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The design and impact of professional development activities in a diverse international education reform context

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Conflict of interest statement

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The design and impact of professional development activities in a diverse international education reform context

With its aggressive education reform, multinational teaching workforce, and increasing implementation of Western-based approaches, Abu Dhabi provides a rich site for learning more about international policy-borrowing in educational improvement initiatives. This article uses survey and interview data from *n*=35 Abu Dhabi public school teachers who participated in a combined total of 297 professional development activities over an academic year. The study examined the design and impact of the professional development activities and the relationships between design and impact in the Abu Dhabi context. The study offers implications for international professional development practice and insights into international policy-borrowing in education.

Highlights:

- 11 categories of professional development were identified, with varying teacher participation rates, design, and impact
- Professional development design features highlighted in Western literature were associated with positive impacts in the non-Western context of Abu Dhabi
- However, the associations between design and impact were weak and complex
- Care is needed when transferring principles from Western research into non-Western contexts
- More research is needed on international policy-borrowing in the specific area of teacher professional development

Keywords: Teacher professional development, design, impact, educational policy-borrowing, education reform, Abu Dhabi

Introduction

Teacher professional development is a critical lever for generating educational improvement (Bobis et al, 2020; OECD, 2016; Opfer, 2016). Education systems around the world invest substantial resources in professional development in the hope of transforming teacher practice and student outcomes (e.g. Lee & Zahir, 2021; TNTP, 2015), with flow-on effects for international competitiveness (Kennedy, 2014). In this context, "a deeper and better understanding of teacher learning and development is critical to improving teaching quality with the ultimate goal of enhanced student outcomes" (Bobis et al., 2020, p. 119).

One area in which our understanding of teacher professional development needs strengthening concerns the applicability of predominantly Western research findings (and the associated policies and practices) in non-Western contexts. In our modern, ultra-connected world, "transnational policy borrowing is the rule and not the exception" (Steiner-Khamsi, 2014, p. 153). However, there are "culturally grounded differences in people's responses to change. These suggest potential differences [across cultures and contexts] in the types of strategies that foster change" (Hallinger & Kantamara, 2001, p. 405; see also Fitzgerald, 2019; Mourshed et al., 2010).

Most existing research on teacher professional development has been undertaken in what Henrich et al. (2010, p. 61) term "Western, Educated, Industrialised, Rich, and Democratic (WEIRD) societies" —arguably, in their view, "among the least representative populations one could find for generalizing about humans." It is important, therefore, to examine the extent to which Western understandings of what makes professional development effective are applicable in non-Western contexts. In making this statement, I am not suggesting that Western approaches should have any primacy or superiority over locally situated alternatives. Rather, I simply argue that since some non-Western education systems are already actively seeking to follow guidance from Western literature, it is necessary to

investigate the extent to which this guidance is appropriate in non-Western contexts. A similar need for investigation exists in Western settings that seek to implement lessons from non-Western research (see, for example, Seleznyov et al., 2021).

Much past research has described professional development in a range of geographic contexts, and much has considered international policy borrowing as a general practice. However, limited research to date has explicitly considered international policy borrowing in relation to teacher professional development (exceptions include Hairon & Dimmock, 2012; Lee & Zahir, 2021). Doing so is the focus of the present article.

The present study

This article reports on research into teachers' experiences of professional development in Abu Dhabi, United Arab Emirates. Abu Dhabi is engaged in an education reform effort that has drawn heavily on Western educational approaches (Badri & Al Khaili, 2014; Matsumoto, 2019), offering a context in which we can explore the appropriateness of international policy borrowing for teacher professional development. Given that Western literature highlights the relationship between the design and subsequent impacts of professional development, the study had two research objectives:

(1) To examine teachers' perceptions of the design and the impact of the professional development that they had experienced in one academic year; and
(2) To investigate relationships between teachers' perceptions of the design and the impact of that professional development.

In this article, the term 'professional development' is used to refer to activities and opportunities that either cause or are intended to cause teacher learning. This definition aligns with Abu Dhabi's policy and practice at the time of this research, which sought to provide substantial professional development activities in order to generate teacher learning and

change (Badri & Al Khaili, 2014; Badri et al., 2016). This definition also acknowledges that a wide range of experiences (formal and informal; planned and spontaneous) have the potential to cause teacher learning (Clarke & Hollingsworth, 2002; Evans, 2002). It is also important to note that teacher learning is a complex phenomenon that may occur in different domains, in non-linear or non-predictable ways, and in close concert with a teacher's surrounding context (Clarke & Hollingsworth, 2002). Rather than seeking to objectively examine these nuances of teacher learning, the present paper relies on teachers' self-reports of the impacts of particular professional development activities.

Concepts of "impact" and "effectiveness" also warrant clarification. This study was underpinned by the seminal work of Desimone (2009) and Guskey (2000), both of whom refer to the outcomes of professional development using such terms. Much evaluation of professional development has also used "impact" and "effectiveness" in broad senses, including to encompass teacher and student perception data, qualitative accounts, and/or consideration of process factors such as implementation fidelity (e.g. Killion, 2016; Sherman & Teemant, 2021). In this paper, the term "impact" is used to refer to the *outcomes* of professional development (McChesney & Aldridge, 2018). Teacher professional learning is thus understood as one possible outcome or impact of professional development opportunities; other possible outcomes or impacts include teachers' affective reactions, changes in teachers' classroom practice, changes in the school culture or organisational practices, and changes in student outcomes. These impacts are discussed further later in the paper. The term "impact" here does not signal a positivist stance but simply an interest in what has happened as a result of teachers engaging in professional development activities. "Effective" professional development, in this paper, signifies professional development that leads to positive impacts. Impacts may, of course, vary greatly in their extent and so the category "effective" should not be seen as a binary classification (as if professional

development is either effective or it is not). Rather, "effective" professional development represents a continuum of activities that all generate positive impacts but ranging from small, localised, incidental, or unsustained impacts to broad, systemic, significant, and ongoing impacts. Larger and sustained impacts are typically to be desired, and hence techniques for capturing the impacts of professional development should allow for exploration of the size or extent of any impacts rather than simply giving binary assessments of whether impact "occurred".

Below, literature is reviewed relating to international policy-borrowing in educational improvement, "effective" teacher professional development, the Abu Dhabi education reform context, and existing research on teacher professional development in that context. Together, these bodies of literature provide a foundation for the present research.

Background

International policy-borrowing in educational improvement

Recent decades have seen an explosion in system-level educational improvement efforts (Fullan, 2009; Fullan & Quinn, 2016). This trend has been fuelled by globalisation (Portnoi 2016) and by international assessment exercises such as TIMSS and PISA that seek to quantify and compare education systems' performance, creating a climate of competitiveness and fear of underperformance (Mohamed & Morris, 2021).

International policy-borrowing is a well-documented phenomenon within such large-scale educational improvement efforts (Portnoi, 2016; Steiner-Khamsi, 2014). Policy borrowing occurs when "governments worldwide seize the opportunity to import educational theories, policies and practices anticipating quick fixes and delivered results to their educational systems" (Romanowski et al., 2018, p. 19). This phenomenon is fostered by

globalisation's impact on the mobility of ideas, expertise, and expert personnel across cultural and geographic contexts (Portnoi, 2016).

Policy borrowing rests on the assumption that emulating other education systems' approaches will result in also emulating those systems' outcomes (Phillips & Och, 2003). However, "quick fix" reform efforts involving policy borrowing have been described as "dangerous" (Phillips & Och, 2003, p. 452), and according to Harris (2012, p. 395), "the harsh reality is that even the best policies travel badly." Policy makers often downplay the importance of context in considering a policy's suitability (Portnoi, 2016), a further outcome of the way international assessment regimes portray education systems and their achievements as being both comparable and commensurable (Steiner-Khamsi, 2014).

Although referred to in the literature as "policy" borrowing, cross-national borrowing can actually involve any of: policies, theories, research findings, models, practices, or even vague aspirations or imaginaries (such as "best practice" or "world class education"; Auld & Morris 2016; Mohamed & Morris 2021; Portnoi 2016; Rizvi, 2006). Policy makers can thus find themselves in highly pressured situations—conscious of urgent imperatives to foster improvement so that their education systems remain (or become) globally competitive, but at the same time surrounded by a range of complex messages, models, and stakeholders reflecting varying ideologies and levels of empirical evidence. This is the broad context within which education systems seek to improve, including through harnessing teacher professional development.

"Effective" professional development

Education systems worldwide deploy teacher professional development with the primary goal of generating improvements in teaching and learning (Jensen et al., 2016; OECD, 2016). Commonly desired impacts of professional development include teacher satisfaction; teacher

learning; changes in teacher practice; student learning, behavioural, attitudinal, or motivational changes; and changes in the wider school context (e.g. Coldwell & Simkins, 2011; Guskey, 2000, 2002; King, 2014; McChesney & Aldridge, 2019a).

Much existing (Western) research has highlighted the design of professional development as an important lever for maximising the impacts that follow (e.g. Darling-Hammond et al., 2017; Desimone, 2009; Garet et al., 2001; Kennedy, 1998, 2016; Timperley et al., 2007; Wayne et al., 2008). As a result, numerous features of "effective" professional development design (that is, design that is understood to facilitate positive teaching and learning impacts) have been identified, as summarised in Table 1. Taken together, the criteria in the table present no small order for schools and education systems seeking to develop effective teacher professional development.

Table 1 about here

However, there are both empirical and theoretical challenges to the contention that optimising the design of professional development will in fact result in teaching and learning impacts. Empirically, several important studies have detailed (supposedly) well-designed teacher professional development initiatives that have not resulted in the expected impacts (Bobis et al., 2020; Hill et al., 2013; Jacob et al., 2017; Kennedy, 2016). Sztajn et al. (2011) and Sheeman and Teemant (2021) argue that it is overly simplistic to reduce professional development to a set of universally applicable design principles. Existing theoretical models of professional development-to-impact trajectory do not agree on the key forms of impact, and they shed limited light on how progression between the various forms of impact components might occur (McChesney & Aldridge, 2021). Existing models have also been criticised for failing to capture the complexity of teacher learning and change (Boylan et al.,

2018; Clarke & Hollingsworth, 2002; Strom & Viesca, 2021) and for discounting the role of teacher-related factors such as prior knowledge and understanding, expertise and agency (Carpendale et al., 2021; Kennedy, 2014; McChesney & Aldridge, 2021). Finally, Sherman and Teemant (2021, p. 363) have criticised the "linear, hierarchical, causal mono-logic model that is the hallmark of Western rational thought" on which such models are based.

Together, these critiques and challenges call into question two previous trends in the professional development field. The first is the historic emphasis on the design of professional development as the major lever for maximising impact. The second is the assumption that there are decontextualised levers that will drive professional development's impact universally, allowing smooth cross-national policy borrowing to occur.

There is thus a pressing need to deepen our understanding of how professional development leads to impact in specific contexts and circumstances, including considering the relevance of Western-based research findings for non-Western contexts. The study reported here sought to contribute to this work for the case of Abu Dhabi.

The Abu Dhabi public education reform context

At the time this study was conducted, the Emirate of Abu Dhabi (one of seven comprising the United Arab Emirates) was engaged in a comprehensive public education reform effort. This reform was aimed at addressing a range of structural and performance challenges as part of a wider national and regional drive for economic competitiveness (Badri & Al Khaili, 2014; Lee & Zahir, 2021; Matsumoto, 2019; UAE Government, 2014).

Policy borrowing from Western countries was a central part of Abu Dhabi's reform approach (Badri & Al Khaili, 2014), as in other Gulf contexts (Mohamed & Morris, 2021). As Whelan (2009, p. 11) recounts, "The work sought inspiration from school systems in countries with strong records of educational achievement. The approach was to scour the

world, looking at what had worked and how it might be applied in the Middle East." In a context where honour and status are of great cultural value, negative public evaluations such as that below from the OECD carried much weight with local policy makers (see also Matsumoto, 2019):

> Students [in the United Arab Emirates] still perform well below the levels expected in advanced economies. This is important because the knowledge and skills of students are a powerful predictor for a country's wealth and social outcomes in the long run … the current deficits in schooling outcomes in the UAE … are the equivalent of a permanent economic recession. (OECD, 2015, p. 3)

Arguably, Abu Dhabi's public education reform lacked critical understandings of the complexities involved in international policy borrowing (Romanowski et al., 2018). Global imaginaries were frequently cited in policy statements; for example, the Abu Dhabi Education Council's initial 10-year strategic plan for its public education reform (ADEC, 2009) sought to "to migrate P-12 education from its current state to one of *high quality*" (p. 1); to "elevate school quality in Abu Dhabi to *international standards*" (p. 5); and to "equip students with *the skills to operate in a global competitive environment*" (p. 10; emphases added). The strategic plan highlights "the Emirate's vision for socio-economic development" (p. 10) as the sole rationale for reform, and it specifies international assessments (TIMSS and PISA) as key benchmarks for measuring progress without critique or justification of this decision. The plan also includes an aspiration to "ensure that 100% of education decisions are *evidence-based*" (p. 24; emphasis added), a statement that masks the true complexity of putting any research into practice (Coburn & Stein, 2010)—especially in a new and very different cultural and political context (Auld & Morris, 2014; Portnoi, 2016). More recent updates to the Abu Dhabi government's strategic direction retain this overall stance, for example, aspiring to "Enhance of [sic] education outcomes to meet Abu Dhabi labor market needs and socio-economic priorities" (Abu Dhabi Government, 2022, para. 4).

Abu Dhabi provides a rich context for investigating education policy borrowing for teacher professional development. Existing literature on international education policy-borrowing has primarily considered either Western or poorer non-Western contexts (Mohamed & Morris, 2021), whereas Abu Dhabi is an extremely wealthy non-Western setting. Further, the Emirate's educational reform effort has been ambitious, comprehensive, well-resourced, and (since the UAE is a monarchy) not subject to the electoral cycles that shape Western democracies (Badri & Al Khaili, 2014; Macpherson et al., 2007). These features therefore allow us to examine what is possible when financial and political factors do not present barriers to reform efforts.

Teacher professional development in Abu Dhabi public schools

As part of Abu Dhabi's reform effort, extensive professional development was mandated for all public school teachers (both Arab and Western[1]). Mandatory professional development included a centrally managed professional development programme of whole-school workshops on set topics (reflecting the desired new pedagogies) delivered by contracted providers. Western subject advisors were also appointed to provide in-school support to English, mathematics, and science teachers. Overall, the professional development approach (as with the wider reform strategy) was heavily informed by Western educational research and practice, including through the employment of Western educational experts at all levels of the Abu Dhabi Education Council[2], which oversaw education across the Emirate of Abu Dhabi.

[1] Large numbers of qualified teachers from Western countries were recruited to teach selected grade levels in Abu Dhabi public schools, using English as the language of instruction and using modern, Western-based pedagogies.

[2] Now the Abu Dhabi Department of Education and Knowledge; https://www.adek.gov.ae/

Past research has highlighted concerns around teacher professional development in Abu Dhabi. Teachers report very high levels of participation in professional development (Badri et al., 2016; Barrera-Pedemonte, 2016), but traditional workshop-style professional development remains dominant (Badri et al., 2016). Abu Dhabi teachers have indicated that some of the mandated professional development is "repetitive, … irrelevant, … [or] too generalized" (Buckner et al., 2016, p. 6) and that they find other forms of professional development more effective (Al Hassani, 2012; Augustine, 2014). Teachers have reported unmet professional development needs (Buckner et al., 2016) and critiqued professional development provision, highlighting "a lack of clear professional development program philosophy, standards, and goals … [and] a lack of deep and meaningful involvement on the part of teachers in professional development planning, implementation, and evaluation" (Badri et al., 2016, p. 11).

Despite the above concerns being raised by Abu Dhabi's teachers, "relatively little professional development program evaluation [has been] conducted to determine the value professional development has on teachers' perception not only of the impact on their teaching practice but also of the effect on student achievement" (Badri et al., 2016, p. 11). The Abu Dhabi government has acknowledged the need to review teacher development approaches (Badri & Al Khaili, 2014), including addressing teachers' perception that they were not receiving adequate professional development. The research reported in this article contributes to such evaluation by investigating a range of aspects of both the design and impact of professional development activities in Abu Dhabi.

Methods

The present research centred on teachers' experiences and perceptions of professional development, privileging teacher voice in a context where this has often been a "missing ingredient" in education policy (Matsumoto 2019, p. 18; see also Goe et al., 2020). Within an

overarching interpretivist paradigm, the study used a triangulation mixed-methods design (McChesney, 2017; McChesney & Aldridge, 2019b), combining "both qualitative and quantitative data to more accurately define relationships among variables of interest" (Castro et al., 2010, p. 344). The variables of interest were the design and impact of professional development.

Ethical approval to conduct the study was obtained from both Curtin University and the Abu Dhabi Education Council. Given that the study involved cross-cultural research, the twelve considerations identified by Cohen et al. (2007, p. 139) were used "to ensure that [the] research [was] culture-fair and culturally sensitive".

Participants

Participants were Grade 6-12 English, mathematics, and science teachers within Abu Dhabi public schools. Government policy specified that these teachers should have received consistent professional development, thus allowing the teachers' experiences to be meaningfully compared.

Purposive and snowball sampling (Cohen et al., 2007) were used to obtain a sample that captured the experiences of a range of teachers, as detailed in Figure 1. Data collection continued until Seidman's (2006) criteria of saturation and sufficiency were both satisfied. The final sample comprised n=35 teachers.

Figure 1 about here

Data collection

The teachers participated in semi-structured interviews, during which they also completed a written survey and commented orally on their survey responses. This approach "allowed a rich interweaving of closely linked quantitative and qualitative data to be obtained" (McChesney & Aldridge, 2019b, p. 232). In total, the interviews took an average of 90

minutes, including an average of 30 minutes for completing the survey.

The interviews and survey were conducted in English, since Government policy included advanced IELTS requirements for all Grade 6-12 English, mathematics, and science teachers. Interviews were audio-recorded and transcribed, with participants being invited to review their interview transcripts. Reflection and constant comparative analysis (Cohen et al., 2007) after each interview allowed for the identification of trends, contradictions, and areas needing further investigation, informing subsequent interviews. Table 2 provides an overview of the interview content.

Table 2 about here

Table 3 about here

The survey that teachers completed during their interview is summarised in Table 3, including sample items and details of response formats. The survey comprised two sets of items. First, 13 quantitative items investigated the *design* of professional development activities in terms of the five features of high-quality professional development identified by Desimone (2009): *content focus*, *active learning*, *coherence*, *duration*, and *collective participation*. The remaining 12 items in the survey came from the Impact of Teacher Professional Development (ITPD) questionnaire (McChesney & Aldridge, 2018) and investigated the *impact* of professional development activities using four scales: *teacher reaction* (affective reactions), *teacher learning*, *outcomes* (comprising changes in both teacher practice and student outcomes), and *organisational response* (school-level actions or changes). The ITPD questionnaire was developed for the present study and validated with another sample (*n*=393 Arab and Western teachers) in the same context (McChesney, 2017;

McChesney & Aldridge, 2018). Scales and items were informed by Desimone (2009) and Guskey's (2000) frameworks for evaluating the impacts of teacher professional development.

Data analysis

Preliminary analysis

Teachers each reported participating in between 6 and 13 forms of professional development during one academic year, creating a total of 297 sets of responses (each constituting one teacher's perceptions of one type of professional development). Using reflexive thematic analysis (Braun et al., 2018), the teachers' 297 activity descriptions were synthesised into 11 categories of professional development as shown in Table 4.

Table 4 about here

Research objective 1

The quantitative survey data were used to describe both the design and impact of the professional development. For each of the 11 professional development categories, scores for each of the five design features (content focus, active learning, coherence, duration, and collective participation) were calculated. These scores were then aggregated to generate an overall design effectiveness score that assigned equal weighting to each design feature, as shown in Figure 2. A similar process was followed for the scores related to the *impact* of professional development, as shown in Figure 3.

The possible score ranges were 0–4 for the individual design feature and impact scale scores, 0–20 for the overall (aggregated) design effectiveness score, and 0–16 for the overall (aggregated) impact score. Higher scores represented professional development that (in teachers' views) had greater alignment with the literature-based design features (design

scores) and/or greater impact (impact scores). Means, standard deviations, and 95% confidence intervals were used to compare the design and impact scores across the different professional development categories.

Figure 2 about here

Figure 3 about here

The qualitative interview data were analysed using reflexive thematic analysis (Braun et al., 2018). The analysis combined both deductive and inductive methods: pre-existing codes (deductive) came from the 11 types of professional development and the design and impact factors identified earler, while inductive codes came directly from the data. The qualitative and quantitative findings were then considered together in order to draw holistic conclusions (as recommended by McChesney, 2020, and Yin, 2006, for mixed methods research).

Research objective 2

To explore relationships between the design and impact of professional development, a scatterplot was created using the overall design effectiveness scores and overall impact scores for the 11 professional development categories. Teacher participation rates were also shown on the scatterplot by modifying the size of each point on the scatterplot based on the number of teachers reporting participation in that type of professional development.

Finer-grained relationships between the individual design feature and impact scale scores were then explored using multiple correlation and regression. Cohen et al.'s (2007) recommended minimum value of .35 was used to identify correlations that can be used for prediction purposes. The goodness of fit of the regression models was judged using the adjusted R^2 values (as recommended by Cohen et al., 2007; Muijs, 2004). Finally, the fit

between each regression model and the data was assessed using Muijs's (2004) criteria for poor ($R^2 \leq .10$), modest ($.11 \leq R^2 \leq .30$), moderate ($.31 \leq R^2 \leq .50$) or strong ($R^2 \geq .50$) fit.

Qualitative data were again analysed using reflexive thematic analysis combining inductive and deductive codes (Braun et al., 2018). This time, the focus was on identifying data that made links between design features and impacts.

Results

Research objective 1: Design and impact of professional development activities

Design of professional development activities

Figure 4 and Table 5 present the design effectiveness scores for the 11 categories of professional development. It is important to remember that this is, in a sense, preliminary data. This article does not assume that professional development reflecting Western literature's guidance around "effective" professional development design is necessarily desirable or appropriate in a non-Western context such as Abu Dhabi. This transferability is explored later within research objective 2.

Figure 4 about here

Table 5 about here

The overall mean design effectiveness scores indicate the extent to which, according to teachers' accounts, professional development activities reflected Desimone's (2009) five features of effective professional development design. The categories of professional development that teachers described as having the greatest alignment with the recommended

design features were formal department activities (15.55)[3], informal interactions with colleagues (13.94), and the system-wide subject-specific professional development (13.96) However, given that the maximum possible value of the overall design effectiveness score was 20, further scope remained for even the most highly scored professional development activities to be better aligned to the literature-based design features. School activities (9.24) and formal lesson observations (9.50) received the lowest overall mean design effectiveness scores.

The qualitative interview data illustrated how different professional development activities enacted the literature-based design features as well as the variation that remained despite design-based commonalities. For example, all teachers interviewed reported that formal department activities involved teams of teachers (collaboration) for a single teaching subject (content focus) meeting together regularly (duration). However, the specific nature of these department activities nonetheless varied. Teachers reported engaging in "information sharing" (W04)[4], taking turns to share an aspect of their practice (W01, W05, W08, W09, W14), or engaging in discussions about their teaching (A3, W04, W08): "We discuss about some beliefs and sometimes we argue" (A03).

The lowest-rated professional development in terms of design features was school activities. Teachers' accounts reflected two main school activities: (a) whole-school workshops led by school leaders (with topics such as health and safety, ICT integration, differentiation, lesson structure, and multiple intelligences), and (b) committee or project work (with focuses such as environmental awareness, student literacy achievement, or school improvement progress monitoring). Teachers did report engaging in all these activities

[3] All scores provided in the text are means; standard deviations are also available in the tables.

[4] Teacher identification codes for qualitative data. "W" and "A" denote Western and Arab teachers, respectively.

collaboratively (collective participation) and for substantial amounts of time (duration). Teachers also agreed that these activities were aligned with other school and system-level priorities (coherence). However, mean scores below the neutral point of 2.0 indicated that the school activities often lacked a subject-specific content focus and opportunities for active learning. For example, teachers typically described whole-staff workshops being conducted in a traditional presentation style with the teachers forming a passive audience:

> That type of training would just be her [the principal] talking at us for two hours; we didn't break up into groups and do anything … They were all just her talking … Even if it's new and interesting topics, no one's going to absorb that. (W01)

The 11 professional development categories are arranged in Figure 4 and Table 5 according to the teacher participation rates, beginning with the most common type of professional development (system-wide generic professional development). Interestingly, the lowest overall design effectiveness scores were reported for some of the most widespread categories of professional development: the system-wide generic professional development (which 100% of teachers reported participating in), formal lesson observation (97% of teachers), and school activities (86% of teachers).

Although all 11 professional development categories were reported to align with at least some of the five design features, there was much variation in the scores across the five features. Four professional development categories were reported to reflect all five design features (i.e., had mean scores above the midpoint of 2.0 for each feature): support from a subject advisor, formal department activities, peer observation, and interactions with colleagues. In contrast, formal observation and school activities had scores above 2.0 for only two of the five design features. Compared to other professional development categories, the system-wide generic professional development and engaging with exemplars and resources

both had particularly high scores for some design features but particularly low scores for others.

Impact of professional development activities

Figure 5 about here

Table 6 about here

Figure 5 and Table 5 present the impact scores for the 11 categories of professional development. The total impact scores ranged from 8.01 for the system-wide generic professional development to 11.67 for study and research. All of the total impact scores were thus above 8.0, the midpoint or neutral score, suggesting that (in teachers' views) the professional development had indeed resulted in some impacts. However, given that the total impact scores had a maximum possible value of 16, the extent of the impacts of the professional development appeared to be relatively modest.

The lowest total impact scores were reported for the system-wide generic professional development (8.01), formal lesson observation (8.55), and support from subject advisors (8.98). These were the three categories of professional development that the largest numbers of teachers had participated in. Indeed, moving from left to right on Figure 5, an upward trend is apparent, with the professional development that involved the greatest number of teachers being described as having poorer impacts than the professional development that involved the fewest teachers.

Although study and research received the highest total impact score (11.67), only 31% of the teachers reported participating in this form of professional development. The interview data showed that much of the activity in this category was self-directed and took place outside school, such as through further tertiary study (W01, W02, W03, W06), attending

conferences (A02), or engaging in independent reading (A01, A02). The self-directed nature of this study or research may partly explain the higher impacts reported, as teachers may have been more intrinsically motivated to pursue this learning.

Arguably, the "bottom line" for teacher professional development is whether professional development activities result in classroom impacts: changes in teacher practice and gains in student outcomes. These impacts are captured in the outcomes scale and are therefore worth considering on their own. Table 6 shows that the mean outcomes scores ranged from 1.87 for the system-wide generic professional development to 2.64 for the system-wide subject-specific professional development.

Of the 11 categories, teachers agreed that nine had resulted (to some extent) in classroom impacts, with the exceptions being the system-wide generic professional development and mentoring others. The reported lack of classroom impacts for mentoring others perhaps makes sense given that the teacher whose practice is most likely to change through mentoring would be the mentee, not the mentor. However, the reported absence of classroom impacts associated with the system-wide generic professional development is noteworthy given that this programme has been central to the Education Council's reform strategy for some time (ADEC, 2012). Interestingly, the teacher learning score of 1.81 for the system-wide generic professional development also indicated that teachers did *not* feel that they had learned from this professional development. This was supported by overwhelmingly negative qualitative comments describing this professional development as a "waste of time" (A14, W05, W06, W11, W13), "pointless" (W07), "frustrating" (W07), and "not useful" (W05), with the main problem being that teachers felt the content of this professional development was not new for them.

Research objective 2: Relationships between design and impact of professional development activities

Figure 6 plots the association between the overall design effectiveness scores and the total impact scores for the 11 categories of professional development. The figure suggests that there is indeed a positive relationship between design and impact. That is, the professional development categories that teachers described most reflecting Desimone's (2009) five design features were also the categories that teachers reported as having the greatest impact.

Figure 6 about here

Figure 6 also shows the varying design effectiveness and impact scores in relation to the prevalence of the different categories of professional development (with teacher participation represented by the size of the circle). The figure reinforces that many of the most prevalent forms of professional development (represented by the larger circles) received lower design and/or impact scores than some of the other forms of professional development available within the Abu Dhabi context.

Table 7 about here

Building on the initial indication of a positive relationship between design and impact, Table 7 provides the results of finer-grained multiple correlation and regression analyses using the mean scores for the five design features and the four impact scales. Both the simple and multiple correlation results supported the existence of associations between the design and impact scores. The simple correlation results (r values) indicated that the teachers' perceptions of all five literature-based features of effective professional development design were positively and statistically significantly related to all four forms of impact ($p <$ .01 for all design–impact combinations except for the relationship between content focus [design

feature] and organisational response [impact], which was statistically significant at $p < .05$). The multiple correlation coefficients (R) were non-zero and statistically significant ($p < .01$) for all four impact scales, supporting the presence of an association between the design features and each of the four impact scales.

Having established that there were relationships between the design and impact scores, the regression results were used to describe those relationships. For each of the four impact scales, three regression coefficients (β) were statistically significant ($p < .05$). This indicates that three of the five design features were independent and statistically significant predictors of each impact scale: content focus, coherence, and duration for the teacher reaction, teacher learning, and outcomes impact scales; and active learning, coherence, and duration for the organisational response impact scale. The statistically significant regression coefficients were all positive, indicating that better alignment with the literature-based design features was associated with greater reported impacts.

Finally, the adjusted R^2 values were examined to determine the explanatory power of the statistically significant design features in predicting impact. The adjusted R^2 values ranged between .143 and .394 and were statistically significant ($p < .05$), indicating that between 14% and 39% of the variation in the impact scores could be explained by the relevant three statistically significant design features.

Despite the quantitative analyses revealing positive and statistically significant associations between design and impact, the correlations were generally weak. Just six of the 20 design feature–impact scale correlations exceeded Cohen et al.'s (2007) recommended minimum of 0.35 for correlations suitable for prediction. Further, the adjusted R^2 values for the regression models showed only moderate fit with the data for two of the four impact scales (teacher reaction and outcomes) and modest fit for the remaining two scales (teacher learning and organisational response; Muijs, 2004). Taken together, these results indicate that

while there were positive associations between the design and impact of professional development, the design feature scores were not able to explain the majority of the variance within the impact scores. It thus appeared that there was "more to the story" in terms of what contributed to the impact of professional development in the Abu Dhabi context.

The qualitative data offered three interesting findings about the relationships between design and impact. First, only one of the five design features—content focus—was described in the qualitative data as contributing positively to the impacts of professional development. Teachers described subject-specific forms of professional development as being more relevant, useful, and impactful; for example:

> There's definitely a need for subject-specific professional development instead of generic professional development that's related to whole school issues. I think that's something that teachers don't appreciate that much: the generic professional development. Whereas when you focus on subject-specific things, I definitely feel that, as a teacher, I valued that more. (W14)

Second, some complex views emerged around the association between duration (one of Desimone's five design features) and the impacts of professional development. While the literature had suggested that any professional development should have substantial and sustained duration, teachers only wanted significant allocations of time for forms of professional development that they valued in other respects. They criticised the lengthy amount of time spent on the whole-school generic professional development, describing it as "staff detention" (W11) and as "training for training's sake" (W12). In contrast, the teachers reported wanting more time for other forms of professional development such as mentoring (W03), in-class modelling by subject advisors (A04), collaborative work with colleagues (W06, W12), or professional reading (A14). Teachers also reported inequitable access to time for professional development (W09, W13). Teachers were pleased when professional development that they perceived as unhelpful had very limited duration; for example, in

relation to her assigned subject advisor, one teacher said: “If she’s not going to be helpful, I’d prefer to never see her than to see her every week” (W05).

Third, teachers made comments that indicated that the nature of professional development’s design was overshadowed by other factors. For example, one teacher stated that although the system-wide subject-specific professional development reflected a subject-specific content focus, active learning, and collective participation, these positive design features were overshadowed by the content of professional development not being new:

> [It’s] boring because the content’s not necessarily engaging … It just feels repetitive, like I’ve done this before. It’s not new, so it’s not like I’m learning … I know about jigsaw activities; I know about differentiation—I know about those things so it’s really more of the same. (W03)

Another teacher described the system-wide subject-specific and system-wide non-subject-specific forms of professional development as being of equal value to her, despite the subject-specific professional development having much stronger alignment to the five design features:

> They [both] gave us new ways—how to introduce the curriculum to the students. And they gave us ideas about activities. They are the same, both of them are the same, but *this* [subject-specific professional development] was concentrating on the [specific subject] curriculum, and *this* [generic professional development] was in general. So both of them were good. (A08)

Together, then, these qualitative findings suggested that the relationship between the design and impact of professional development in the Abu Dhabi context was weak at best, and somewhat complex. This finding aligned with the quantitative analyses described earlier and reinforced the sense that considering the design of professional development was not (at least in this context) a reliable or sufficient way to facilitate impact.

Additional findings

While not the focus of the present article, it is important for the sake of completeness to note that teachers also highlighted a number of non-design-related factors that, in their view, had affected the impacts of professional development. These factors worked in different ways: two—language and school-related factors—affected teachers' *access* to professional development, while three—cognitive access, contextual fit, and teacher agency—related to teachers' *acceptance* of professional development. These factors have previously been reported in McChesney and Aldridge (2021), and readers are referred to that publication for further detail. To fully contextualise the present article's results, it is simply important to note that these other, non-design-related factors were highlighted by the teachers in the present study as being arguably more important than design features in affecting the impacts that arose from professional development. Given the relatively weak associations between design and impact, these other factors warrant consideration.

Discussion and implications

The present study responds to calls for "closer attention to and analysis of what is happening in the Gulf [to] illustrate the consequences of borrowing systems of educational policy making" (Mohamed & Morris, 2021, p. 196). The study also responds to the limited prior research on professional development in the Abu Dhabi context (Badri et al., 2016) and on international policy borrowing in relation to teacher professional development. The study offers insights both for the local Abu Dhabi context and more broadly, as discussed below.

Insights for the Abu Dhabi context

Overall, the study found that professional development activities in Abu Dhabi reflected (Western) literature-based design recommendations (specifically, the five design features identified by Desimone, 2009). Room for improvement in professional development

design remains, however, particularly through strengthening the extent of subject-specific content focuses, active learning, and collective teacher participation in teacher professional development. Most professional development had (in teachers' views) resulted in some degree of impact, consistent with other research into teachers' perceptions of the impacts of professional development in Abu Dhabi (Badri et al., 2016).

Much variation was observed in both the design and the impact scores across the 11 categories of professional development. This finding highlights the importance of continued evaluation of professional development offerings in Abu Dhabi to identify areas for improvement and inform targeted decision making and action. Such evaluation would align with calls in the literature for professional development (in any context) to be explicitly examined (Guskey, 2000; Kyriakides et al., 2017; McChesney & Aldridge, 2019a).

An interesting finding was that in the Abu Dhabi context, some of the categories of professional development with the lowest scores for both design and impact were the categories in which the largest numbers of teachers participated. Though far from ideal, this finding is consistent with international trends (OECD, 2009; Opfer, 2016) and with other reports of workshop-heavy professional development in Abu Dhabi (Al Hassani, 2012; Badri et al., 2016; Opfer, 2016). Educational leaders in Abu Dhabi could therefore look to reduce reliance on workshop-style approaches and instead promote forms of professional development that the present study indicated were less widespread but led to greater impacts: informal collaboration, engagement with exemplars/teaching resources, peer mentoring, lesson observation and feedback, and engagement in further study or research.

Broader insights

A key feature of this study was the opportunity it provided to consider the extent to which the indications of Western research related to professional development were applicable in a non-

Western context. While the findings of this study cannot speak directly for any other non-Western context, the findings nonetheless contribute to our emerging understanding of the international transferability of professional development research and theory.

First, the study identified positive associations between the design and impact of professional development in Abu Dhabi. The directionality of this relationship cannot be verified using the present results, but the finding is consistent with the indications of existing literature (e.g. Barrera-Pedemonte, 2016; Desimone, 2009; Garet et al., 2001; Hill, 2007; Penuel et al., 2007). This suggests that Western research findings about the importance and nature of effective professional development design may indeed have some relevance for professional development practice in non-Western settings.

At the same time, the results of this study problematise the assumption that just optimising the design of professional development might be enough to ensure impact. The relationships between design and impact in this study were weak and complex; further, a set of other, non-design-related factors have been reported elsewhere (McChesney & Aldridge, 2021) that teachers felt had greater influence on the impacts of professional development in their context. Taken together, these findings confirm that basing professional development provision solely on the borrowed policy ideal that quality design will lead to positive impacts is an incomplete theorisation of the professional development process (Sherman & Teemant 2021).

The present study also reinforces perspectives that highlight the complexity of teacher development (e.g. Clarke & Hollingsworth, 2002; Sherman & Teemant, 2021; Sztajn et al., 2011) and critique models of effective professional development that involve "synthesised products of research … abstracted away from the reality of professional learning and growth in which they arose" (Sherman & Teemant, 2021, p. 1). The present study demonstrated that the relationships between professional development design and impact—while present—were

weak and complex, with a range of considerations affecting whether a design feature such as duration indeed supported impact. This finding highlights the importance of ongoing teacher voice research as well as careful evaluation of professional development in order to understand what is working well and what could be improved in a given context.

Given that very little past research has explicitly examined the international transferability of professional development research findings, the study offers an original contribution. The ubiquity of international policy-borrowing in education (Steiner-Khamsi, 2014) means that future research should continue to explore the applicability of Western research findings related to professional development in a range of international contexts. It is also important that there be efforts to develop new, locally situated theories of effective professional development practice in a range of diverse global contexts. Finally, those describing "effective" professional development practice should acknowledge the contextual origins of the research findings they are drawing on, acknowledging that very little knowledge is universally applicable (Willis, 2007) and that educational improvement strategies must be culturally situated and culturally informed (Mourshed et al., 2010).

Limitations

As an interpretivist study, this research privileged teachers' subjective perceptions of their experiences of professional development. Although teachers' perspectives are of crucial importance, complementary research could consider teacher professional development in Abu Dhabi from other paradigmatic and stakeholder perspectives.

The study was also closely tied to a specific geographic, cultural, and political context, as is the nature of interpretivist research. Care is therefore needed in generalising specific findings to other contexts (Willis, 2007), reviewing the extent of any similarity between Abu Dhabi and other contexts.

The definition of professional development used in this study acknowledged that a broad range of experiences can contribute to a teacher's learning and development. However, some of the activities teachers described as contributing to their professional development may have served purposes other than professional development in the Abu Dhabi policy context (for example, a compliance/accountability purpose for formal lesson evaluation). In terms of any design and resourcing decisions for improving professional development practice in Abu Dhabi, this study's recommendations should therefore be considered alongside the various activities' purposes.

Directions for future research

This article contributes to the emerging body of literature related to education in the Abu Dhabi context. The present study's focus on teachers' perceptions could usefully be complemented by studies capturing the views of school leaders, professional development providers, or policy makers as well as by research involving more objective measures of the impacts of professional development.

Given that studies in other areas of educational research have demonstrated that "a 'one size fits all' approach to education is not appropriate" (Fitzgerald, 2019, p. 96), there is a need for further research to specifically investigate international policy-borrowing in relation to teacher professional development. Such research might include the extent to which the predominantly Western literature on professional development is applicable elsewhere, as well as what those in Western contexts might be able to learn from other contexts such as the Global South. Recent calls to better recognise the complexity of teacher development (e.g. Sherman & Teemant, 2021; Strom & Viesca, 2021) could usefully inform future research on policy borrowing in teacher professional development.

Conclusion

According to Seidman (2006, p. 10), "social abstractions like 'education' are best understood through the experiences of the individuals whose work and lives are the stuff on which the abstractions are built." Using teacher voice data, this study has provided insight into the professional development experiences of teachers in Abu Dhabi public schools, exploring the design and impact characteristics of various professional development activities occurring in the Abu Dhabi context and how these were related. The study has also provided "on the ground" perspectives on a Western-to-non-Western policy borrowing initiative by capturing teachers' experiences of professional development in this non-Western setting.

The present study extends the existing literature on teacher professional development in diverse international contexts as well as that on policy borrowing in teacher professional development. Importantly, the study problematises simplistic assumptions that what works for teacher professional development in one context will work equally well elsewhere. Rather, the study suggests that while education systems may understandably wish to learn from the successes of others, teacher professional development practice in any context needs to be informed by careful attention to the local context and to teacher voice in order to enhance impacts on teaching and learning.

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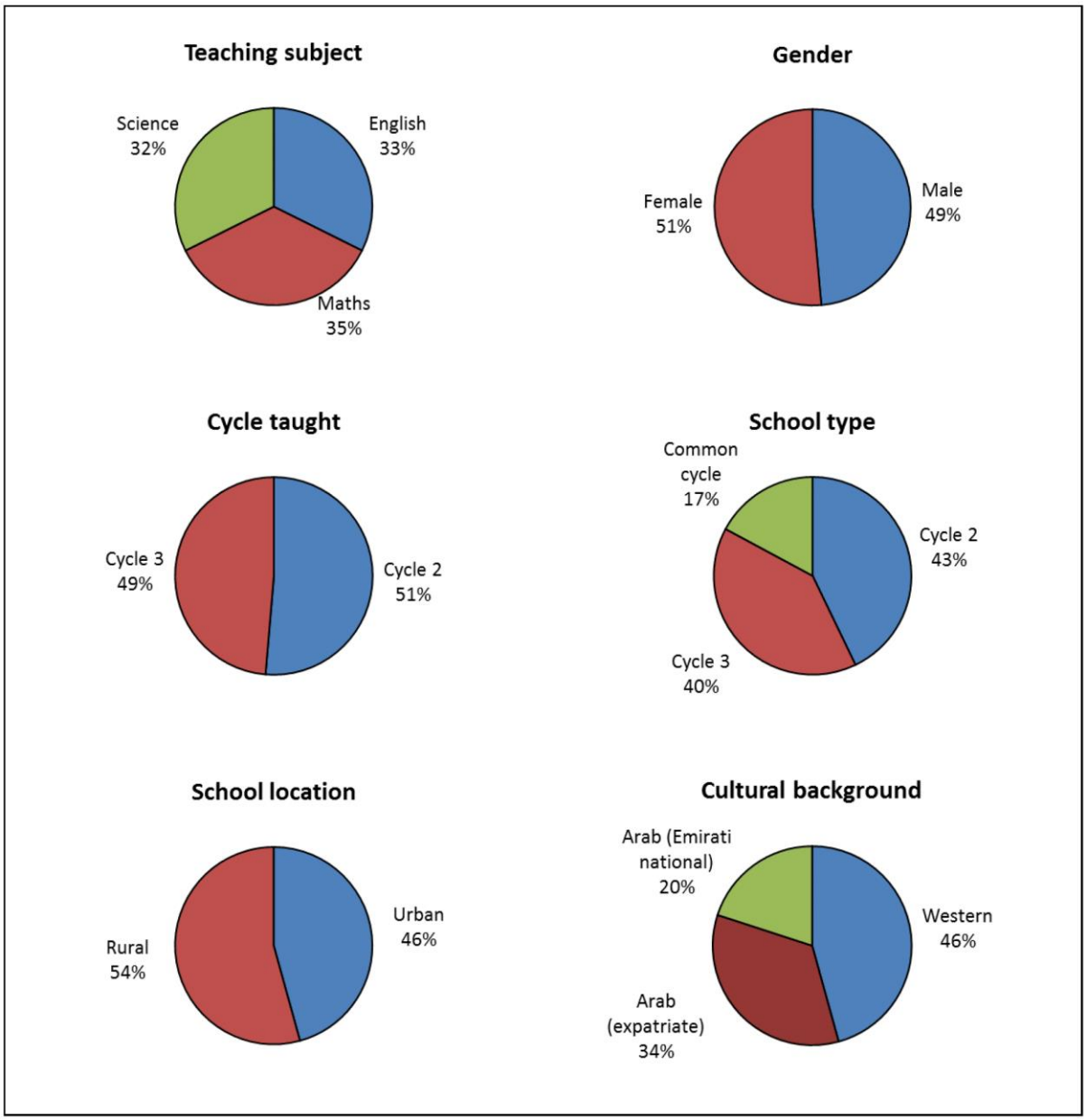
Figure 1. Demographic breakdown of the sample (*n*=35 teachers)



Note: Cycle 2 = grades 6-9; cycle 3 = grades 11=12; common cycle = grades 6-12, 1-12, or KG-12. Teachers from common cycle schools were only eligible to participate in the study if their teaching was in cycles 2 or 3.

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Figure 2. Calculation of design effectiveness scores

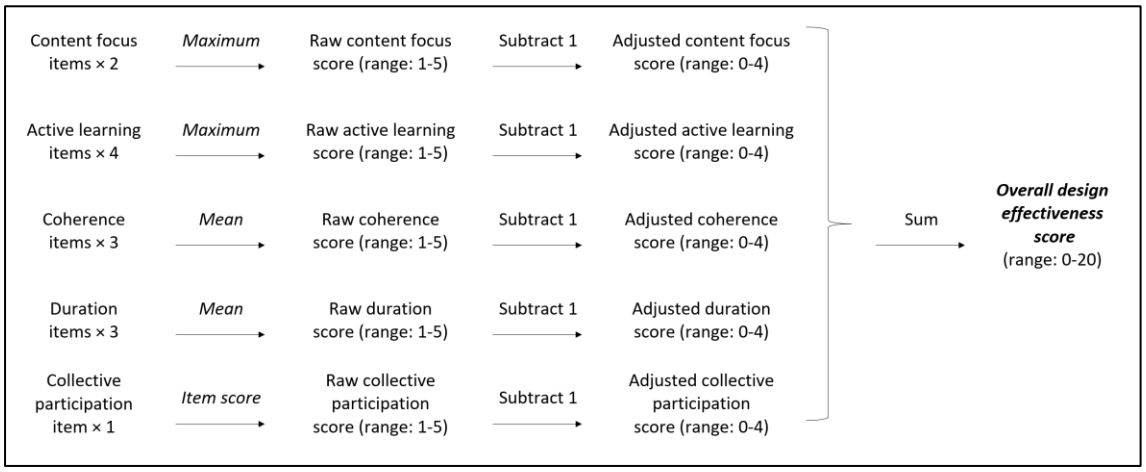

Figure 3. Calculation of impact scores

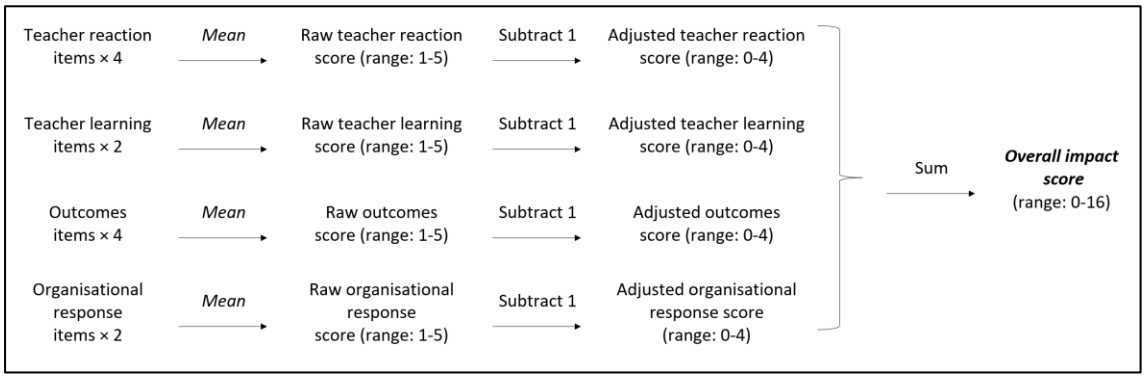

Figure 4. Design effectiveness scores for 11 categories of professional development (means and 95% confidence intervals)

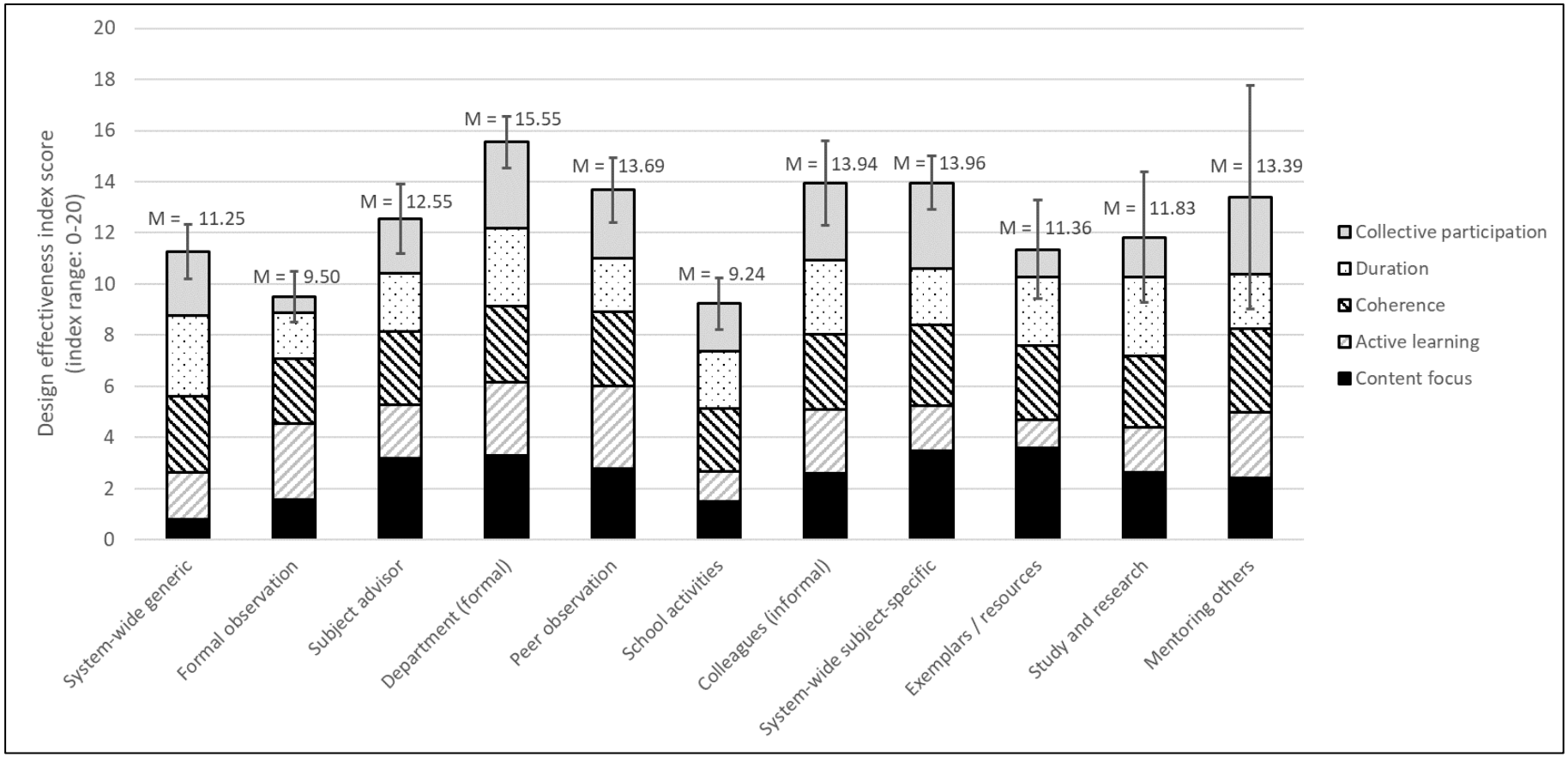

Figure 5. Impact scores for 11 categories of professional development (means and 95% confidence intervals)

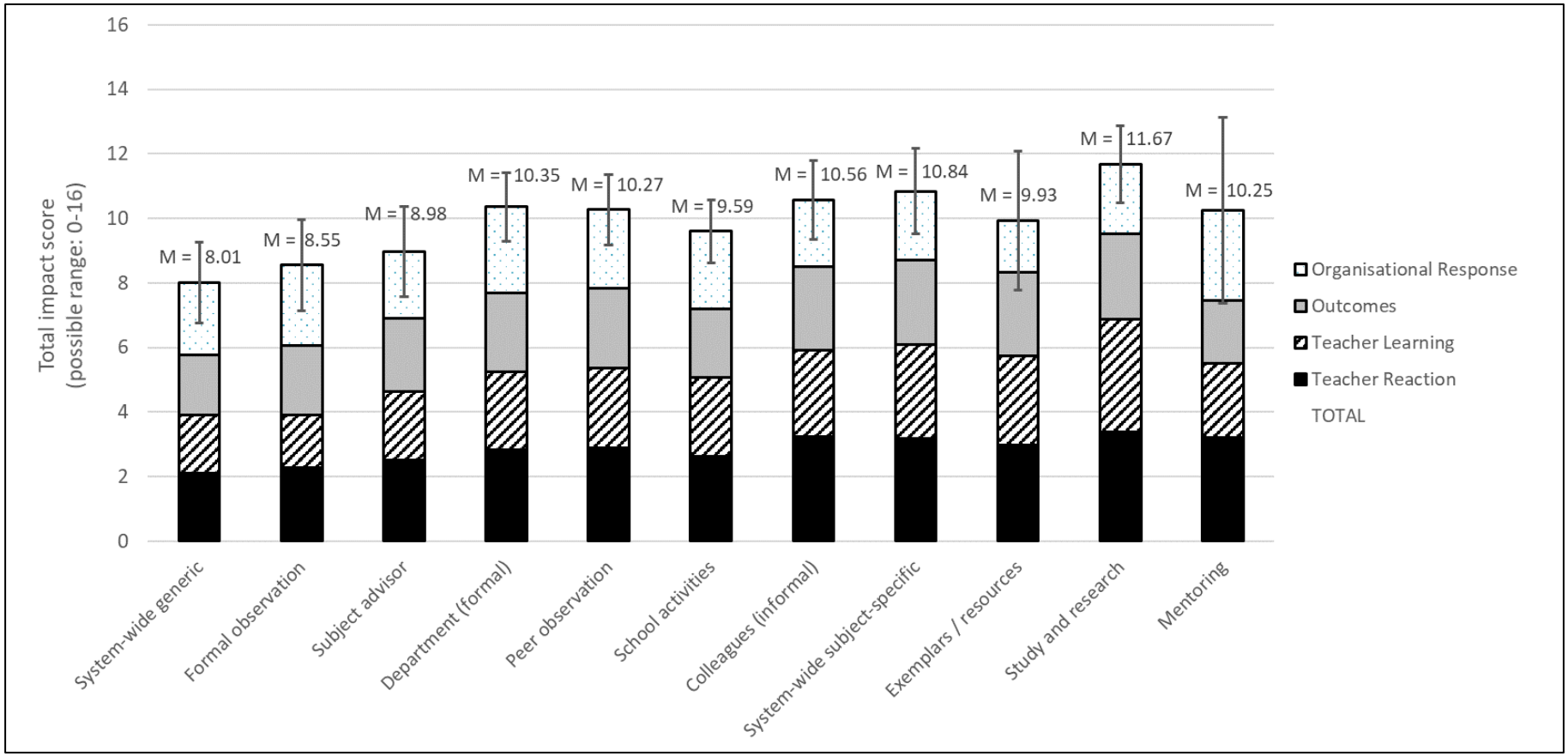

Figure 6. Relationship between the design effectiveness scores and total impact scores of 11 professional development categories, with teacher participation rates indicated by the size of each point

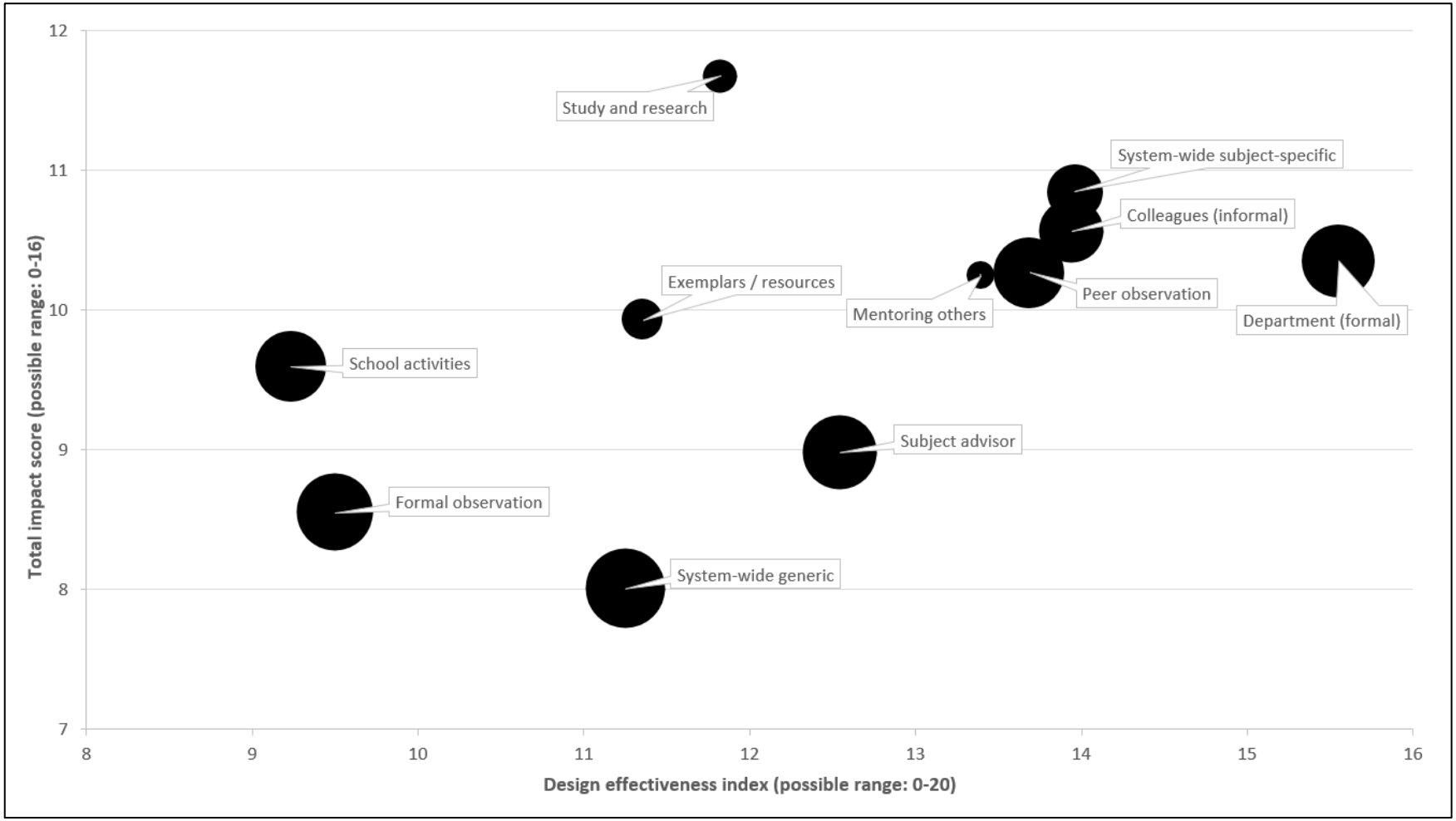

Table 1. Features of effective professional development design

Feature of effective professional development design	Darling-Hammond et al. (2009)	Darling-Hammond et al. (2017)	Desimone (2009)	Garet et al. (2001)	Hill (2007)	Ingvarson et al. (2005)	Jensen et al. (2016)	Loucks-Horsley et al. (2010)	Timperley (2008)	Timperley et al. (2007)
Subject-specific content focus	✓	✓	✓	✓	✓	✓				
Active learning		✓	✓	✓	✓	✓		✓		
Coherence	✓		✓	✓	✓		✓	✓	✓	✓
Collective teacher participation	✓	✓	✓	✓		✓	✓	✓	✓	✓
Sufficient & sustained duration	✓	✓	✓	✓	✓	✓		✓	✓	✓
Focused on links between teaching & student outcomes							✓	✓	✓	✓
Connecting theory, classroom practice, skills, & knowledge	✓	✓			✓	✓	✓			✓
Addressing teachers' existing knowledge, beliefs, & motivation								✓	✓	✓
Incorporating external expertise		✓							✓	✓

Table 2 Overview of teacher interview content

- Exploring the teacher's understanding of what professional development means and its purpose and value
- Identifying all of the forms of professional development that the teacher participated in during the previous academic year
- Gathering detailed descriptions of particular professional development experiences
- Having the teacher complete the interviewee survey, inviting them to comment or ask questions as they wish, and discussing any matters arising
- Asking a selection of follow-up questions exploring:
    - specific types of professional development (e.g. "Can you tell me about [professional development type]? Describe this type of professional development for me. Was this professional development helpful? Why/why not? Can you compare […] and […] types of professional development for me?")
    - the teacher's perceptions of effective and ineffective professional development (e.g. "What things really help you learn as a teacher? Why? What does really good professional development look like for you? Why?")
    - the teacher's overall response to the professional development that they had experienced in the previous academic year (e.g. "What is your overall feeling about the professional development you received this year? Has it met your needs? Why/why not? How could your overall professional development experience be improved? What messages would you like to give to ADEC?")

Note: The full interview guide is available in McChesney (2017)

Table 3. Overview of survey content

Construct or scale	Explanation	Structure	Response format	Sample item
Content focus (design feature)	The extent to which a professional development activity had a subject-specific (rather than generic) focus.	2 items describing types of content focus; scored using maximum across these items.	5-point scale (1 = never; 5 = a great deal)	*This professional development focused on how students learn specifically within my teaching subject (e.g. common misconceptions about fractions.*
Active learning (design feature)	The extent to which a professional development activity engaged teachers in active (rather than passive) forms of learning.	4 items describing types of active learning; scored using maximum across these items.	5-point scale (1 = never; 5 = a great deal)	*This professional development included time for me to look at student work samples.*
Coherence (design feature)	The extent to which a professional development activity aligned with the teacher's personal-, school-, and system-level contexts.	3 items describing coherence in different contexts; scored using mean across these items.	5-point scale (1 = never; 5 = a great deal)	*This professional development was consistent with my personal knowledge, beliefs, and professional development goals.*
Duration (design feature)	The amount and sufficiency of time allocated to a professional development activity.	3 items describing different aspects of duration; scored using mean across these items.	Sufficiency: 5-point scale (1 = strongly disagree; 5 = strongly agree). Total hours & span: Actual amount of time (these responses then re-coded into brackets on a 5-point scale for analysis)	*Enough time was allocated to this professional development during the academic year.*
Collective participation (design feature)	The extent to which a professional development activity engaged the teacher alongside their teaching colleagues.	1 item	5-point scale (1 = never; 5 = a great deal)	*In this professional development, I collaborated with other teachers from my subject area, grade level, or school.*
Teacher reaction (impact)	The extent to which the teacher had positive affective reactions to a professional development activity.	4 items forming a validated scale; scored using mean across these items.	5-point scale (1 = strongly disagree; 5 = strongly agree)	*I have positive memories of this professional development.*

Teacher learning (impact)	The extent to which the teacher reported they had learned as a result of a professional development activity.	2 items forming a validated scale; scored using mean across these items.	5-point scale (1 = strongly disagree; 5 = strongly agree)	*I have learned a lot of new things from this professional development.*
Outcomes (impact)[a]	The extent to which the teacher reported that a professional development activity had resulted in changes to their teaching practice and/or student learning outcomes.	4 items forming a validated scale; scored using mean across these items.	5-point scale (1 = strongly disagree; 5 = strongly agree)	*As a result of this professional development, my students' learning has improved*
Organisational response (impact)	The extent to which the teacher reported that their school had changed as a result of a professional development activity.	4 items forming a validated scale; scored using mean across these items.	5-point scale (1 = strongly disagree; 5 = strongly agree)	*Overall, this professional development has had a positive impact on my school.*

[a] The "Outcomes" scale was originally conceived as two distinct scales, one capturing changes to teaching practice and another capturing changes to student outcomes. However, in the exploratory factor analysis (McChesney, 2017; McChesney & Aldridge, 2019), the scores for both these areas came together and functioned as a single scale. This is acknowledged as a limitation of the survey instrument.

Table 4. The 11 categories of professional development used for analysis

Professional development category	Description	Teachers participating (*N*=35 teachers)
System-wide generic professional development	System-wide, centrally organised, non-subject-specific professional development activities.	35 (100%)
Formal lesson observation	Teachers' lessons being observed by senior school staff (with or without feedback from the observer to the teacher).	34 (97%)
Support from a subject advisor	Subject-specific advice, guidance, coaching, and support provided to teachers by visiting subject advisors.	33 (94%)
Formal department activities	Meetings and training sessions involving teachers within a subject department at a school.	31 (89%)
Peer lesson observation	Teachers observing each other's lessons (with or without feedback from the observer to the teacher).	30 (86%)
School activities	Activities initiated by and based within individual schools (such as staff meetings, school committees, and interactions between teachers and school administrators).	30 (86%)
Informal interactions with colleagues	Teachers' informal collaboration and communication with their peers.	27 (77%)
System-wide subject-specific professional development	System-wide, centrally organised, subject-specific professional development activities organised by ADEC.	22 (63%)
Engaging with exemplars and resources	Teachers' engagement with classroom-ready exemplars or resources (including centrally supplied material, teacher-to-teacher sharing, and online materials).	14 (40%)
Study and research	Teachers' engagement in formal courses of study or research projects.	11 (31%)
Mentoring others	Teachers' involvement in mentoring other staff (typically new teachers).	7 (20%)

Table 5. Design effectiveness scores for 11 categories of professional development (means)

Professional development category	% of teachers participating	Individual design features[a]					Overall design effectiveness score[b, c]
		Content focus	Active learning	Coherence	Duration	Collective participation	
System-wide generic	100%	0.79	1.83	**2.99**[d]	**3.17**	**2.48**	**11.25 (SD 3.53)**
Formal observation	97%	1.57	**2.97**	**2.53**	1.80	0.63	9.50 (SD 2.79)
Subject advisor	94%	**3.18**	**2.09**	**2.86**	**2.30**	**2.12**	**12.55 (SD 3.95)**
Department (formal)	89%	**3.29**	**2.86**	**3.00**	**3.05**	**3.36**	**15.55 (SD 2.75)**
Peer observation	86%	**2.79**	**3.21**	**2.90**	**2.10**	**2.68**	**13.69 (SD 3.43)**
School activities	86%	1.51	1.16	**2.45**	**2.25**	1.87	9.24 (SD 3.43)
Colleagues (informal)	77%	**2.58**	**2.52**	**2.92**	**2.92**	**3.00**	**13.94 (SD 4.68)**
System-wide subject-specific	63%	**3.47**	1.78	**3.15**	**2.22**	**3.34**	**13.96 (SD 2.99)**
Exemplars / resources	40%	**3.60**	1.10	**2.90**	**2.66**	1.10	**11.36 (SD 3.13)**
Study and research	31%	**2.62**	1.77	**2.79**	**3.11**	1.54	**11.83 (SD 4.68)**
Mentoring others	20%	**2.40**	**2.60**	**3.27**	**2.13**	**3.00**	**13.39 (SD 4.97)**
Means for all professional development activities[e]		**2.34 (SD 1.49)**	**2.15 (SD 1.36)**	**2.84 (SD 0.94)**	**2.52 (SD 0.91)**	**2.33 (SD 1.58)**	**12.19 (SD 4.07)**

[a] Possible scores for the individual design features ranged from 0 to 4. Scores above the midpoint of 2 for an individual design feature indicate that the professional development reflected that feature at least occasionally.
[b] Possible values for the overall design effectiveness score ranged from 0 to 20.
[c] All scores in the table are rounded to 2 decimal places. The overall scores in the final column were found by totaling the un-rounded individual design feature scores; as such, in some cases the overall score is not exactly equal to the sum of the rounded individual design feature scores visible in the table.
[d] Scores in bold are above the midpoint of the response range (2 for individual design features and 10 for the overall design effectiveness score). Scores above the midpoint indicated that teachers *agreed* or *strongly agreed* that the professional development reflected the literature-based design feature/s.

[e] The means in the last row of the table are weighted according to the number of teachers who reported participating in each professional development category; they are not simple arithmetic means of the figures in the columns above.

Table 6. Impact scores for 11 categories of professional development (means)

Professional development category	% of teachers participating	Impact scales[a]				Total impact score[b]
		Teacher reaction	Teacher learning	Outcomes	Organisational response	
System-wide generic	100%	**2.10**[c]	1.81	1.87	**2.23**	**8.01 (SD 4.16)**
Formal observation	97%	**2.28**	1.62	**2.15**	**2.50**	**8.55 (SD 3.94)**
Subject advisor	94%	**2.52**	**2.11**	**2.28**	**2.08**	**8.98 (SD 4.10)**
Department (formal)	89%	**2.84**	**2.41**	**2.44**	**2.66**	**10.35 (SD 2.86)**
Peer observation	86%	**2.88**	**2.48**	**2.46**	**2.45**	**10.27 (SD 2.95)**
School activities	86%	**2.64**	**2.43**	**2.11**	**2.41**	**9.59 (SD 3.31)**
Colleagues (informal)	77%	**3.23**	**2.68**	**2.60**	**2.05**	**10.56 (SD 3.44)**
System-wide subject-specific	63%	**3.19**	**2.89**	**2.64**	**2.13**	**10.84 (SD 3.85)**
Exemplars / resources	40%	**2.98**	**2.75**	**2.60**	1.60	**9.93 (SD 3.47)**
Study and research	31%	**3.38**	**3.50**	**2.63**	**2.15**	**11.67 (SD 2.18)**
Mentoring others	20%	**3.20**	**2.30**	1.95	**2.80**	**10.25 (3.29)**
Means for all professional development activities[d]		**2.73 (SD 1.09)**	**2.36 (SD 1.24)**	**2.30 (SD 1.07)**	**2.28 (SD 1.02)**	**9.68 (SD 3.67)**

[a] Possible scores for the individual impact scales ranged from 0 to 4. Scores above the midpoint of 2 for an individual impact scale indicate that teachers agreed that the professional development resulted in that form of impact.
[b] Possible scores for the total impact score ranged from 0 to 16
[c] Scores in bold are above the midpoint of the response range (2 for individual impact scales / 8 for the total impact score). Scores above the midpoint indicated that teachers *agreed* or *strongly agreed* that the professional development had resulted in impact(s).
[d] The means in the last row of the table are weighted according to the number of teachers who reported participating in each professional development category; they are not simple arithmetic means of the figures in the columns above.

Table 7. Simple correlation and multiple regression results for the design and impact of teacher professional development

Design features	Impact scales							
	Teacher reaction		Teacher learning		Outcomes		Organisational response	
	r	β	*R*	β	*r*	β	*r*	β
Content focus	.405**	.244**	.290**	.173**	.464**	.376**	.131*	.019
Active learning	.261**	.054	.150**	–.023	.270**	.065	.242**	.146*
Coherence	.538**	.408**	.492**	.417**	.440**	.279**	.271**	.175**
Duration	.242**	.120*	.236**	.149**	.353**	.286**	.289**	.215**
Collective participation	.360**	.084	.252**	–.014	.297**	–.039	.217**	.046
Multiple correlation (*R*)		.626**		.539**		.636**		.397**
Adjusted R^2		.381**		.278**		.394*		.143**

*$p < .05$; **$p < .01$.

Results are based on 297 teacher responses (from 35 teachers each reporting on up to 11 professional development categories)