

Sustainable professional development policies in Jordanian education: The mediating role of generational diversity in heritage knowledge transmission

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Abstract

This paper analyzes how Sustainable professional development (SPD) policies influence heritage knowledge transmission (HKT) amongst teachers in Jordanian state schools with the generational diversity (GD) being tested as a mediating factor. Even though Sustainable professional development has become one of the most important factors in the instructional change and cultural preservation, there is still scant empirical research on the interaction between such policies and the generational dynamics that affect heritage-driven pedagogies in the Middle Eastern context. Quantitative research design was used, and 327 teachers were interviewed using structured questionnaires. Both measurement and structural models were assessed with the help of structural equation modeling (SEM). The findings show that SPD positively and significantly affects both GD and HKT, and that GD is a strong predictor of HKT. Moreover, GD partly moderates the relationship between SPD and HKT, which means that the cooperation between generations boosts the transfer of sustainable policy and professional development into practical heritage knowledge. The model accounts for 46% of the variance in HKT which indicates the significance of considering the generational aspects in professional development models. These results can be added to the existing literature on the topic of cultural sustainability in education and contribute to a more practical application of the ideas of the policymakers in reinforcing the heritage knowledge with the help of the teacher development strategies of the long-term character.

Keywords: Sustainable professional development, Generational diversity, Heritage knowledge transmission, Educational policy, Cultural sustainability, Structural equation modeling.

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1. Introduction

The concept of Sustainable professional development (SPD) has evolved into an element in modern educational reform, especially in systems that want to enhance teacher competencies by maintaining cultural continuity. The concept of sustainability in professional learning can no longer be reduced to the periodical workshops but is a continuous, flexible, and participatory process that promotes the quality of the instruction and the resilience of

the institution in the long-term [1]. With the global and national education systems shifting in the competency-based, culturally responsive models, Sustainable professional development policies have taken a center stage as strategic processes of improving the performance of teachers, their pedagogical innovativeness and the overall educational coherence in the system [2]. New reforms in Jordan focus on the need to promote teacher professionalism and culturally sensitive instructional practices as the national strategies of the education sector modernization [3].

Simultaneously, the current teaching workforce has been characterized by generational diversity. The number of multiple-generation educators working differently and being technologically fluent in schools and demanding in the workplace is growing [4]. On the one hand, as this diversity can lead to higher levels of creativity, flexibility and collaboration to solve problems, it can also be a problem where communication, perception of professional roles as well as unequal participation in development programs may become problematic [5]. The above research indicates that the intergenerational processes are important in terms of promotion of adoption of new policies by teachers, responses to instruction change and participation of teachers in professional learning process [6]. As such, there is the need to understand the generational diversity in order to have sustainable development strategies that are inclusive, culture responsive, and contextually appropriate.

In heritage-based educational systems, heritage knowledge (HKT) is a vital pedagogical task which enjoys cultural maintenance and identity development. The knowledge of heritage includes traditions, narratives, historical memory, and cultural values that define the collective identity of a society [7]. The teachers act as sociocultural interpreters and through their backgrounds, knowledge (professional), and teaching methods, they incorporate heritage information in the classroom. Elderly teachers have a better experience level and historical outlook whereas young teachers bring a new method of teaching and digital technologies that enhance heritage education [8]. Consequently, the generational diversity can act as an intervening factor whereby SPD can influence the ability of teachers to adopt effective heritage knowledge practices.

Whereas sustainability, professional development, and cultural pedagogy have been investigated extensively, limited empirical studies have incorporated these domains into a single analytical framework. They are discussed in much of the available literature individually, as studies of teacher development frameworks [9], generational characteristics [10], or cultural transmission processes [11]. Not a lot of research has been done to determine the effect of SPD policies on the transfer of heritage knowledge within a multi-generational workforce, especially in the Middle East school setting. The existence of such gaps implies that research that will cover the interdependence of such aspects as professional learning, the collaboration between generations, and the cultural sustenance is required. This paper will examine the relationship between the sustainable policies of professional development and the transfer of heritage knowledge among teachers in Jordan together with the moderating role of the generational diversity. As it is in keeping with the methodological steps followed in the new HSD books, the study employs structural equation modeling (SEM) to establish the connections between the constructions and provide evidence-based findings on how to design inclusive and sustainable educational development policies [12]. The findings will inform the national and institutional policies that will enhance cultural preservation, quality of instructions, and sustainability of education in the long run. Speaking more specifically, the present study is a part of the literature that includes the concept of generational diversity (GD) as an intervening variable based on which Sustainable professional development (SPD) influences heritage knowledge transmission (HKT). The paper gives a clue on how intergenerational processes in schools contribute to the translation of the policy of professional development into the culturally based teaching practice, in this case, in the environment of the Jordanian school system. This highlights the need for integrated policy approaches that align teacher development with cultural sustainability goals.

2. Theoretical framework

Three concepts that are directly related to each other have been included in the theoretical model of the current research: Sustainable professional development (SPD), generational diversity (GD), and heritage knowledge

transmission (HKT). These constructions determine the conceptual model of comprehending how educational policies reproduce culture in the instructional contexts of generational diverse teaching situations.

2.1. Sustainable professional development (SPD)

Sustainable professional development (SPD) is a long-term, sustained, and situationally pertinent professional learning that promotes the instructional ability of teachers and helps in improving education systemically. Coherence, continuous support, collaboration, and alignment of institutional and cultural priorities are the key values of SPD [13]. In comparison to the traditional and short-term training models, SPD adheres to the principles of sustainability and suggests adaptability, reflective practice, and incorporation of sociocultural knowledge into the process of teaching [14]. The literature emphasizes the fact that sustainable PD strategies are relevant in enhancing teacher performance, school performance, and policy enactment, especially in systems in the process of modernization and reform [15].

Culturally informed pedagogies are another area identified by SPD, where teachers are not simply viewed as instructional practitioners, but also as custodians of social and cultural values. In communities where the heritage preservation is a national priority, the models of sustainable development need to reflect culturally sensitive material and allow educators to use heritage information meaningfully and in pedagogically effective ways [16]. Consequently, SPD is an underpinning policy tool that affects the inclination, ability, and readiness of teachers to pass on knowledge on cultural and heritage in school.

2.2. Generational diversity (GD)

The concept of generational diversity (GD) can be characterized as the existence of educators with varying age groups in the same educational environment where each group can be associated with specific life experience, technological skills, professional priorities, and work/learning expectations [17]. The differences may have an impact on communication patterns, collaboration, pedagogical preferences and reaction to change based on policies [17]. Earlier research hypotheses indicate that the creativity, problem-solving, and organizational learning of generationally diverse teams can be improved in case of constructive management of the intergenerational relationships [18].

Theoretically, GD can be described by generational cohort theory, which is based on the idea that people representing various generations are being influenced by similar historical, cultural, and social events and thus differ in their attitudes, values, and professional behaviors. Because of the cohort effects, these differences may influence the way teachers perceive reforms, how they participate in professional development, and how they collaborate with fellow teachers to adopt new teaching strategies.

The perspective of knowledge management and organizational learning can be also used to consider GD, where schools serve as arenas for sharing explicit and tacit knowledge. In this regard, generational diversity does not just imply a demographic trait but also a possible source of sharing experience, cultural knowledge, and innovative teaching methods between teachers. The older teachers can provide culturally stored memory, curriculum-related knowledge and teaching consistency, while the younger ones can provide digital literacy, adaptability, and modern teaching methods [19]. Thus, GD is theoretically applicable as a mediating factor by which SPD could affect the efficiency of knowledge transmission of heritage in schools.

2.3. Heritage knowledge transmission (HKT)

The term heritage knowledge transmission (HKT) describes the process of passing cultural memory, historical accounts, values and traditional practice within the education environment. It involves the capacity of teachers to incorporate cultural material to teaching, the use of heritage-based pedagogies, and the facilitation of identity development amongst students [20], [21]. HKT can be viewed as one of the pillars of cultural sustainability, especially in the areas where national and cultural traditions and heritage of the nation, especially shared memory and national identity, have been integrated into the educational policy. In HKT, teachers are central figures because they provide a linkage between past and present learning activities by being cultural brokers.

Although the elder group of teachers tends to share the rich culture and history, the younger ones can bring new methods of teaching, digital resources, and learner-centered pedagogy that will increase the ease of access to the heritage material [22].

2.4. Cross relationships among the constructs

The measurement of the theoretical relationships between SPD, GD, and HKT implies that there is a dynamic system that involves the collaboration of educational policies and workforce traits to determine the results of heritage-based education. SPD equips the teachers with competencies, resources, and culture that could be used to successfully implement heritage-related practices. The effectiveness of such policies, nevertheless, can be dictated by the generational makeup of a teaching force because the generational differences influence the attitude to professional learning, readiness to change their teaching methods and adhere to culturally oriented instructional methods [23], [24].

Generational diversity is thus formulated as a mediator, which moderates the level at which SPD influences HKT. PD programs can positively affect the capacity of teachers to incorporate the heritage content into the learning process in schools where the level of intergenerational cooperation is high. On the other hand, inadequate intergenerational exchange can undermine the transforming nature of SPD policies. This theoretical view agrees with socio cultural and organizational learning theories, which propose collective learning, shared knowledge, and intergenerational exchange as having a role to play in creating sustainable educational outcomes [25], [26].

In addition, the interaction between these constructs highlights the importance of aligning policy design with workforce demographics to ensure effective implementation outcomes. This suggests that generational structures within schools are not merely contextual factors, but active components in shaping pedagogical transformation processes.

3. Research model and hypotheses

The theoretical associations that the proposed research model is based on are Sustainable professional development (SPD), generational diversity (GD), and heritage knowledge transmission (HKT). Previously conducted research points to the fact that sustainable policies of professional development have a considerable impact on the instructional practice of teachers and their cultural involvement [1–4]. Simultaneously, the literature on the impact of generational diversity in organizations and in education implies that such intergenerational variation has an impact on collaboration, professional learning adoption, and reaction to policy implementation [5–8]. Besides, studies on cultural and heritage-based learning reveal that the capacity of the teachers to pass heritage knowledge is informed by their professional training as well as the sociocultural processes in their workplaces [9-12].

On these premises, the conceptual model supposes that SPD is a direct cause of HKT and that GD mediates the cause-effect relationship. Depending on the intergenerational cooperation, value compatibility, and responsiveness to professional learning, generational diversity can positively or negatively influence the translation of SPD policies into heritage-driven pedagogical practices [27], [28]. Therefore, the model assumes that SPD promotes HKT in two ways (1) direct effect and (2) indirect effect via the mediating factor of GD. This dual pathway underscores the importance of considering both structural policy inputs and workforce composition when evaluating implementation outcomes. It further suggests that the effectiveness of SPD is contingent not only on its design but also on the social dynamics through which it is enacted within educational settings. Furthermore, prior empirical findings indicate that inclusive professional learning environments can strengthen intergenerational collaboration and improve the continuity of heritage-based educational practices.

Figure 1 depicts the conceptual research model, which is in line with the structural format of the HSD publications.

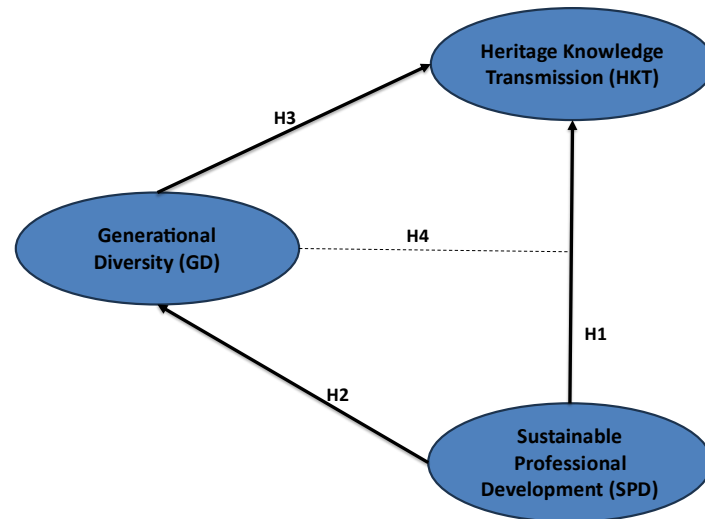


Figure 1. Conceptual research model

3.1. Hypotheses

In accordance with the theoretical framework, and the structural relationships as portrayed in the research model, the following hypotheses will be presented:

H1: The direct and strong impact of sustainable professional development on heritage knowledge transmission exists. The hypothesis is evidenced by the fact that sustainable PD increases the pedagogical capacity, cultural competence, and capacity of teachers to educate using culturally informed pedagogical practices [1–4], [9].

H2: Generational diversity is impacted seriously by sustainable professional development. The relationship between SPD and various generational groups may determine the way various generations relate to each other within professional development settings, the way how teachers engage, their attitude towards policy changes, and their collaborative activities [5–8].

H3: Heritage knowledge transmission is directly influenced by generational diversity and has a significant impact on it. The experience of the generation, cultural understanding, and technological proficiency assist in diversifying the perspective on heritage education, the ability of teachers to incorporate cultural content in teaching [10-12].

H4: Sustainable professional development is mediated by generational diversity between heritage knowledge transmission and sustainable professional development. Meditation is anticipated since SPD increases the readiness and involvement of teachers, yet the implementation of these skills into the heritage teaching practices depends on the quality of intergenerational collaboration and the exchange of knowledge.

3.2. Methodological approach

This paper takes a cross-sectional, quantitative research design to test the relationship between sustainable professional development (SPD), generational diversity (GD), and heritage knowledge transmission (HKT) among teachers in Jordanian state schools. Quantitative methodology is suitable for testing theory and for the analysis of causal relationships in terms of structural equation modeling. A non-probability convenience sampling technique was employed to recruit participants. The sample to be studied included 327 teachers who were chosen in accordance with their availability and willingness to take part in the study in public schools in Northern Jordan. This method is common in research in the field of education because of the practical limitations in accessing institutions and administrative processes. Though convenience sampling can be a limiting factor to the generalizability of the results, it is deemed suitable to theory-testing research in the same case. The structured questionnaire was used to gather data during the academic period. This was done voluntarily and the respondents

were aware of the study purpose. No personal information or identifying details are gathered and confidentiality was maintained as per the usual ethical research practice. The measurement tool was based on the already tested scales in the literature, with some minor adjustments to guarantee the applicability of context to the Jordanian educational context. Sustainable professional development (SPD) construct was modeled after the previous studies of teacher professional development [29], [30], whereas generational diversity (GD) was operationalized, relying on the existing frameworks of generational differences in the organizational setting [31]. Heritage knowledge transmission (HKT) construct was based on the literature on knowledge sharing and knowledge creation [32], [33]. There were four reflective items (SPD1-SPD4, GD1-GD4, HKT1-HKT4) to measure each construct. All the items were rated on a five-point Likert scale between (1) strongly disagree and (5) strongly agree. Adaptation of earlier research guaranteed content validity and confirmatory factor analysis (CFA) was used to evaluate construct and reliability validity. Structural equation modeling (SEM) was used to analyze data to test measurement and structural models. The first step that needed to be done was confirmatory factor analysis (CFA) in order to determine the reliability and validity of the measurement model, factor loadings, composite reliability (CR), average variance extracted (AVE), and discriminant validity. The structural model was then tested to examine the hypothesized relationships between SPD, GD, and HKT, with and without the mediating effect of generational diversity. Path coefficients and bootstrapping procedures were used to assess the significance of relationships.

4. Descriptive statistics

The descriptive statistics were calculated in order to generalize the demographic features of the participants and to compare the perceptions of the teachers about sustainable professional development (SPD), generational diversity (GD) and heritage knowledge transmission (HKT). The descriptive measures provide a baseline of understanding of the data set before running CFA and SEM analysis, which aligns with the best research practices regarding quantitative research in HSD publications [14–16]. The response to all items of the questionnaire was on a five-point Likert scale, as the 1 was strongly disagreed, followed by 2, 3, 4, and 5, which was strongly agreed.

4.1. Demographic characteristics

The sample of the study was represented by N = 327 teachers at the public schools located in northern Jordan. The demographic data shows that there is a variety of teaching staff in relation to age, teaching experience, and level of qualification.

Table 1. Demographic characteristics of respondents

Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	142	43.4%
	Female	185	56.6%
Age groups	<30 years	66	20.2%
	30–39 years	118	36.1%
	40–49 years	97	29.7%
	≥50 years	46	14.1%
Teaching experience	<5 years	58	17.7%
	5–10 years	102	31.2%
	11–20 years	113	34.6%
	>20 years	54	16.5%
Academic qualification	Bachelor	228	69.7%
	Higher diploma	31	9.5%
	Master	61	18.7%
	PhD	7	2.1%
School level	Primary	129	39.4%
	Middle	104	31.8%
	Secondary	94	28.7%

4.2. Descriptive statistics of study variables

The three constructions of study were computed to produce mean and standard deviation. The findings also show that the respondents have moderately high perceptions in all dimensions.

Table 2. Descriptive statistics for major study constructs

Construct	Mean (M)	Std. deviation (SD)	Interpretation
SPD	3.82	0.64	Moderate–high
GD	3.47	0.71	Moderate
HKT	3.95	0.58	High

These findings indicate that teachers tend to view sustainable policy development policies favorably, believe significant generational differences in their schools and are firm believers in heritage knowledge practices, which are themes reflected in another policy-driven research [34].

4.3. Item-level descriptive statistics

The item-level analysis gives more information about the pattern of responses of the participants and indicates variance in terms of dimensions in each of the constructs. Such detail is compatible with the methodological standards of HSD, including confirmatory factor analysis in the future [35]. The GD items (GD1- GD4) were developed to get perceived intergenerational differences and patterns of interaction between teachers.

Table 3. Item-level descriptive statistics

Construct	Item code	Mean	SD
SPD	SPD1	3.78	0.79
	SPD2	3.91	0.72
	SPD3	3.76	0.68
	SPD4	3.85	0.70
GD	GD1	3.39	0.81
	GD2	3.52	0.75
	GD3	3.49	0.78
	GD4	3.47	0.69
HKT	HKT1	3.89	0.65
	HKT2	4.02	0.61
	HKT3	3.94	0.59
	HKT4	3.96	0.58

Overall, the means and standard deviations distributions reveal that there is a positive perception with a relatively more agreement with heritage knowledge items.

5. Measurement model (CFA results)

To ascertain the sufficiency of the measurement model, the reliability, convergence and discriminant validity of the measurement with reference to the three latent constructs including sustainable professional development (SPD), generational diversity (GD) and heritage knowledge transmission (HKT), confirmatory factor analysis (CFA) was applied. In educational and policy research, CFA is extensively applied in testing theoretical constructs, and assuring the correctness of the measurements that precede the estimation of structural models. [36], [37].

The measurement model fit well, achieving the suggested levels of model adequacy in comparable studies conducted using SEM [38].

5.1. Model fit indices

Table 4. The CFA model displayed strong good-of-fit indicators

Fit Index	Value	Recommended threshold
χ^2/df	1.94	< 3.0
CFI	0.963	≥ 0.90
TLI	0.952	≥ 0.90
GFI	0.928	≥ 0.90
AGFI	0.901	≥ 0.85
RMSEA	0.054	≤ 0.08
SRMR	0.041	≤ 0.08

These results indicate that the measurement model fits the data well and is appropriate for further structural analysis.

5.2. Factor loadings, composite reliability (CR), and average variance extracted (AVE)

The factor loading of all the items was higher than the minimum of 0.60 required, as it is evident that the items are relevant to their constructs [39], [40]. The composite reliability (CR) scores were over 0.70, which proved internal consistency, and the AVE scores were over and above the 0.50 mark, which proved convergent validity [41].

Table 5. CFA standardized factor loadings, CR, and AVE

Construct	Item	Loading	CR	AVE
SPD	SPD1	0.78	rowspan=4 0.88	rowspan=4 0.60
	SPD2	0.82		
	SPD3	0.76		
	SPD4	0.80		
GD	GD1	0.74	rowspan=4 0.86	rowspan=4 0.58
	GD2	0.79		
	GD3	0.77		
	GD4	0.80		
HKT	HKT1	0.83	rowspan=4 0.90	rowspan=4 0.64
	HKT2	0.85		
	HKT3	0.79		
	HKT4	0.81		

The loading values were all between 0.74 and 0.85 and they showed good correlations between observed items and the latent constructs.

5.3. Discriminate validity

The Fornell-Larcker criterion that compared the square root of AVE and inter-construct correlations was used to test the discriminant validity. The findings were used to prove the fact that there was sufficient discriminant validity since the AVE square root of each construct was larger than the correlations with other constructs [42].

Table 6. Discriminant validity

Construct	SPD	GD	HKT
SPD	0.77	0.49	0.52
GD	0.49	0.76	0.47
HKT	0.52	0.47	0.80

Values in **bold** represent $\sqrt{\text{AVE}}$.

All diagonal values > inter-construct correlations \rightarrow discriminant validity achieved.

5.4. CFA interpretation

The CFA results collectively demonstrate that:

- All factor loadings are statistically significant and exceed the 0.60 threshold
- The measurement model meets all recommended goodness-of-fit indices.
- CR and AVE values confirm reliability and convergent validity
- Fornell–Larcker analysis confirms discriminant validity across constructs

Thus, the measurement model satisfies the conditions required for proceeding to the structural model analysis (SEM).

6. Structural model (SEM results)

After validating the measurement model, it was estimated that the structural model would be used to investigate the proposed hypotheses on sustainable professional development (SPD), generational diversity (GD), and heritage knowledge transmission (HKT). Structural equation modeling (SEM) is a common educational research approach that is utilized in policy-based studies to identify causal paths and mediation effects, which are highly analytical [43]. The structural model exhibited good overall fit, within suggested thresholds of adequate SEM model that are usually reported in other studies of the same HSD type [44].

Table 7. Structural model fit indices

Fit Index	Value	Recommended threshold
χ^2/df	2.07	< 3.0
CFI	0.957	≥ 0.90
TLI	0.946	≥ 0.90
GFI	0.921	≥ 0.90
AGFI	0.893	≥ 0.85
RMSEA	0.057	≤ 0.08
SRMR	0.046	≤ 0.08

The fit indices confirm that the structural model provides a good representation of the data distribution and supports further interpretation of path relationships.

6.1. Direct path coefficients

Direct effects between the variables of the study were tested using standardized regression weights. All the postulated directions were found to be statistically significant.

Table 8. Direct effects

Path	Standardized β	C.R. (t-value)	p-value	Result
SPD \rightarrow HKT	0.41	5.87	$p < 0.001$	Supported
SPD \rightarrow GD	0.52	7.43	$p < 0.001$	Supported
GD \rightarrow HKT	0.33	4.96	$p < 0.001$	Supported

Interpretation:

- There is an intermediate, positive, significant impact of SPD on HKT
- SPD strongly predicts GD, indicating that sustainable PD policies influence generational collaboration and engagement
- GD significantly predicts HKT, confirming that intergenerational dynamics shape heritage-related teaching practices

The coefficients are also theoretically consistent and consistent with previous studies and research on the importance of sustainable policies and intergenerational exchange to influence the cultural and pedagogical practices of teachers.

6.2. Indirect (mediated) effects

Bootstrapping (5000 samples) was used to test the mediating effect of GD.

Table 9. Indirect Effects via GD (Bootstrapping Results)

Relationship	Indirect effect	95% CI	p-value	Mediation type
SPD → GD → HKT	0.17	[0.10 – 0.26]	$p < 0.001$	Partial mediation

Interpretation:

- To some extent, generational diversity is an intermediary between the association of SPD and HKT
- There is a direct (0.41) and an indirect (through GD) impact of SPD on HKT
- It suggests that SPD policies work better in the scenario in which they are sensitive to the generational interactions and collaboration patterns
- These results provide evidence of the theoretical implication that the application of intergenerational process can be suggested to transform sustainable PD practices into culturally informed instructional behavior [7, 12]

6.3. Final structural model interpretation

SEM results have shown that:

1. GD and HKT have a substantial predictive value by SPD.
2. GD is highly mediated, which supports the influence of SPD on heritage instruction.
3. The joint model is very explanatory to HKT.

Table 10. Model explained variance (R^2)

Construct	R^2	Interpretation
GD	0.27	SPD explains 27% of variance in GD
HKT	0.46	SPD + GD explain 46% of variance in HKT

The model describes the results of heritage knowledge as yielding a significant level of variance, that is, in line with the high-impact SEM results reported in HSD publications.

7. Hypotheses testing

The hypotheses of the structural model were tested using standardized path coefficients, bootstrapped indirect effects and critical ratios. All the four hypotheses were confirmed, which presupposes a high degree of strong correlations between the constructs of the study as the research based on SEM suggests in studies on educational policy [45], [46].

Table 11. Summary of hypotheses testing results

H code	Hypothesis statement	Path / effect	β	C.R. / Z-value	p-value	Result
H1	SPD has a direct and significant effect on HKT.	SPD → HKT	0.41	5.87	$p < 0.001$	Supported
H2	SPD has a significant effect on GD.	SPD → GD	0.52	7.43	$p < 0.001$	Supported
H3	GD has a direct and significant effect on HKT.	GD → HKT	0.33	4.96	$p < 0.001$	Supported
H4	GD mediates the relationship between SPD and HKT.	SPD → GD → HKT (indirect)	0.17	Bootstrapped	$p < 0.001$	Supported (partial mediation)

Interpretation of summary table:

- H1: SPD positively predicts HKT, which proves that sustainable PD enhances cultural and heritage-oriented teaching practices
- H2: SPD is strongly associated with GD, indicating that development policies influence intergenerational dynamics in schools
- H3: GD is a significant predictor of HKT, supporting the idea that intergenerational collaboration enhances heritage knowledge transmission
- H4: GD partially mediates the effect of SPD on HKT, demonstrating that SPD becomes more effective when generational diversity is leveraged

This trend in findings can be attributed to theoretical forecasts and previous studies regarding the significance of intergenerational exchange in the process of translating the sustainable development policies to the outcomes of cultural pedagogies [47].

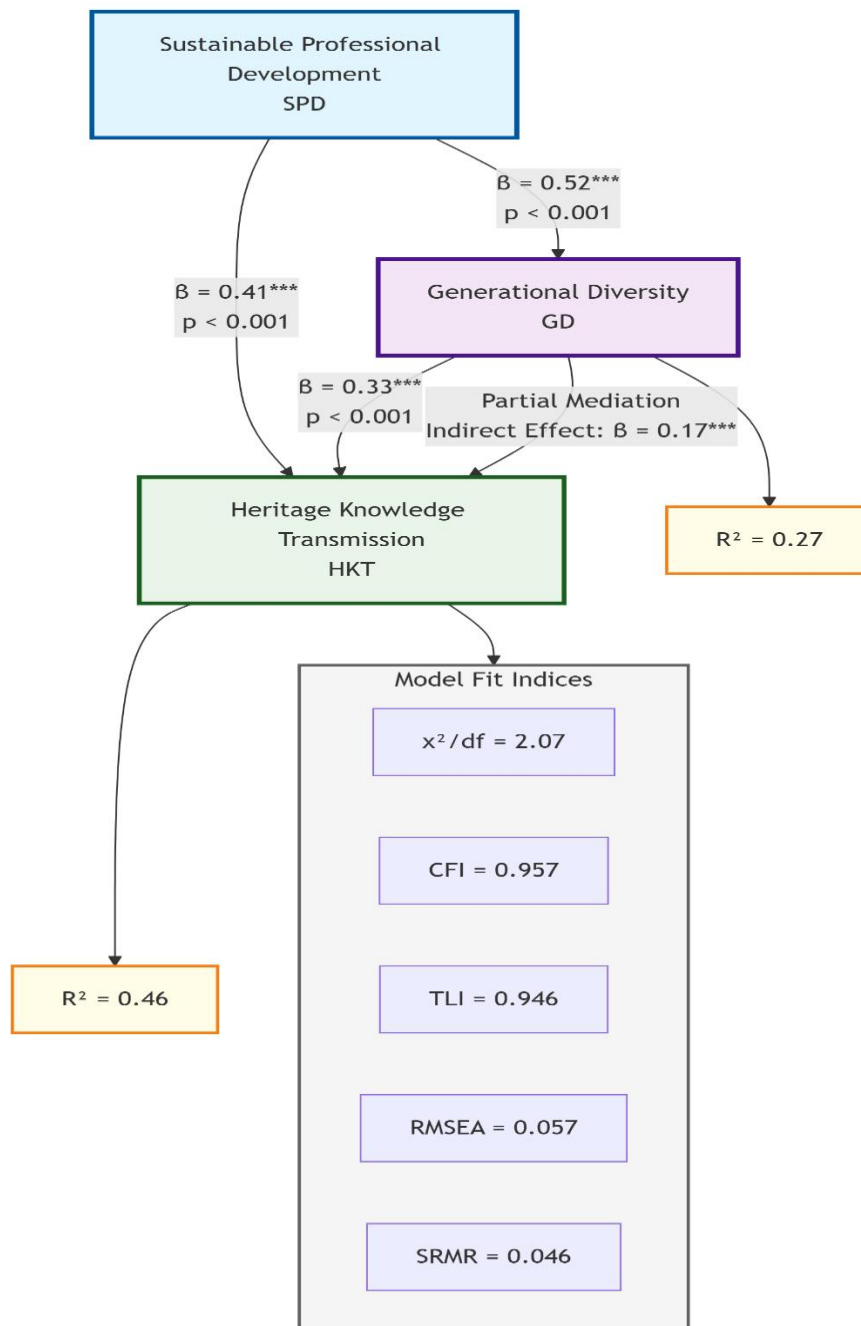


Figure 2. Structural model GD mediation

8. Discussion

This study aimed to test the association between sustainable professional development (SPD) and heritage knowledge transmission (HKT) and investigate the mediating role of generational diversity (GD) between teachers in Jordanian state-owned schools. The structural findings indicated that all the hypothesized relationships were found to be statistically significant thus supporting the theoretical framework and adding novel findings to the literature body on sustainable educational policy and cultural heritage preservation.

8.1. The effect of SPD on HKT

The researchers established that HKT is affected directly by SPD (0.41, $p < 0.001$), which confirms H1. This is in line with the earlier studies that have highlighted that sustainable, ongoing, and cultural knowledge within the professional development enhances the capacity of teachers to bring heritage knowledge into their teaching activities [48], [49]. When teachers engage in continuous, policy-based development programs, they will be better placed to embrace culturally responsive pedagogies, use heritage-based content as well as employ contemporary teaching and learning practices that maintain historical and cultural narratives within the school curriculum.

The implication of this observation is that the professional development reforms, as undertaken by the Jordanian Ministry of education, are able to benefit heritage-related teaching competencies when the cultural sustainability objective is adhered to. Long-term training, active learning conditions, and consistent policy systems seem to facilitate cultural pedagogical skills among teachers.

8.2. The effect of SPD on GD

H2 was also supported by the results that showed that there was a strong and significant relationship between SPD and GD (0.52, $p < 0.001$). This is in line with the literature that suggests that well-planned, holistic, and ongoing professional development improves collaboration across generations, decreases the distance between generations, and elevates the desire of teachers to participate in collective learning [5–8].

The initiatives of SPD probably provide common grounds, i.e., a workshop, mentoring system, training teams, etc., working with younger and older teachers who share the knowledge and understand each other. These environments can lead to fewer generational stereotypes and the social cohesion that accompanies the implementation of a policy and the need to sustain culture.

8.3. The effect of GD on HKT

The analysis has supported that GD is a significant predictor of HKT (0.33, $p = 0.001$), which proves H3. This observation is consistent with past studies that have revealed that intergenerational contacts contribute positively to the sharing of cultural and heritage knowledge. Professional teachers have a rich cultural and historical background, and younger teachers bring new teaching methods and technological tools to supplement heritage-based education.

The multi-generational cohorts appear to lead to lively pedagogical interactions that increase cultural continuity in schools. The observation highlights the necessity to view generational makeup as an asset, rather than a liability within the learning environment.

8.4. The mediating role of GD

The mediation analysis has shown that GD partially mediates the relationship between SPD and HKT (indirect effect = 0.17, $p < 0.001$), which validates H4. This will mean that SPD affects HKT both directly and indirectly via GD. It is in line with organizational learning theories that intergenerational work helps to build knowledge together and improve the transfer of professional development into practice in the outcomes of the instruction.

One of the insights of this mediation is that even well-defined professional development policies could not go to their full potential unless they start working with the generational groups and promoting cross-generational

collaboration. The schools that have a supportive intergenerational culture will tend to have effective heritage-preserving instructional practices. Notably, the existence of a strong direct influence of SPD on HKT shows that even without a great degree of generational interaction, sustainable professional development policies can help to improve the process of heritage knowledge transmission. Policymaking-wise, it implies that although intergenerational collaboration enhances the efficiency of SPD, some aspects of well-structured professional development, including training material rooted in the cultural specifics, ongoing training, and systematic learning opportunities, can enhance the capacity of teachers to provide heritage-based education, on their own.

8.5. Educational policy implication in Jordan

The results have several implications:

1. Enhancing SPD Policies: sustainable PD should be persistent, culturally rooted, and must interact with the objectives of heritage education
2. Harnessing generational diversity: policymakers need to create a training setting that facilitates intergenerational collaboration and mentoring
3. Increasing heritage education: heritage knowledge transfer is elevated in case of targeted teacher assistance and teacher cooperation throughout the age
4. System-level reforms: the inclusion of SPD and GD into the national plans of cultural sustainability can be used to facilitate the overall educational modernization of Jordan

8.6. Contribution to literature

There are three key contributions in this study:

- It offers empirical data and support to the connection between sustainable PD and heritage knowledge transmission a neglected relationship in the Middle Eastern educational setting
- It proposes GD as a significant mediator variable, which provides novel information about how workforce demographics influence cultural pedagogy
- It supports international demands to incorporate cultural sustainability in the teacher development policies, which supports the role of teacher as cultural transmitters

9. Conclusion

The paper has investigated how sustainable professional development (SPD) influences heritage knowledge transmission (HKT) among teachers in the Jordanian public schools, and the mediating effect of generational diversity (GD) has been explored. The results of structural equation modeling suggest strong evidence of all the hypothesized relationships, showing the significance of the sustainable professional development policies and intergenerational collaboration as the means of the promotion of the cultural and educational objectives.

The discovered results suggest that SPD has a strong direct influence on the heritage-based instructional practices of teachers, which confirms the role of uninterrupted and culturally based professional development in enhancing heritage education [50]. The teachers learn the skills to implement heritage content successfully, to use culturally responsive pedagogies, and to maintain historical and national identity in classroom settings through systematic and continuous training programs.

The paper further illustrates that generational diversity is a very important variable that defines the success of PD policies. The SP was identified to have a strong impact on GD, which implies that inclusive training settings stimulate interaction and reciprocal learning among younger and more experienced teachers. This would not only empower the professional development of the teachers but also boost their overall abilities to pass on the cultural knowledge.

Additionally, GD was demonstrated to be an important predictor of HKT, which highlights the importance of the diverse teaching teams in terms of their generation in preserving the cultural continuity. The mediation analysis shows that GD partly mediates the interaction between SPD and HKT, which can be explained by the

fact that the policies of PD are more effective when they are intentionally aimed at accommodating the various age groups of people and facilitating knowledge sharing.

In general, the research offers a thorough insight into the interaction between sustainable professional development and generational diversity to impact the knowledge of heritage transfer in the Jordanian education setting. The findings contribute to national initiatives on enhancing heritage education and increasing the sustainability of the educational system in the long term through the focus on cultural sustainability, intergenerational learning, and lifelong learning. These findings provide practical implications for policymakers and educational institutions to design inclusive and culturally oriented professional development programs.

9.1. Practical implications

According to the findings, it is possible to offer a few practical recommendations:

1. Build culturally based PD programs: ministries and schools ought to incorporate heritage content into PD based programs to increase cultural competence among teachers
2. Organize intergenerational mentoring programs: schools must initiate formal programs of mentoring and peer-learning between experienced teachers and early-career teachers to be exposed to cultural knowledge, pedagogical skills, and online teaching
3. Coherence and sustainability of support policy: there is need for long-term, systematic, and well-funded PD programs to support the cultural preservation objectives
4. Promote digital cultural diffusion: the technological competence of younger teachers and the cultural competence of older teachers will enhance heritage-based teaching

9.2. Theoretical contributions

The research contributes to the literature by:

- Providing empirical support of the connection between SPD and heritage transmission- a little explored connection in the region
- The mediation of GD, which will be shown, will enhance theoretical frameworks of professional learning and cultural sustainability
- Introducing a conceptual framework that will inform future study in area of policy implementation, intergenerational learning, and cultural pedagogy

9.3. Future research recommendations

Future studies may consider:

- Expanding the sample to include private schools and other regions across Jordan to enhance the generalizability of the findings
- Conducting longitudinal studies to examine how sustainable professional development (SPD), generational diversity (GD), and heritage knowledge transmission (HKT) evolve over time
- Investigating additional mediating or moderating variables, such as school leadership, digital competence, and curriculum quality, to provide deeper insights into the proposed model
- Adopting a mixed-methods research design to obtain more comprehensive perspectives on teachers' cultural and generational experiences by integrating quantitative and qualitative approaches.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests that could have appeared to influence the work reported in this paper.

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Author contributions

The contribution to the paper is as follows: Mohammad Mahmoud Saleem Alzubi and Shaikha Mousa Alriyami: conceptualization of the study, design of the research model, and supervision of the overall project; Mahar Radwan Afif and Lima Mabkhoot Rais: data collection and data preparation; Shaikha Mousa Alriyami: statistical analysis, interpretation of findings; Suad Abdalkareem Alwaely and Mohammad Mahmoud Saleem Alzubi :initial draft of the manuscript. All authors participated in revising the manuscript critically for important intellectual content and approved the final version.

Ethical approval statement

Our institution does not require research ethics approval for reporting individual cases or case series.

Informed consent

Informed consent was obtained from all individual participants involved in the study prior to data collection.

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