictive models to determine teachers' professional development needs were examined. The analyses were conducted using the statistical package SPSS v27 (IBM 2013) and AMOS v18 (Arbuckle 2013).

Results

Following the suggested transformative and integrative framework for teachers' professional development (Calderón and MacPhail 2023; Sancar, Atal, and Deryakulu 2021; Winch 2017), our findings showed a high correlation among the teachers' professional development needs items that were statistically grouped into three dimensions. First, items related to what to teach (item a. knowledge and understanding of my subject field(s), item b. pedagogical competencies in teaching my subject field(s), and item c. knowledge of the curriculum). Second, items related to how to teach (item d. student assessment practices, item l. analysis and use of student assessments, item f. student behaviours and classroom management, and item k. teaching cross-curricular skills). Third, items related to 'who to teach' (item j. teaching in a multicultural or multilingual setting, item n. communicating with people from different cultures or countries, item i. teaching students with special needs). However, after the exploratory factor analysis and considering values of reliability, four items (E, M, H, and G) were eliminated with values lower than or equal to .60 (Timmerman and Lorenzo-Seva 2011). The exploratory factor analysis showed values with adequate variance percentages and saturation values (Table 1).

After the elimination of those items, the indices of goodness-of-fit were considered acceptable: $\chi^2(21, N = 153674) = 211.09$, $p = .712$, $\chi^2/df = 3.51$, $CFI = .95$, $NFI = .95$, $TLI = .94$, $RMSEA = .06$, $SRMR = .06$ (Figure 2). The validity of the construct (teachers' professional development needs) was corroborated with three dimensions and 10 items, and the dimensionality confirmed by the suitability of the Kaiser–Meyer–Olkin sampling ($KMO = .93$), and Bartlett's sphericity test ($p < .000$). The adequate values found in both the exploratory and confirmatory factor analysis justified the grouping of the items as part of the theoretical dimensions in which they were proposed.

The three dimensions were positively associated when exploring the relationship between the teachers' perception of professional development needs, because adequate goodness-of-fit indexes was found, $\chi^2(21, N = 153674) = 211.09$, $p = .712$, $\chi^2/df = 3.51$, $CFI = .95$, $NFI = .95$, $TLI = .94$, $RMSEA = .07$, $SRMR = .07$ (Figure 3). The dimension what to teach predicted the dimension how to teach ($ß = .98$), and both, in turn, predicted the dimension who to teach ($ß = .95$, Figure 3).

Table 1. Exploratory factorial analysis.

Dimensions and items	Factor
Dimension 1: What to teach	
Item B. Pedagogical competencies in teaching my subject field(s)	.84
Item A. Knowledge and understanding of my subject field(s)	.82
Item C. Knowledge of the curriculum	.82
Item E. ICT (information and communication technology) skills for teaching	.59
Dimension 2: How to teach	
Item D. Student assessment practices	.81
Item L. Analysis and use of student assessments	.71
Item F. Student behaviours and classroom management	.70
Item K. Teaching cross-curricular skills	.61
Item M. Teacher-parent co-operation	.59
Dimension 3: Who to teach	
Item J. Teaching in a multicultural or multilingual setting	.84
Item N. Communicating with people from different cultures or countries	.79
Item I. Teaching students with special needs	.70
Item H. Approaches to individualised learning	.58
Item G. School management and administration	.55

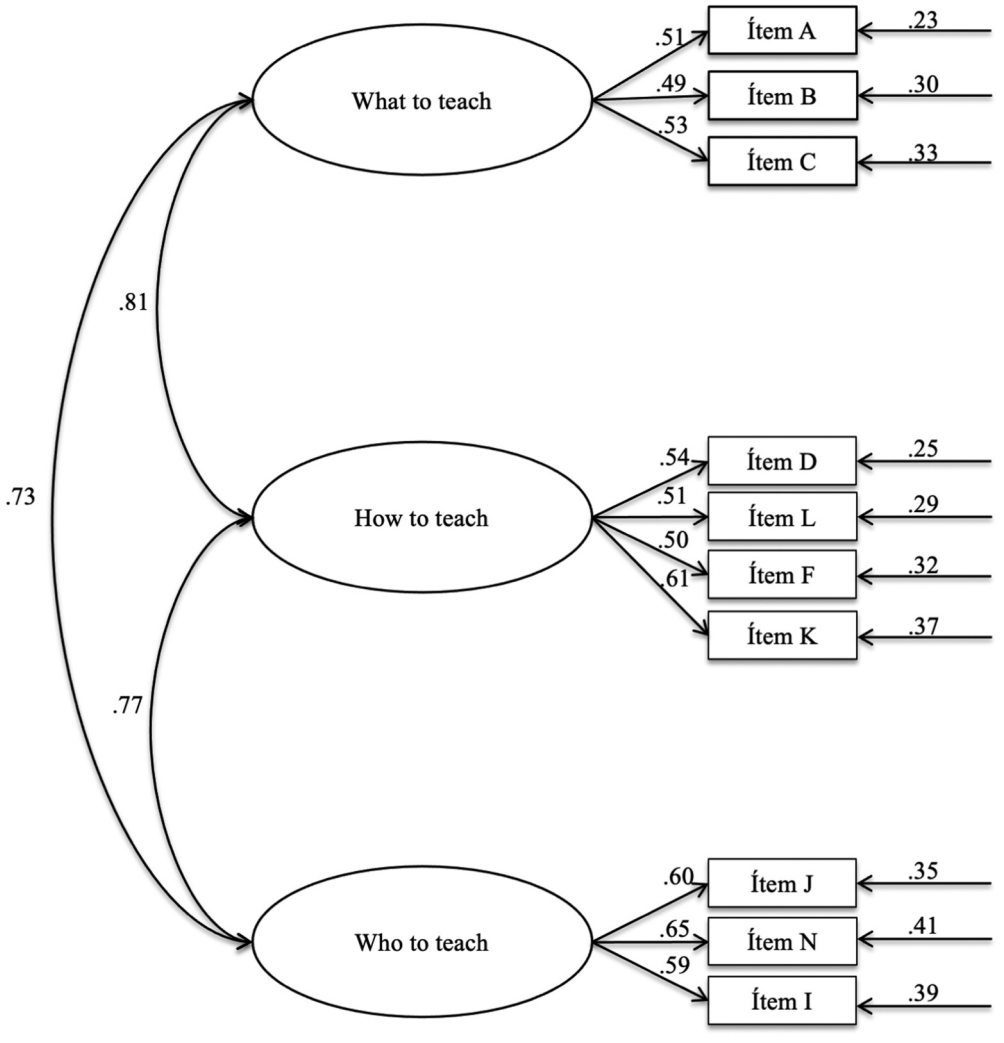

Figure 2. Measurement model of the three-factor professional development scale.

Discussion

The present study aimed to contribute to the critical analysis of TALIS survey, by exploring teachers' voice and challenge the reality of teachers' professional development needs based on TALIS 2018. Our findings confirmed the methodological issues, and the shortcomings of validity and reliability of TALIS construct of teachers' professional development needs, given the lack of factorial structure (Toth 2021; Zakariya 2020). Benoliel and Berkovich (2021) also identified that TALIS design is biased in its psychological-functional conceptualisation of ideal teaching and teachers, which is aligned with the classic conservative teaching model that emphasises normative behaviours and their integration into society. Opfer (2016) and Urick and Bowers (2019) also reported TALIS challenges of being a superficial tool limited to formulated fragmented items, which are disconnected from deep issues of curriculum and learning. Previous critical studies conveyed that TALIS outcomes are used to define teachers

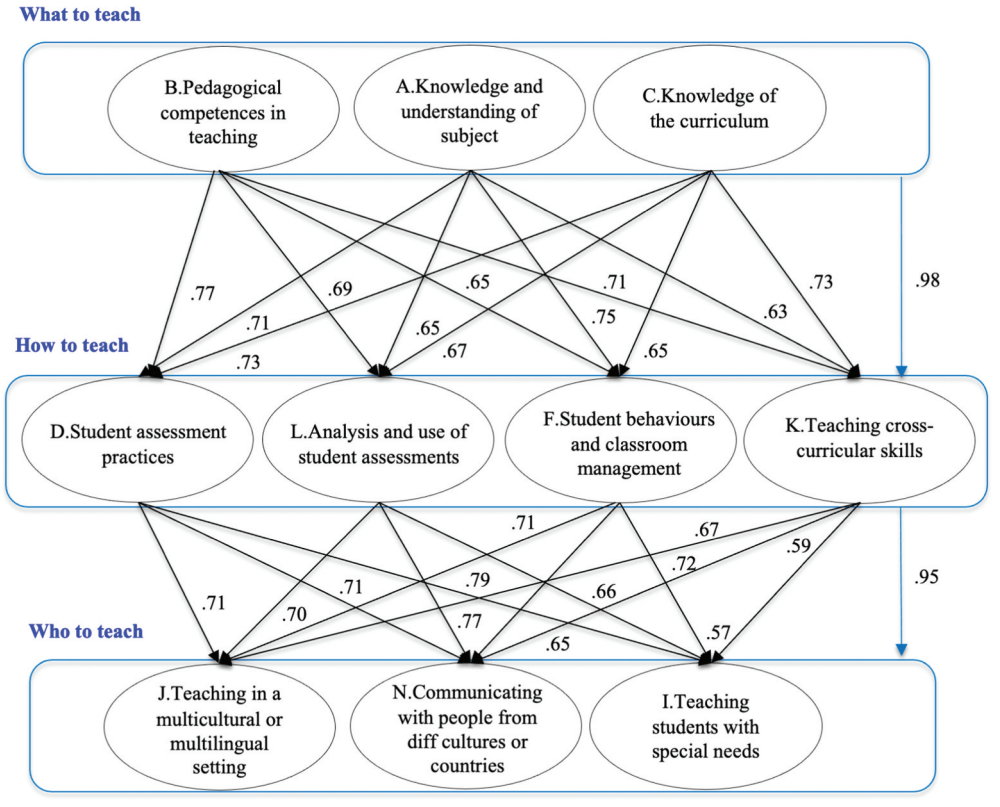

Figure 3. Prediction model of teachers' professional development needs based on TALIS 2018.

as problematic professionals and resistance to change, and the OECD as being in a position of authority that sells to the broader society and relevant stakeholders a particular brand of effective teaching and effective teachers, which feed the neoliberal economic agenda in public policy (Berkovich and Benoliel 2020a). As Robertson (2012, 596) emphasised: 'the OECD's own position in the world of education as a giver of orders from on high to national systems and teachers, although this time mediated through a rather different set of technologies for governing: data and rankings'. There are also studies that critique TALIS conceptualisation of teacher professionalism, which the authors defined as decontextualised and denationalised (Berkovich and Benoliel 2020b), as well as the political embeddedness of the programme, and their epistemological governance mainly framed in bureaucratic-technic terms (Sørensen and Robertson 2020).

Teachers' professional development needs based on TALIS 2018

Despite the psychometric issues of TALIS 2018 related to teachers' professional development needs, and trying to explore a factorial structure, the exploratory analysis done in the present study showed a measurement model based on three dimensions of professional development (Calderón and MacPhail 2023; Sancar, Atal, and Deryakulu 2021; Winch 2017 - Figure 1): what to teach (content knowledge, pedagogical content knowledge and curriculum knowledge), how to teach (teaching and assessment knowledge)

and who to teach (contextual knowledge), with adequate variance percentages and saturation values. While each of these dimensions (what, how and who) reflects some qualities of good teachers based on a technical or instrumental conception of teaching, we would argue based on Winch (2017) that those are insufficient:

> Neither should we assume that being able to give an account of how something is done necessarily gives us grounds for assuming that someone has the appropriate underpinning knowledge for practicing an occupation. It is likely that a body of systematic knowledge will provide the underlying rationale for professional action. (p. 360)

According to our results, in TALIS 2018, teachers' professional learning needs are defined with categories related to what, how, and who to teach, which is not surprising given the TALIS 2008, 2013 and 2018 definition of teacher as: 'A person whose professional activity involves the transmission of knowledge, attitudes and skills to students enrolled in an education programme' (p. 73). Yet, to achieve (teaching) expertise, the different kinds of knowledge have to be integrated in a network of conceptual and empirical connections which teachers should have mastered in order to achieve expertise, both in the theory underlying the practice and in being able to justify and explain actions and decisions taken in professional contexts (Winch 2017). Put differently, if we are to explore teachers' professional development needs, first we need to re-think the definition of teachers, and expand our focus beyond the what and how to teach aspects to the why, when, and where to teach aspects.

A critical analysis of TALIS 2018 conceptual framework

Remarkably, drawing in our analysis, TALIS 2018 does not include any item related to teachers' (critical) reflection or teachers' engagement with research as one of items describing teachers' professional development needs (why and when to teach). As it currently is, teachers' professional development needs are outlined through a pre-packed version of items constructed based on a purely instrumental conception of teaching and teachers (Biesta 2022), where teachers are profiled as professionals that implement specific instructional techniques and procedures that have been developed by curriculum designers (i.e. OECD) based on supposedly universal criteria provided by educational research (Hordern and Tatto 2018), which is the dominant voice or 'back bone' that defined TALIS 2018 conceptual framework. It is a conception of teachers and teaching that minimise the space for agency, interpretation and judgement. It is a particular 'brand' of teaching and teacher professionalism that undermines the same aspect it hopes to achieve, more innovative, creative teachers, and learners for the knowledge economy (Sorensen and Robertson 2018). If we are to re-define the dimensions that describe teachers' professional learning needs in TALIS 2018, as we suggest in this paper, the conception of teaching as a professional endeavour and teachers as reflective practitioners and research literate professionals, able to make their own judgements about educational knowledge, might be a worthwhile framework to start with (Figure 4). This conception will empower teachers and their voices as essential when dictating the professional learning national and international agendas (Hordern 2015). As Barrett and Hordern (2021) pointed out, under this conception teachers should be able to

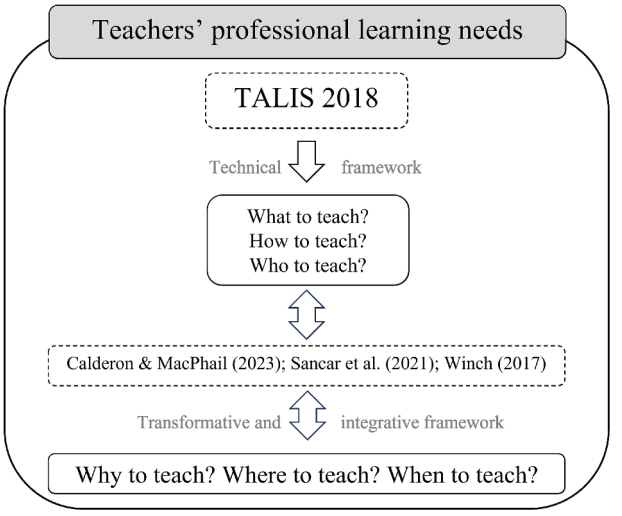

Figure 4. TALIS 2018 ideal of teachers' professional learning needs and expanded proposal based on Calderón and MacPhail (2023), Sancar, Atal and Deryakulu (2021), and Winch (2017).

exercise more authority over their own work and their own profession, to work with academic educationalists and others to demonstrate to the state and the public that they should control the jurisdiction of educational work and make decisions about the knowledge base and specify what counts as acceptable competent and expert practice in areas of curriculum, pedagogy and assessment.

Rethinking TALIS structure based on current conceptions of teachers and professional development programmes

Calderón and MacPhail (2023) definition of holistic teachers and their double-pyramid three-dimensional approach might better explain the main findings from our predictive model where the dimensions what to teach and how to teach, predicted the dimension who to teach. Put differently, having a strong understanding of education and teaching, and pedagogical and curriculum knowledge (what and how to teach dimensions) will provide a solid foundation for teachers and their ability to understand, interpret and form critical judgements on empirical research and its relevance to their particular situation or context (where and when to teach dimensions). This might have a (in)direct implication on the structure of professional development programmes, which depending on the stage of the teacher education continuum (e.g. ITE or CPD) could focus more on one or another dimensions. However, drawing on the proposed framework (Calderón and MacPhail 2023; Sancar, Atal, and Deryakulu 2021; Winch 2017) the other dimensions related to why, when and where to teach should also be integrated and be embedded when designing professional development transformative programmes (Kennedy 2005) and when re-thinking TALIS related items. Good teachers under this perspective would need to know whether or not to teach in a certain way, why it is necessary or appropriate to do so, and when and where it is necessary or appropriate to do so (Figure 4).

This integrated perspective on teaching and professional development is consistent with the notion of teaching as a professional endeavour that combines three types of knowledge: tacit knowledge, technical know-how, and critical reflection. According to, Schön (1992) reflection implies that teachers review thoughtfully and systematically what they have done in the past with a view to sustaining or improving their practice in the future. There is an extensive corpus of literature supporting the benefits of reflective teaching (when and why to teach). For instance, reflecting on the empowering aspects of teaching, results in the construction of knowledge that can more easily be used to guide teacher actions and therefore might facilitate the bridging of the 'gap' between theory and practice (Allas, Leijen, and Toom 2020). The role of research, and teachers' engagement with research is also crucial to enrich reflection processes, but also to inform and improve teachers' technical knowledge (what and how to teach), alongside their practical judgement. Good teachers need to engage actively with educational research, but also inform their judgement based on the craft-based elements of their work. An iterative relationship and cycles of research and teaching experience might be more appropriate than one single isolated conception or type of knowledge (Winch, Oancea, and Orchard 2015). Indeed, personal experience and educational theories have to be in a continuous dialogue and inform practice, research and reflection (Avgitidou 2020) to avoid a prioritisation of knowledge on the basis that it is preferred by an organisation or by dominant voices, such as OECD (Hordern 2015).

Conclusions

In conclusion, after performing an analysis of teachers' professional development items as presented in TALIS 2018 through structural equation model, we found: (1) a lack of factorial structure (which question the validity of the instrument); (2) items grouped in three dimensions (what to teach, how to teach, and who to teach); and (3) prediction model showing that the dimensions what and how to teach, predicted the dimension who to teach. Yet, teachers voice regarding their needs for professional development is reduced to data gathered through an ontologically and epistemologically biased survey, that pre-packs professional development needs based on an instrumental conception of teaching and teachers, that does not prioritise, not even mention, the importance of teachers engaging in critical reflection and research literature as essential for effective professional development. Thus, we suggest a re-definition of the construct to ensure logical and valid results (Zakariya 2020) based on a conception of education that goes beyond the what, how and who to teach, and focus also on the why, when and where to teach. We suggest re-thinking the construct of TALIS survey based on a different framework(s) such as transformative pedagogies to allow for an expanded understanding of the reality of teachers' professional development needs. An integration of Calderón and MacPhail (2023), Sancar, Atal and Deryakulu (2021) and Winch (2017) might be a worthwhile framework to kick off the discussion among the educational community (including teachers – Figure 1). This means, re-thinking TALIS 2024 conceptual framework in general, to move ahead from narrow definitions of evidence and technical questions about effectiveness and efficiency (Sørensen 2021), to allow for a more holistic conception of teaching and teachers and their professional learning needs. It is essential that the main international survey to gather teachers voice, provide a broader picture of teachers'

professionalism and conceptions of teaching, not only for teachers to express what they perceive they need to become better teachers but also to further educate them in areas that they might lack pedagogical experience and/or knowledge (e.g. teaching through, for and about social justice). The current version of TALIS is not allowing for that to happen. As Robertson (2012) rightly suggested almost a decade now, it is finally time, to place teachers in the centre but not as objects for governing but as important actors in a global conversation about why, and how, teachers really matter. If TALIS is meant to survive as the largest international assessment tool about teaching and teachers, prospective studies might work towards discussing the construct, the dimensions and the items related to why, where and when to teach, to confirm their psychometric properties hence to be suggested as an updated version of teachers' professional development needs of future TALIS iterations, being conscious of the limitations of this data gathering procedure. Though, we are also conscious that the impact or the uses of TALIS results beyond the OECD events and international summits of the 'PISA regime' (Sørensen 2017, 225), varies in different countries.

What does this paper add?

The contribution of this article is significant because it is the first critically examine teachers' professional development needs based on TALIS 2018 outcomes through structural equation modelling. From the approach followed, the present study adds to the existing ones, at least in four significant ways. First, we justify a theoretical framework to design TALIS in terms of teachers' professional development needs (Figure 1). Second, according to this framework, we provide the six theoretical dimensions along which TALIS should structure the items for assessing teachers' professional development needs (What, How, Who, Why, Where, and When to teach, Figure 4). Third, the article shows the items from the 2018 version of TALIS that could define three of these dimensions: What to teach (a. knowledge and understanding of my subject field(s), b. pedagogical competencies in teaching my subject field(s), and c. knowledge of the curriculum), How to teach (d. student assessment practices, l. analysis and use of student assessments, f. student behaviours and classroom management, and k. teaching cross-curricular skills), and Who to teach (j. teaching in a multicultural or multilingual setting, n. communicating with people from different cultures or countries, i. teaching students with special needs). Fourth, building on the proposed theoretical framework, dimensions and items, future work should explore the items for the remaining three dimensions (Why, Where and When to teach) and test the factorial structure of the instrument.

Limitations

Indeed, there are certain limitations that must be acknowledged for this type of studies. For example, the findings present data from teachers of several disciplines, age groups, and countries. Additionally, professionalisation trajectories and educational policies might differ between European countries. More research using structural equation modelling to explore teachers' professional learning needs considering the different countries, but also triangulating that information using other data analysis methods such as policy document analysis with the different professionalisation

trajectories and educational policies, might add a bigger and more global picture of teachers' professional development for the current times of uncertainty and interrogation of teachers' professionalism.

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

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