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### PRIVATE SCHOOL TEACHERS' PERSPECTIVES ON DIGITAL BADGE SYSTEM ACCEPTANCE: A Q METHODOLOGY STUDY

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#### ABSTRACT

**Purpose** – This Q methodology study explores teachers' views on using a digital badge system in two private schools. It aims to understand how teachers interpret, use, and value this system for personalising their professional development and validating skills from informal learning. The research seeks to identify factors influencing the acceptance and integration of digital badge systems in private schools.

**Methodology** – The study used Q methodology, combining qualitative and quantitative methods to explore subjectivity. Thirty teachers from two private schools participated in professional development using a digital badge system. They ranked statements about the system on a scale from -4 (most disagreement) to +4 (most agreement) to identify features that would encourage acceptance. After ranking, teachers completed an open-ended questionnaire designed to obtain respondents' personal insights. Principal component analysis was conducted on the rankings to identify factors related to acceptance. These factors, representing different opinion clusters, were analysed with the questionnaire responses and demographic data for a comprehensive understanding.

**Findings** – Three distinct factors emerged from the analysis, highlighting the varied expectations of private school teachers. Factor 1, "Empowered Professional Development," focused on giving teachers a sense of empowerment over their growth. Factor 2, "Rigorous and Flexible Professional Development," emphasized the need for challenging yet flexible learning experiences. Factor 3, "Personalised Career Advancement," prioritised individual career growth. Together, these factors

represented the teachers' diverse views on accepting a digital badge system for professional development.

**Significance** – These findings offer insights into teachers' diverse expectations and needs, helping to create a tailored and effective digital badge systems that private school teachers are more likely to embrace.

**Keywords:** Digital badge system, private school teachers, teacher professional development, Q methodology, teacher acceptance, educational technology.

## INTRODUCTION

In recent years, the landscape of professional development (PD) for teachers has undergone a significant transformation, propelled by advancements in technology and pedagogical approaches. Amid this evolution, digital badge systems (DBS) have emerged as a promising tool for recognising and validating the skills acquired through formal and informal learning experiences (Aberdour, 2016; Jonathan Finkelstein et al., 2013; Lafrate, 2017; Roy & Clark, 2018; Wardrip et al., 2016). Unlike individual digital badges, DBS offer a more comprehensive framework that personalises PD and validates teachers' competencies in a structured, ongoing manner. However, most existing research focuses on the implementation of digital badges in K-12 schools, higher education, and corporate environments, rather than DBS as a holistic system (Dyjur & Lindstrom, 2017; Fontichiaro & Elkordy, 2016; Sousa-Vieira et al., 2021; Stefaniak & Carey, 2019; Yu et al., 2015). This gap in the literature highlights the need for further exploration of how DBS are perceived and accepted, particularly in private schools.

Private and public schools operate in distinct contexts, which significantly affect the design and delivery of PD initiatives. In private schools, there is often a mismatch in understanding PD between administrators and teachers. Administrators tend to emphasise the importance of formal PD programs and often prioritise measurable outcomes, such as certification and compliance with institutional standards. However, they may also question the direct impact of such programs on actual teaching behavior and student outcomes. In contrast, teachers often view PD through a more practical and immediate lens, valuing opportunities that are relevant to their classroom practice, personalised to their developmental stage, and flexible in terms of time and delivery. This divergence in understanding creates challenges in aligning PD goals with the teachers' professional needs and expectations (Mohd Redza Badaruddin, 2008). Moreover, due to resource constraints, PD in private schools is often guided by principles of essentiality, incrementalism, and selectivity. This often results in only a limited range of formal PD activities being offered and typically only to a selected group of teachers based on perceived need, subject area, or performance. This selective approach making it difficult to create a comprehensive PD framework that teachers can consistently rely on for their professional growth (Nesamany, 2023).

In contrast, public schools in Malaysia benefit from a national, government-funded approach to PD that is systematically implemented across the country. The Malaysian Education Blueprint (2013-2025) outlines a comprehensive framework for PD, with continuous teacher development identified as a core

strategy for enhancing the quality of education. This system ensures that PD activities are consistent, well-coordinated, and aligned with national education goals, providing a structured pathway for professional growth (Ministry of Education, 2013). In public schools, PD is largely unaffected by individual school leadership changes, offering a level of stability and continuity that is often absent in private schools. The government also plays a key role in ensuring that PD is accessible to all public-school teachers, regardless of location, with the aim of building a highly skilled teaching workforce to support the country's educational priorities (Jamil et al., 2011; Omar et al., 2017).

The centralisation and consistency of PD in public schools stand in stark contrast to the more fragmented, decentralised model in private schools. Private institutions, often faced with resource constraints, rely on smaller-scale PD programs, which may be more selective in nature and limited in scope. This lack of central coordination and long-term strategic planning for PD makes it challenging for teachers to access a cohesive, structured system for professional growth (Nesamany, 2023). Additionally, private schools face unique challenges related to teacher motivation and engagement with PD. Research on private academic institutions reveals a general lack of motivation to engage in PD activities, particularly when there is little direct link between PD and tangible rewards or career progression (Nesamany, 2023). Teachers may also lack the self-reflection practices required for effective PD planning, further exacerbating the difficulty in creating meaningful development experiences. Collectively, these factors further diminish the motivation for professional growth.

Another key challenge in private schools is high teacher turnover, which is typically higher than in public schools. Factors such as workplace stress, limited career progression opportunities, availability of external job opportunities, unfair compensation, and unfair performance measurement contribute to this high turnover rate (Foo et al., 2023; Rathakrishnan et al., 2017). This frequent turnover disrupts the continuity of PD initiatives, making it difficult for schools to implement sustained, long-term PD programs that require consistent engagement from both teachers and administrators. New staff may not be fully integrated into the existing PD structures, hindering their ability to participate in ongoing PD activities. The lack of continuity in the service of members of the teaching staff further complicates the implementation of effective PD, as the institutional memory of PD programs may be lost when teachers leave or new staff arrive.

These challenges highlight the need for a flexible and sustainable system for PD in private schools, one that can adapt to the unique and evolving needs of teachers while addressing issues such as high turnover, leadership changes, and resource constraints. DBS offer a potential solution by providing a personalised, scalable approach to PD that is responsive to teachers' professional needs, encouraging ongoing engagement and motivation with PD initiatives over time even in the face of leadership changes or resource limitations (Aberdour, 2016; Cucchiara et al., 2014a; Risquez et al., 2020; Roy & Clark, 2018). The adaptability and scalability of DBS make them an ideal solution for private schools, offering a consistent and effective means of supporting teachers' professional growth, despite the constraints they may face.

This study examines how DBS, tailored to private school contexts, can address these challenges by offering continuity and customization in teachers' professional learning experiences. The DBS used in this research, developed and expounded in a previous publication (Ng & Dharam Singh, 2024a) was

developed through a rigorous, multi-phase process. It began with a comprehensive needs assessment, guided by input from private school administrators, to ensure the system was designed to address real-world challenges and align with stakeholders' expectations. Expert reviews of the prototype provided critical feedback, leading to refinements that incorporated best practices and innovative approaches. A subsequent pilot study, including usability testing, evaluated the system's functionality and user-friendliness, ensuring it was both technically robust and accessible for teachers. The final DBS offered a dynamic platform where teachers could earn digital badges aligned with their professional goals, supported by integrated feedback mechanisms and validated through demonstrated competencies.

Despite the potential benefits offered by the DBS as a tool to personalise professional development (PD) and validate competencies, its acceptance in private schools remains a significant challenge (Risque et al., 2020). This reluctance can be attributed, in part, to the broader sociocultural contexts within which the system operates as the integration of DBS requires a shift in established practices and mindsets, particularly in environments where professional development has traditionally been inconsistent or resource-constrained. (Diamond & Gonzalez, 2014). Additionally, the adoption and sustained use of technology, including the DBS, depend significantly on its perceived usefulness and alignment with users' needs (Marikyan & Papagiannidis, 2021; Skoumpopoulou et al., 2018). To address this challenge, understanding private school teachers' perspectives within their unique institutional contexts is essential for fostering acceptance.

Therefore, this study endeavors to explore the perceptions of teachers from two distinct private schools regarding the implementation and utility of the digital badge system. Specifically, it seeks to explore how these private school teachers interpret, utilise, and value the digital badge system as a tool to personalise their professional development and validate skills acquired through formal and informal learning channels. Through this exploration, the study aims to uncover insights into the factors influencing its acceptance and integration. Ultimately, the study seeks to contribute to the design and implementation of a DBS that is not only technically robust, but also contextually relevant, fostering its broader acceptance and effectiveness in private school settings.

## **METHODOLOGY**

### **Research Design**

To explore teachers' perceptions of a digital badge system (DBS) in an authentic and meaningful way, this study adopted a phenomenological approach, justified by its focus on understanding the lived experiences of participants and the subjective meanings they attached to those experiences (Developments, 1970; Thomas & Sohn, 2023). This epistemological stance aligns with the study's aim to capture how private school teachers interact with and perceive the DBS, particularly in the context of their professional development. Phenomenology provides the foundation for uncovering the complexities of these interactions, offering insights into the deeper factors that influence acceptance, resistance, and engagement with the system.

Based on this epistemological stance, the study incorporated a digital badge system developed based on the feedback from private school administrators, which offered digital badges to private school teachers who successfully demonstrated competencies in applying different pedagogical practices (Ng & Dharam Singh, 2024b). This system provided a platform for teachers to explore and earn badges aligned with their professional goals at their own pace. Teachers submitted evidence of their competencies through the system, which was then assessed by master teachers serving as evaluators. Over a two-month period, this process encouraged teachers to engage meaningfully with the system, allowing them to reflect on their skills and actively participate in their professional development journey.

This participatory design ensured that teachers' experiences and insights were integral to understanding the adoption of the DBS in private school contexts. To systematically examine the subjective factors influencing teachers' acceptance of the DBS, Q methodology was employed. This methodological approach is particularly suited for capturing diverse viewpoints and systematically analysing patterns of perception, making it an ideal complement to the phenomenological framework (Bashatah, 2016; Damio, 2016; Watts & Stenner, 2005). By focusing on subjective experiences, Q methodology has made it possible for the present study to unravel the layers of acceptance and resistance among participants, highlighting the factors shaping their interactions with the DBS. The combined use of phenomenology and Q methodology has enabled a deeper analysis of the lived experiences of teachers, contributing valuable insights into the potential of the DBS as a personalised, scalable tool for professional learning in private schools.

### ***Overview of Q Methodology***

Operationally, the Q method of analysis begins with selecting a sample of statements, known as the Q set regarding the topic of research interest and a group of individuals, known as the P-set, who are asked to rank order the statements in order to indicate their opinions about them. This generates a "Q sort" for each individual. By Q-sorting, individuals give their subjective meaning to the statements, and by doing so reveal their subjective viewpoints. Next, these individual rankings or viewpoints are then subjected to a by-person factor analysis, also known as "inverted factor analysis", in which participant's points of view on the topic of study (Q-sorts) become variables. Thereafter, using factor rotation, similar Q-sorts (persons) are then grouped together into several factors, where each factor represents a group of individuals with similar views, feelings, or preferences. The following step in Q-analysis involves estimating factor scores for each statement on all factors and identifying distinguishing statements for each factor. The final stage of Q methodology involves a comprehensive interpretation of each factor, which represents distinct opinion clusters. This interpretation integrates data gathered from the Q sorting activity with supplementary information such as demographic details, post-sorting questionnaires from individuals with significant loadings, and statements that significantly contribute to each identified factor. This holistic approach ensures a thorough understanding of the factors influencing perceptions and preferences among participants.

### ***Q Set Design and Content***

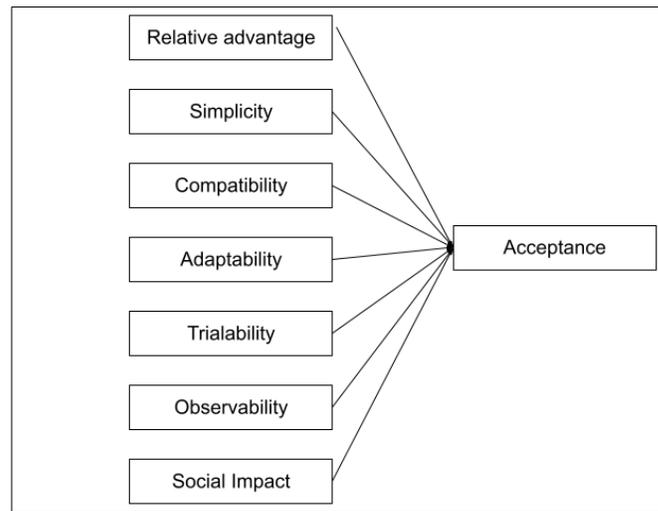
For this study, an initial pool of statements that could potentially describe and sufficiently encapsulate views on the acceptance of the digital badge system were gathered from a comprehensive review of

academic journals published within the last ten years, focusing on the design, implementation, and assessment of digital badges or the DBS across different settings and learner groups. The selected journals had provided insights into various aspects of the DBS, including its effectiveness, challenges, and the perceptions of different learners, which guided the selection of statements reflecting diverse views on the system.

To ensure a comprehensive and structured approach, the statements were categorised based on a conceptual framework (see Figure 1) which describes the following seven characteristics of the proposed change (digital badge system): relative advantage (RA), simplicity (S), compatibility (C), adaptability (A), trialability (T), observability (O), and social impact (SI). These categories were designed to address the various dimensions of the system as perceived by teachers, drawing from established constructs in innovation adoption literature such as the Chocolate Model of Change (CACAO) and Innovation Diffusion Theory (Brittnee Earl et al., 2020; Lauren Acree, 2018). This conceptual framework provided a comprehensive structure to the Q set which in turn, offered insights into how proponents and opponents frame their views on the digital badge system (see Table 1).

**Figure 1**

*Conceptual Framework of the Study*



**Table 1**

*Categories Describing Characteristics of the Digital Badge System*

Characteristics	Descriptions
Relative Advantage	How much better it is than the previous programme
Simplicity	How easy it is to understand
Compatibility	How well it aligns with the users’ values, experiences, and needs
Adaptability	How easily it can be adjusted to fit individual preferences

(continued)

Characteristics	Descriptions
Trialability	How much it can be tested before committing fully
Observability	How visible the tangible results of the innovation are to others
Social Impact	How it affects the user's social relationships

Once categorised, the initial set of Q statements underwent expert review and pilot testing to refine the final set used in the Q-sorting process. Experts in educational technologies reviewed the statements for clarity and precision, ensuring that they were contextually relevant, free from jargon, and easily understandable by participants. This refinement process was aimed at eliminating any complex or ambiguous language, making the statements accessible to the target audience. Additionally, to ensure clarity and consistency, the statements were framed in a positive tone, avoiding the blending of negative and positive statements, ensuring that participants could read and rank the statements accurately, ranging from most disagreement (-4) to most agreement (+4). Table 2 presents the final Q set, consisting of 39 statements categorised according to the conceptual framework adopted for this study. Each statement is numbered for easy reference during the factor interpretation phase.

**Table 2**

*Q-set*

Category	Numbered Statements
Relative Advantage (RA)	<ol style="list-style-type: none"> <li>1. Digital badge system allowed teachers to express choice in their professional learning opportunities. (RA1)</li> <li>2. The digital badge system gives teachers feedback as part of the awarding process for digital badges, allowing them to make improvements based on the learning artefacts they provide. (RA2)</li> <li>3. Rather of thinking that teachers don't know how to do a skill in their classroom, the digital badge system gave teachers credit for the work they currently do. (RA3)</li> <li>4. Digital badge system provides an opportunity for teachers to engage in job embedded professional learning that is connected to the daily skills that teachers need in their classrooms. (RA4)</li> <li>5. Digital badge system encourages teachers to participate in more rigorous learning, such as metacognitive or evaluative thinking. (RA5)</li> <li>6. The mechanism for awarding digital badges is motivating. (RA6)</li> <li>7. Digital badge system enables professional communities to quickly produce, validate and award in-demand skills badge to teachers. (RA7)</li> </ol>
Simplicity (S)	<ol style="list-style-type: none"> <li>8. It is easy to use the digital badge system, navigate the resources, curate artefacts, upload artefacts, and submit the necessary documentation. (S1)</li> <li>9. Digital badge systems are more approachable as compared to traditional model of professional learning. (S2)</li> <li>10. Teachers can easily and clearly understand from the digital badge system what each badge seeks to measure as well as the requirements for earning a digital badge. (S3)</li> </ol>

(continued)

Category	Numbered Statements
	<p>11. Digital badge system makes it easier for teachers to engage others in those professional activities that are significant to them, thereby expanding participation and the community itself. (S4)</p> <p>12. Digital badge system has clearly articulated approach to follow with resources and rubrics a teacher can use. (S5)</p> <p>13. The digital badge system is self-explanatory. (S6)</p> <p>14. Teachers understand how digital badges would be of value outside of their professional learning. (S7)</p>
Compatibility (C)	<p>15. Teachers who are inclined to plan their own professional development can benefit from the digital badge system. (C1)</p> <p>16. The digital badge system is appropriate for self-regulated learners who can monitors, directs, and regulates actions toward achieving the digital badge. (C2)</p> <p>17. The digital badge system is more prestigious than a certificate of completion. (C3)</p> <p>18. Digital badge system can be aligned with the needs and values of the school. (C4)</p> <p>19. A sense of ownership is fostered by including teachers in the design and implementation of the digital badge system. (C5)</p> <p>20. The rigorous process of earning the digital badge increase teacher effectiveness. (C6)</p> <p>21. The digital badge system is compatible with teachers' learning style. (C7)</p>
Adaptability (A)	<p>22. The digital badge system allows teachers to personalise their learning. (A1)</p> <p>23. The use of digital badge system enables the school to focus on one or two set of skills collectively. (A2)</p> <p>24. The implementation of a digital badge system can supplement traditional or in-person professional development. (A3)</p> <p>25. Teachers are not required to be physically present in the school to earn digital badges. (A4)</p> <p>26. The digital badge system can afford multiple types of assessment to verify skill. (A5)</p> <p>27. The digital badge system may be adapted to recognise both formal and informal learning. (A6)</p>
Social Impact (SI)	<p>28. Digital badge system does not involve any shifts in school social dynamics or relationship among teachers. (SI1)</p> <p>29. Sharing digital badges to professional networking sites help to create a sense of affiliation and a growing social presence. (SI2)</p> <p>30. An online portfolio of digital badges represents a distinguishing mark of comprehensive learning and achievements, therefore establishing professional reputations. (SI3)</p>
Trialability (T)	<p>31. The digital badge system allows teachers to try out without consequence. (T1)</p> <p>32. The digital badge system allows teachers to explore and attempt a digital badge at any time and in any subject area. (T2)</p> <p>33. Teachers can experiment with the digital badge system before formally using it. (T3)</p>

(continued)

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Category	Numbered Statements
Observability (O)	34. Teacher can share their digital badge with their professional network and potential employers to increase their chances of being noticed. (O1) 35. Digital badges signify professional recognition when it is aligned to standards, best practices, or framework. (O2) 36. A digital badge system makes it possible for anyone to track professional activities within a community of professionals. (O3) 37. The digital badge system allows for the recognition of lifelong learning. (O4) 38. Digital badges provide verifiable evidence of what teachers are capable of to employers and colleagues. (O5) 39. The publication and distribution of digital badges may have a favourable influence on job applications. Even if it does not, it is unlikely to have a negative impact in any situation. (O6)

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### ***Participants (P-Set)***

In Q methodology, the focus is not on generalising findings to a population but on exploring the range and structure of subjectivities that exist around a given topic (Watts & Stenner, 2012). As such, the sample size is not governed by statistical power calculations typical of R-methodology but by the number of distinct viewpoints likely to emerge through the factor analysis of individual Q sorts. Therefore, while the participant sample may appear limited by conventional quantitative standards, it is deemed methodologically appropriate given the nature and purpose of Q studies (S. R. Brown & Stephenson, 1980; Watts & Stenner, 2012). As a rule of thumb, the total number of Q statements can be used to determine the total number of respondents (P-set) required to complete the Q-sort. A 3:1 ratio of statements to participants is preferred in the literature, however a ratio of 2:1 is also acceptable (Webler et al., 2009; Young & Shepardson, 2018).

For this study, 30 participants from two distinct private schools in Sarawak, Malaysia, were recruited to complete the Q-sort of a Q set comprising 39 statements. It is noteworthy that although all participants had engaged with the digital badge system, not all had earned a digital badge. Nonetheless, all 30 participants expressed interest in adopting the system. Including these participants is justified because their interactions with the system provided valuable perspectives, even in the absence of direct badge-earning experiences. Their insights have contributed to a more comprehensive exploration of the digital badge system's impact within the unique context of private schools, enriching our understanding of its acceptance and utilisation.

**Table 3**

*Participant Demographics*

No	Participant Code	Age	Gender	Highest Education Level	Teaching Qualification	Teaching Experiences	Earned a digital badge
1	MMYEYY1	35	Male	Master	Yes	Experienced	Yes
2	MBYEYY2*	42	Male	Bachelor	Yes	Experienced	Yes
3	MMNEYY3	50	Male	Master	No	Experienced	Yes
4	FMYEYY4	41	Female	Master	Yes	Experienced	Yes
5	FMYEYY5	34	Female	Master	Yes	Experienced	Yes
6	FMYYTY6	33	Female	Master	Yes	Transitioning	Yes
7	MPNEYY7	45	Male	Doctorate	No	Experienced	Yes
8	FBNTYY8	27	Female	Bachelor	No	Transitioning	Yes
9	FBYBNY9*	30	Female	Bachelor	Yes	Beginning	No
10	FBYEYY10	53	Female	Bachelor	Yes	Experienced	Yes
11	FMYEYY11	47	Female	Master	Yes	Experienced	Yes
12	FBNENY12*	41	Female	Bachelor	No	Experienced	No
13	FBYTNY13*	31	Female	Bachelor	Yes	Transitioning	No
14	FBYTYTY14*	28	Female	Bachelor	Yes	Transitioning	Yes
15	FBNBNY15*	27	Female	Bachelor	No	Beginning	No
16	FMYENY16	36	Female	Master	Yes	Experienced	No
17	FBNTNY17	39	Female	Bachelor	No	Transitioning	No
18	FMYYTY18	36	Female	Master	Yes	Transitioning	Yes
19	MPYENY19*	48	Male	Doctorate	Yes	Experienced	No
20	FMYYTNY20	38	Female	Master	Yes	Transitioning	No
21	FMNENY21	35	Female	Master	No	Experienced	No
22	FMYENY22	39	Female	Master	Yes	Experienced	No
23	FBYTNY23	33	Female	Bachelor	Yes	Transitioning	No
24	FMYENY24*	39	Female	Master	Yes	Experienced	No
25	MMYEYY25	32	Male	Master	Yes	Experienced	Yes
26	FPYENY26	32	Female	Doctorate	Yes	Experienced	No
27	MDYENY27	68	Male	Diploma	Yes	Experienced	No
28	FMYEYY28	49	Female	Master	Yes	Experienced	Yes
29	FBYEYY29*	34	Female	Bachelor	Yes	Experienced	Yes
30	FBYTYTY30*	29	Female	Bachelor	Yes	Transitioning	Yes

*Notes.* Each participant was identified by a unique code, which was constructed using seven components in the following sequence: gender (Male/Female), highest education level (Diploma/Bachelor/Master/Doctorate), teaching qualification (Yes/No), teaching experience category (Beginning, 0-3 Years; Transitioning 4-5 years; Experienced more than 5 years), earning of a digital badge (Yes/No), acceptance of the digital badge system (Yes/No), and participant number. For instance, Participant 1 was assigned the code MMYEYY1. This code provided demographic information, indicating that Participant 1 was male, held a master's degree, possessed a teaching qualification, was an experienced teacher with more than 5 years of teaching experience, had earned a digital badge, and expressed acceptance of the digital badge system.



**Statistical Analysis**

*Q Sorts to Factors*

The first transition is from Q sorts to factors, which is accomplished by a correlation and factor analysis of Q sorts. The significant correlation for this study, set at  $p < 0.01$ , was calculated using Equation 1.

$$2.58 \times (1/\sqrt{\text{No. of items in Q set}}) \quad (1)$$

Given the deployment of a Q set comprising 39 items, a correlation of  $\pm 0.41$  or greater was considered statistically significant in this analysis. While conventional wisdom suggests that a correlation coefficient between 0.30 and 0.50 is generally weak, this study has adopted a more stringent criterion, defining significant correlations as  $\pm 0.41$  or greater. The intercorrelation matrix computed for the 30 Q sorts ranged from 0.30 to 0.70, revealing positive correlations that indicated alignment in perspectives among some participants, and negative correlations that suggested divergence in viewpoints among others. Following the correlation matrix analysis, factor analysis was conducted using principal component analysis (PCA) with the KenQ Analysis Desktop Edition (KADE). This process was aimed at unveiling the key, commonly held meanings within the participant group, which manifest as factors. Initially, eight factors were extracted, but after applying Cattell’s scree test criterion, only the first three factors were retained for rotation using Varimax rotation. The rotated loadings for the Q sorts are as presented in Table 4. Collectively, the three factors help to explain a substantial 40% of the study’s variance. The first group of Q sorts (numbers 1, 3, 16, 20, 22, 25, 26, 27, 28) exhibits high loading on Factor 1, the second group (numbers 4, 5, 6, 7, 10, 11, 18, 21) loads significantly on Factor 2, and the third group (numbers 8, 17, 23) closely aligns with Factor 3. Each factor represents an opinion cluster, resulting in three distinct opinion clusters formed from 20 of the 30 participants initially involved in the Q-sorting.

**Table 4**

*Factor Matrix with Defining Sorts Flagged*

Q-sort	Factor 1		Factor 2		Factor 3
MMYEYY1	0.75	Flagged	0.03		0.21
MBYEYY2	0.09		-0.01		-0.31
MMNEYY3	0.57	Flagged	0.34		-0.20
FMYEYY4	-0.21		0.56	Flagged	0.23
FMYEYY5	0.21		0.47	Flagged	0.22
FMYTTY6	0.17		0.73	Flagged	0.18
MPNEYY7	-0.12		0.67	Flagged	-0.22
FBNTYY8	-0.03		-0.08		0.79
FBYBNY9	0.38		0.17		0.39
FBYEYY10	-0.10		0.72	Flagged	-0.03
FMYEYY11	0.06		0.64	Flagged	-0.27
FBNENY12	0.41		0.21		0.38

(continued)

Q-sort	Factor 1	Factor 2	Factor 3	
FBYTNY13	0.33	0.08	-0.11	
FBYTTY14	0.47	0.51	-0.26	
FBNBNY15	0.24	-0.14	0.24	
FMYENY16	0.51	Flagged	-0.02	
FBNTNY17	0.10	-0.05	0.59	Flagged
FMYTTY18	0.27	0.55	Flagged	0.21
MPYENY19	0.31	0.19	0.41	
FMYTNY20	0.49	Flagged	-0.03	0.31
FMNENY21	0.27	0.66	Flagged	0.30
FMYENY22	0.51	Flagged	0.19	0.29
FBYTNY23	-0.05	0.24	0.69	Flagged
FMYENY24	0.20	0.31	0.04	
MMYEYY25	0.61	Flagged	-0.12	0.05
FPYENY26	0.65	Flagged	0.20	-0.16
MDYENY27	0.62	Flagged	0.26	0.00
FMYEYY28	0.41	Flagged	-0.16	0.23
FBYEYY29	0.23	0.25	0.09	
FBYTTY30	0.40	0.26	0.42	
Eigenvalue	4.37	4.38	3.08	
% Explained Variance	15	15	10	

Notes. The Q sorts that defined a particular factor were marked as “flagged”. The percentage of explained variance measured the proportion to which the factor accounted for the variation of the given data set.

### Factors to Factor Array

The second transition moves from factors to factor arrays through the weighted averaging of significantly loading or factor-exemplifying Q sorts. This process begins by calculating the total weighted scores for each item, which are then converted into Z scores. These Z scores for each individual item are combined to create a single factor array, which is essentially a single Q sort configured to represent the viewpoint of a particular factor. This factor array ranks the statements based on their Z scores, thereby illustrating the relative importance of each statement within the context of the identified factor. Figure 3, Figure 4, and Figure 5 feature factor array for Factor 1, Factor 2, and Factor 3 respectively.

In these figures, the numbers correspond to the numbered statements listed in Table 2. The symbols are defined as follows: \* denotes a distinguishing statement with a significance level of  $p < 0.05$ ; \*\* denotes a distinguishing statement with a significance level of  $p < 0.01$ ; ► indicates that the z-score for the statement is higher than in all other factors; ◀ indicates that the z-score for the statement is lower than in all other factors.

Since the study’s significance level was set at  $p < 0.01$ , the interpretation will primarily focus on distinguishing statements at this level. Additionally, statements with z-scores significantly higher or lower than those in other factors were included to aid in interpreting and comparing factors. This helps

identify which statements were uniquely emphasised or deemphasised within each factor, thereby clarifying the distinct perspectives represented by each factor.

**Figure 3**

*Composite Q Sort for Factor 1*

	-4	-3	-2	-1	0	1	2	3	4
	*◀ 17	**◀ 33	**◀ 27	21	** 11	**▶ 7	2	34	**▶ 16
	**◀ 28	**◀ 31	*◀ 3	10	4	** 36	30	**▶ 1	22
		**◀ 13	6	**◀ 26	** 29	39	**▶ 15	**▶ 35	
			*◀ 8	*◀ 23	*▶ 12	24	32		
			20	*◀ 9	5	37	** 25		
				* 14	* 38	*▶ 19			
					18				

**Figure 4**

*Composite Q Sort for Factor 2*

	-4	-3	-2	-1	0	1	2	3	4
	**◀ 30	17	**◀ 35	* 3	*◀ 2	** 1	*▶ 9	31	**▶ 25
	**◀ 38	**◀ 5	6	19	8	** 26	**▶ 33	32	22
		**◀ 20	**◀ 29	18	23	27	24	* 16	
			7	**◀ 36	4	*◀ 34	**▶ 10		
			**◀ 14	**◀ 11	21	37	*▶ 13		
				12	28	39			
					15				

**Figure 5**

*Composite Q Sort for Factor 3*

-4	-3	-2	-1	0	1	2	3	4
**◀ 6	**◀ 4	19	* 13	**◀ 16	*▶ 3	2	**▶ 26	**▶ 29
**◀ 39	17	20	** 33	** 35	30	34	32	**▶ 36
	**◀ 1	12	10	*▶ 14	37	**▶ 11	31	
		7	5	15	23	**▶ 18		
		**◀ 21	**◀ 22	8	27	*▶ 38		
			**◀ 24	**◀ 25	* 9			
				28				

**RESULT**

**Factor Interpretation**

By closely examining the distinguishing statements and those with z-scores significantly higher or lower in the factor array compared to other factors, as well as focusing on the highest and lowest ranked statements, interpretations were made about the opinions and perspectives represented by each factor.

***Factor 1: Empowered Professional Development***

Factor 1 had an eigenvalue of 4.37 and helped to explain 15% of the study variance. Factor 1 represented a cluster of experienced and highly experienced teachers. The positive perception of relative advantage (statement 1, statement 7) indicated that teachers appreciated the system’s ability to express their professional learning choices and quickly receive recognition for valuable skills. The observability aspect (statement 35) ensured tangible results, making teachers’ achievements visible to others, contributing to a sense of empowerment. However, Factor 1 also included negative perceptions related to adaptability, trialability, simplicity and social impact. Participants expressed concerns about the system’s adaptability (statement 26, statement 27), their feeling that it might have a limitation in recognising both formal and informal learning, which could affect its overall flexibility. Trialability (statement 33, statement 31) was perceived as a challenge, suggesting that teachers might find it less suitable for experimentation before formal adoption. Simplicity (statement 13) was another concern, despite the system being self-explanatory, indicating potential complexity in certain aspects. Finally, the perceived lack of social impact (statement 28) seemed to suggest that teachers felt that the system

did not significantly influence social dynamics or relationship among teaching staff. In conclusion, teachers aligned with Factor 1 regard the digital badge system as pivotal for fostering autonomy in their professional learning choices, enhancing flexibility in learning approaches, and providing meaningful recognition for their achievements. These aspects are crucial for empowering educators to tailor their professional growth and adapt their learning methods according to their individual needs.

### ***Factor 2: Rigorous and Flexible Professional Engagement***

Factor 2 had an eigenvalue of 4.38 and helped to explain 15% of the study variance. Factor 2 emerged as a compelling cluster characterised by participants with advanced qualifications. Positive perceptions in this factor revolved around adaptability (Statement 25), suggesting that teachers found the system flexible enough to be adapted to various needs and preferences. Trialability (Statement 33) was viewed positively, indicating that teachers believed that the system was suitable for experimentation before formal adoption. Simplicity (Statement 10) was another positive aspect, suggesting that teachers found the system easy to understand and navigate. Conversely, Factor 2 also encompassed negative perceptions related to observability, social impact, relative advantage, and compatibility. Observability (Statement 35, Statement 36, Statement 38) was a major concern, indicating that teachers in this factor felt the system lacked visibility and tangible results. Social impact (Statement 29, Statement 30) was perceived negatively, suggesting that teachers were concerned about the potential impact on social relationships and community-building. Relative advantage (Statement 5) and compatibility (Statement 20) were also negatively ranked, indicating reservations about the system's superiority over traditional methods and its alignment with the values and needs of teachers. The varied perceptions of the digital badge system revealed that teachers aligning with Factor 2 believed that the digital badge system should facilitate deep and challenging learning opportunities that yield impactful results. This suggests the system had the capacity to support personalised learning goals that enhance performance. Additionally, the teachers also expected it to serve as a platform that would encourage flexible engagement in their professional growth, driven by community involvement—an advantageous characteristic akin to traditional professional development.

### ***Factor 3: Personalised Career Advancement***

Factor 3 had an eigenvalue of 3.08 and helped to explain 10% of the study variance, revealed distinct perceptions among teachers who were predominantly in the transitional stages of their careers. Positive perceptions within Factor 3 included a strong emphasis on social impact (Statement 29), indicating that teachers in this factor perceived the digital badge system as having a positive influence on social relationships and professional communities. Observability (Statement 36) was another positive aspect, suggesting that teachers believed the system could produce tangible results, enhancing visibility. However, Factor 3 also reflected the teachers' concerns. Compatibility (Statement 16, Statement 21) was rated negatively, suggesting reservations about how well the digital badge system aligned with the teachers' values and experiences. Adaptability (Statement 22, Statement 24, Statement 25) was also negatively ranked, indicating concerns about the system's flexibility to meet individual needs. Relative advantage (Statement 1, Statement 4, Statement 6) raised doubts within this factor, with participants less convinced about the system's superiority over traditional methods. Furthermore, the observability of the digital badge's impact on job applications (Statement 39) was negatively perceived, indicating

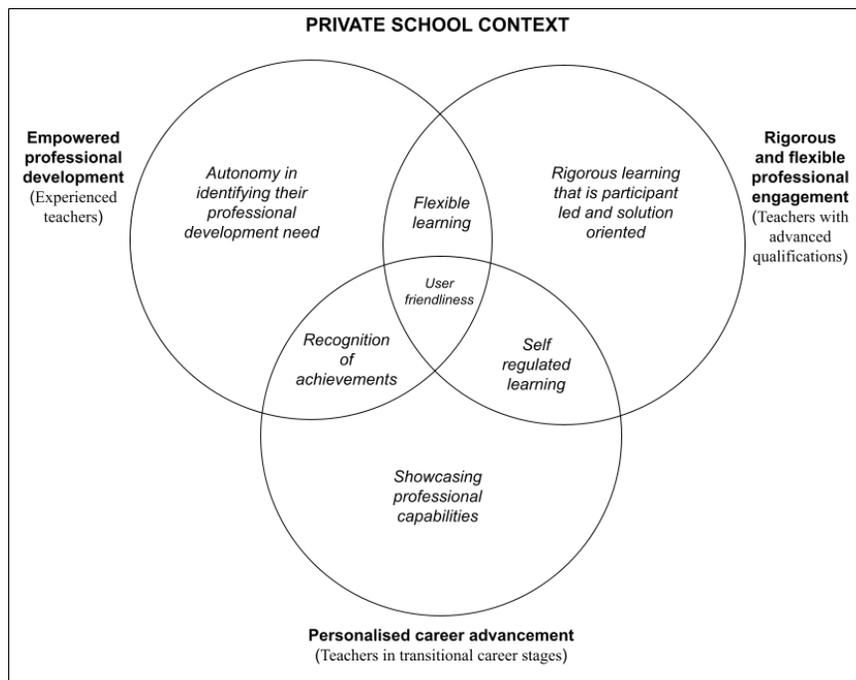
reservations about its effectiveness in professional contexts. Overall, teachers aligned with Factor 3 tended to prioritise professional networking and demonstrated tangible evidence of their capabilities to support career advancement. They anticipated that the digital badge system would enhance social connections and also aid in planning and monitoring their learning, simulating a process of self-regulated learning conducive to career advancement. This expectation appears to stem from their transitional career stage, where they were found to value networking opportunities and the ability to visibly showcase their skills and achievements.

## DISCUSSION

Through the analysis carried out in the present study, three distinct factors, each representing a unique opinion cluster, have emerged: Factor 1, labelled "Empowered Professional Development"; Factor 2, denoted "Rigorous and Flexible Professional Engagement"; and Factor 3, identified as "Personalised Career Advancement." These factors collectively represented the multifaceted landscape of opinions within this demographic. As illustrated in Figure 6, these factors encapsulated the demographic nature of private school teachers and have provided valuable insights into their understanding of how a digital badge system could meet their unique needs. Recognising these diverse perspectives is essential for designing professional development programs that effectively utilise digital badge systems and align with the specific needs and aspirations of private school teachers.

**Figure 6**

*Key Similarities and Differences in Teacher Perspectives on Acceptance of the Digital Badge System (DBS)*



The ensuing paragraphs will delve into a detailed examination of each factor, unraveling the intricate tapestry of private school teachers' expectations and providing actionable insights for shaping transformative professional development experiences through the digital badge system. This thorough analysis will highlight the key aspects that need to be addressed to ensure that the system is both effective and well-received by teachers.

Factor 1, labeled as "Empowered Professional Development," emerged as a dominant theme encompassing teachers' perspectives on the digital badge system. This theme, common among the group of experienced teachers, highlighted the significance of digital badge system in providing a sense of empowerment in their professional development journey. These teachers expressed a strong desire for a flexible learning environment that accommodates their individual learning needs and a system that could systematically recognise their achievements or skills acquired.

A digital badge system can cater to this by offering a diverse range of professional development activities that teachers can explore at their own pace and on topics aligned with their interests. For instance, badges could be awarded for mastering specific teaching methodologies, acquiring new skills, or completing advanced training programmes (DeMarco et al., 2024; Diamond & Gonzalez, 2014). Likewise, administrators could intentionally integrate "flexibility" into professional development activities by offering options such as self-paced modules accessible at any time, completing online courses, or participating in collaborative projects outside of regular teaching hours (Agola, 2020). Such initiatives not only acknowledged the varying learning preferences among the teaching staff, but also provided teachers with meaningful recognition and validation of their skills and achievements, whether gained through formal or informal learning (Martin et al., 2020). This dynamic system holds immense potential for effectively empowering teachers in their personalised professional learning journey. By offering tailored and flexible professional development, the system can cultivate a positive school culture centered around lifelong learning. Teachers who feel a sense of achievement are more likely to remain engaged in ongoing professional development initiatives, making the digital badge system a crucial tool for sustaining their commitment to continuous improvement (Gamrat et al., 2014; Ruthanne Cole, 2022).

In contrast, Factor 2, labelled "Rigorous and Flexible Professional Engagement," highlights teachers' expectations for a challenging yet adaptable professional development experience. While both Factor 1 and Factor 2 were exhibited by teachers with substantial teaching experience, Factor 2 was distinguished by those with advanced qualifications. Factor 1 saw an emphasis on flexibility primarily through self-paced and multi-modal learning, whereas Factor 2 expanded on this by stressing the need for professional development activities that actively engaged teachers in rigorous learning experiences with impactful results. These experiences could involve a cyclical process where teachers in a community of practice collaborated to identify strategies for addressing specific issues, plan tasks, monitor their performance, and reflect on outcomes. This approach not only ensured that professional development was both challenging and relevant, but also fostered a deeper engagement among teachers, enabling them to apply their advanced skills and knowledge effectively.

School administrators can strategically use this insight to design professional development initiatives within a digital badge system that has the ability to integrate through badge-related activities evidence-

based strategies and collaborative practices to foster knowledge sharing among teachers (He, 2017; Mcdaniel et al., 2012; Pedro et al., 2015; Pitt et al., 2019). For instance, to promote evidence-based strategies through the digital badge system, administrators can design badges that specifically recognise teachers who have demonstrated a commitment to evidence-based practices in their teaching methodologies. This could include badges for successfully implementing research-backed teaching strategies or incorporating innovative evidence-based approaches into the curriculum. Additionally, administrators can incorporate features that promote peer interaction, such as discussion forums, collaborative projects, or joint badging opportunities. This collaborative dimension adds richness to the learning process, allowing teachers to share insights, collectively tackle challenges, and celebrate joint achievements. By embedding collaborative elements, the digital badge system not only recognises individual achievements, but also emphasises the significance of collective professional growth within the private school community.

Factor 3, identified as "Personalised Career Advancement," focused on teachers' aspirations for individualised pathways in their professional journey, particularly those in transitional career stages. School administrators can translate this understanding into professional development programmes that empower teachers to set personalised goals and envision clear pathways for career advancement. The digital badge system can complement this by providing a tangible way to showcase competencies through acquired badges, each representing essential skills. These badges can be stacked to construct a roadmap towards various career trajectories. Nevertheless, it is important to note that school administrators should emphasise a holistic approach to career development by incorporating mentorship, leadership opportunities, and tailored learning experiences alongside badges achievements. Together, these supplementary components complement the badges, creating a robust framework that fosters holistic career growth and progression.

Additionally, the design of the digital badge system can further enhance career advancement by offering badges that specifically reflect the skills and competencies relevant to teachers' career aspirations. For instance, badges can be tailored to highlight leadership achievements, innovative teaching methodologies, or successful implementation of educational initiatives. By offering a range of badges that reflect these diverse competencies, the digital badge portfolio effectively serves as tangible proof of teachers' professional accomplishments. This not only enhances their professional reputation but also supports their career progression by showcasing their expertise in relevant areas (Perkins & Pryor, 2021; Steenkamp et al., 2024). Administrators can further improve these efforts by structuring badges into clear pathways for career advancement and personalisation. These pathways encourage teachers to take charge of their professional learning and align it with their individual career goals, fostering self-regulation and ongoing growth (Cheng et al., 2023; Cucchiara et al., 2014b). This approach ensures purposeful and meaningful professional development efforts that cater to the varied needs and aspirations of teachers. Such tailored recognition fosters motivation and encourages continuous growth and development among teachers.

Last but not least, another crucial consideration is the user-friendliness of the digital badge system, which had emerged as a significant finding across all three factors. Regardless of how well the system meets teachers' expectations, its usability is paramount. If the system is difficult to use, teachers will not be able to fully experience its benefits. For that reason, a user-friendly interface is essential to ensure

that teachers, regardless of their technological skills, can easily navigate and engage with the system (Al-Emadi et al., 2021; Anderson et al., 2013; Davis et al., 1989). The findings of the present study have highlighted the fact that implementing intuitive design principles, such as clear navigation menus and straightforward instructions significantly enhances usability. This approach not only prevents potential demotivation, but also fosters positive engagement, making interaction with the system seamless and rewarding. Therefore, administrators should prioritise simplicity and clarity in the system's design to encourage active participation (A. Brown & Voltz, 2005; Echeles, 2021). By doing so, the digital badge system becomes an invaluable and accessible tool for enhancing professional development within the unique context of private school environments.

## CONCLUSION

Understanding the perspectives of private school teachers regarding digital badge systems for professional development is essential for their effective implementation. By addressing the unique expectations and concerns identified within each of the factors identified in the study's conceptual model, stakeholders can design more tailored and engaging digital badge systems. These systems have the potential to offer personalised learning experiences while accurately acknowledging, assessing, and documenting meaningful professional development activities.

However, it is important to note that this research is limited by its exclusive focus on two private schools. This narrow focus may limit the generalisability of the findings. To overcome this limitation, future studies should consider expanding the participant pool to encompass a broader spectrum of private schools. This approach will contribute to advancing knowledge in the field of digital badge systems for teacher professional development. It will also ensure the insights and strategies derived from the research are applicable across diverse educational contexts, thereby enhancing the relevance and impact of digital badge systems in education.

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