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Design & Development of the Technology–Psychological Well-Being Teaching Module (MPTKP)

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ABSTRACT

Digital technology has become increasingly central in early childhood education (ECE), particularly in enhancing learning experiences, socioemotional interaction, and the psychological well-being of young children. This study examines the design and development of the Technology–Psychological Well-Being Teaching Module (MPTKP), developed based on the PERMA Model (Positive Emotion, Engagement, Relationships, Meaning, Accomplishment). Guided by the Design and Development Research (DDR) approach, the study addressed three research questions focusing on (i) issues and needs related to technology integration in Malaysian preschools, (ii) the development of a technology-based module for supporting children's psychological well-being, and (iii) the module's usability and preliminary outcomes. Data from the needs analysis phase—comprising interviews with preschool teachers, classroom observations, and document analysis in two Malaysian preschools—revealed limited access to digital tools and a lack of structured activities to support children's socioemotional development. These findings informed the design of the MPTKP, which consists of technology-supported activities aligned with each PERMA component. Initial evaluations with teachers suggest that the module is usable and may contribute to improvements in children's engagement, interaction, and positive classroom behaviours. However, the findings are preliminary and based on small-scale exploratory implementation; further empirical validation is required to confirm the module's effectiveness across diverse preschool contexts.

1. Introduction

The rapid development of digital technology in the global era has driven significant changes in the education system, including Early Childhood Education (ECE). In the context of 21st-century learning, technology integration is no longer optional but essential to ensure learning that is interactive, relevant, and meaningful. However, the use of technology must be carefully planned to align with the

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psychological well-being of young children. Therefore, this study focuses on the design and development process of the Technology Teaching Module for Psychological Well-Being (MPTKP).

The present study reports the design and development of the Technology–Psychological Well-Being Teaching Module (MPTKP), created specifically for preschool contexts. The development process began with a comprehensive needs analysis involving two preschools, examining institutional readiness, the availability of technological infrastructure, teacher competency, and the suitability of digital learning materials for emotional and cognitive development. While technology has the potential to enhance children's motivation, engagement, and learning outcomes when applied interactively and responsively [7], existing evidence also shows persistent implementation challenges. For instance, Hrdinova [6] noted that limited infrastructure, insufficient professional training, and the lack of specialised modules remain significant barriers in many preschools. These issues reinforce the need for a systematic module to guide teachers in integrating technology in developmentally appropriate ways.

The MPTKP was developed using Seligman's PERMA Model—Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment—ensuring that technology functions as a medium that supports holistic psychological well-being. Each PERMA domain is translated into structured technology-supported learning activities, such as creative digital tasks, video-assisted interactive learning, and collaborative activities that promote social interaction. This design framework ensures that every technological element used in the module has a clear pedagogical purpose and contributes meaningfully to children's socioemotional development.

Overall, this study aims to develop and evaluate a structured module that enables intentional, systematic, and developmentally informed technology integration in preschool classrooms. Through this effort, the MPTKP seeks to support both teachers' instructional practices and the psychological well-being of preschool children.

1.2 Research Question

In Phase II: Design and Development, what are the appropriate design and development elements of the Technology–Psychological Well-Being Teaching Module (MPTKP) for preschool use based on expert consensus?

i. "What are the suitable objectives of the MPTKP based on expert consensus?"
ii. "What are the appropriate content components of the MPTKP based on expert consensus?"
iii. "What are the suitable activities in the MPTKP based on expert consensus?"
iv. "What are the appropriate assessment methods for the MPTKP based on expert consensus?"

1.3 Research Objectives

i. Identify suitable MPTKP objectives based on expert consensus,
ii. Identify appropriate module content based on expert consensus,
iii. Identify suitable activities based on expert consensus, and
iv. Identify appropriate assessment methods based on expert consensus.

2. Methodology

This study aims to address the research question of determining the design of the Technology Integration in Psychological Well-Being Teaching Module (MPTKP) and evaluating the initial module prototype through expert consensus before it is implemented with preschool children. The results of the expert evaluation form the foundation for developing the prototype module in the subsequent phase.

2.1 Research Context and Participants

This study was conducted in two government preschools located in urban and rural areas of Perak, Malaysia. Both preschools serve predominantly low- to middle-income communities and have a combined enrolment of approximately 125 children aged 5 to 6 years.

Six preschool teachers participated in the needs analysis phase. All teachers were female, aged between 30 and 40 years old, and had between 7 and 13 years of teaching experience. They taught in either government (SK) or government-aided Chinese national preschools (SJKC), providing variation in school setting within the rural context. In terms of academic qualifications, four teachers possessed a Bachelor's degree in Early Childhood Education, while two held a Master's degree. This combination of experience and qualifications provided valuable insight into the practical challenges of technology integration and the socioemotional needs of preschool learners.

For the Fuzzy Delphi Method (FDM) phase, ten experts were selected based on their academic and professional backgrounds in Early Childhood Education (PAKK), psychology, and educational technology. These experts included senior lecturers and lecturers from several Malaysian public universities and teacher education institutes, offering diverse professional perspectives essential for validating the module's objectives, content components, activities, and assessment methods. Presenting this contextual and demographic information strengthens the interpretation and generalisability of the study's findings.

2.2 Module Development and Design Process

The development of the initial module prototype began with the construction of a comprehensive content framework. This framework includes the module introduction, rationale, goals, learning objectives, significance, needs analysis summary, and target user group. Core pedagogical components such as content standards, learning standards, proposed digital learning activities, implementation procedures, and teachers' roles—were structured in alignment with Malaysia's Preschool Standard Curriculum (KSPK) and established developmental benchmarks for young children. The refinement of these components was carried out using the Fuzzy Delphi Method (FDM) to ensure that the final content was grounded in expert agreement.

The FDM was selected as the primary validation method because it provides a systematic and quantitative approach to analysing expert judgement in situations characterised by ambiguity or subjective interpretation. This method integrates fuzzy number sets with the traditional Delphi procedure, allowing expert opinions to be converted into measurable consensus values. As highlighted by Mohd Ridhuan Mohd Jamil, Saedah Siraj, Zahara Hussin, Nurulrabihah Mat Noh, and Ahmad Ariffin Sapar (2017), the FDM increases the reliability of qualitative judgements by reducing bias, limiting the number of required rounds, and preventing respondent fatigue.

In this study, the FDM was used to gather expert responses on the preliminary module structure and content. Experts evaluated elements such as the relevance of learning objectives, appropriateness of digital activities, alignment with PERMA components, and suitability of proposed assessment methods. The method's suitability for module development is supported by previous applications, such as the work of Mohd Rusdin (2021), who successfully applied the FDM when developing an Active Learning Pedagogy Module based on 4C skills. His study demonstrated that the FDM is effective in obtaining structured, quantifiable consensus for educational module design, reaffirming its appropriateness for the present research, which involves developing a technology-based psychological well-being module.

3. Validity and Reliability

To ensure the validity of the instruments used in the needs analysis phase, the interview protocol was reviewed by six experts in Early Childhood Education, psychology and counselling, and educational technology. These experts examined each item for clarity, relevance, and alignment with the research objectives and preschool education context. Their feedback was incorporated to refine the wording, structure, and focus of the questions, thereby strengthening content validity.

Reliability testing was conducted to determine the internal consistency of the interview instrument. Six respondents participated in the pilot process, and the reliability coefficient obtained indicated satisfactory item correlations. The results demonstrate that the instrument possesses adequate reliability to be used in subsequent stages of data collection and module development.

Table 1
Findings on instrument validity (interview)

Bil	Role	Field	Validity
1	Senior Lecturer of Universiti Pendidikan Sultan Idris	PAKK	78%
2	Senior Lecturer of Wawasan Open Universiti	Teknologi	91%
3	Lecturer of Universiti Pendidikan Sultan Idris	PAKK	80%
4	Senior Lecturer of Universiti Putra Malysia	Psikologi	80%
5	Senior Lecturer of IPG Ilmu Khas	Psikologi	86%
6	Senior Lecturer of Universiti Tunku Abdul Rahman	Teknologi	93%
7	Senior Lecturer of Universiti Putra Malysia	Psikologi	98%
8	Senior Lecturer of Universiti Pendidikan Sultan Idris	Psikologi	100%
9	Senior Lecturer of Universiti Utara Malaysia	Psikologi	95%
10	Senior Lecturer of IPG Kampus Perempuan Melayu	PAKK	90%
	Overall		**89%**

Table 1 presents the instrument validity findings evaluated by ten experts, consisting of five lecturers in Early Childhood Education (PAKK), two experts in the field of technology, and five experts from the field of psychology. The evaluation results show that the highest validity percentage obtained was 100%, while the lowest was 78%. The overall average validity recorded was 89%, indicating that this instrument has a high level of validity and is suitable to be used in the study.

3. Results and Discussion

Research Question 1: What are the appropriate objectives in MPTKP according to expert consensus?

Based on expert agreement through the Fuzzy Delphi analysis, four main objectives were established in the module, namely active engagement with technology, awareness of the impact of technology on psychological well-being, the development of positive social relationships through technological interaction, and self-reflection and emotional regulation in managing the negative effects of technology use. The strong expert consensus indicates that all these objectives are critical and relevant to be included in the development of the prototype teaching module for preschool children's psychological well-being.

Table 2

MPTKP Objective

EXPERT	ITEM			
	1	**2**	**3**	**4**
1	0.078	0.059	0.051	0.079
2	0.193	0.059	0.221	0.079
3	0.199	0.174	0.171	0.079
4	0.193	0.218	0.221	0.206
5	0.199	0.174	0.171	0.206
6	0.199	0.174	0.171	0.079
7	0.199	0.174	0.171	0.079
8	0.199	0.174	0.171	0.206
9	0.483	0.508	0.221	0.187
10	0.193	0.218	0.221	0.780
d value per item (d ≤ 0.2)	**0.213**	**0.193**	**0.179**	**0.198**
Percentage per item	**90.0%**	**90.0%**	**100.0%**	**90.0%**
Defuzzification value (≥ α= 0.5)	0.830	0.847	0.850	0.823

As shown in Table 2, all objectives met the acceptance criteria, with d values below or close to 0.2 and high levels of agreement (90–100%). Objective 3 achieved full consensus with a 100% agreement rate. All items exceeded the defuzzification threshold ($\alpha \geq 0.5$), ranging from 0.823 to 0.850.

These results demonstrate that experts consider socioemotional competencies—such as emotional regulation and relationship building—equally important as digital engagement when integrating technology into preschool learning. This supports the argument that technology in early childhood education must prioritise psychological well-being rather than solely focusing on cognitive outcomes.

Research Question 2: What are the appropriate contents in the MPTKP according to expert consensus?

Table 2
Content of MPTKP

EXPERT	ITEM				
	5	**6**	**7**	**8**	**9**
1	0.243	0.188	0.164	0.231	0.354
2	0.136	0.064	0.046	0.115	0.624
3	1.206	0.204	0.520	0.167	0.089
4	0.163	0.064	0.046	0.115	0.235
5	0.243	0.064	0.164	0.231	0.235
6	0.243	0.188	0.046	0.231	1.101
7	0.243	0.188	0.164	0.231	0.354
8	0.243	0.188	0.164	0.231	0.354
9	0.136	0.495	0.228	0.448	0.089
10	0.163	0.204	0.046	0.749	0.235
d value per item (d ≤ 0.2)	**0.302**	**0.185**	**0.159**	**0.275**	**0.367**
Percentage per item	**90.0%**	**90.0%**	**90.0%**	**80.0%**	**50.0%**
Defuzzification value (≥ α= 0.5)	0.800	0.837	0.853	0.807	0.723

The analysis in Table 2 shows that four content items were accepted—Positive Emotion (Mindfulness Colouring Page), Engagement (Digital Art Project), Relationships (Friendship Tree), and Meaning (Digital Storytelling). All four items achieved high defuzzification values (≥ 0.807) and strong expert agreement (80–90%), confirming their suitability within the PERMA framework.

Only Item 9 (Achievement – Creating Animation) failed to reach consensus despite a high defuzzification value (0.723). Experts noted that the activity was too complex for preschool-aged children and less aligned with psychological well-being outcomes. This item was therefore removed and replaced with a simpler and more developmentally appropriate activity, “Creating a Name Card,” which better supports children’s sense of accomplishment and identity.

Overall, the accepted content reflects a balance between digital creativity, emotional expression, and social interaction is consistent with developmentally appropriate practices in early childhood technology integration.

Research Question 3: What types of activities in the MPTKP are appropriate according to expert consensus?

Table 3
MPTKP Actvities

EXPERT	ITEM							
	10	**11**	**12**	**13**	**14**	**15**	**16**	**17**
1	0.174	0.203	0.076	0.176	0.193	0.099	0.093	0.177
2	0.059	0.072	0.076	0.042	0.100	0.056	0.068	0.068
3	0.508	0.483	0.076	0.042	0.193	0.056	0.093	0.177
4	0.174	0.072	0.076	0.176	0.193	0.099	0.093	0.177
5	0.174	0.072	0.076	0.042	0.100	0.056	0.093	0.068
6	0.218	0.189	0.076	0.217	1.254	0.099	0.093	0.216
7	0.174	0.203	0.076	0.176	0.193	0.099	0.093	0.177
8	0.174	0.203	0.076	0.217	0.193	0.099	0.093	0.177
9	0.218	0.189	0.076	0.217	0.100	0.295	0.299	0.804
10	0.059	0.072	0.076	0.042	0.100	0.056	0.299	0.068

d value per item (d ≤ 0.2)	**0.193**	**0.176**	**0.076**	**0.135**	**0.262**	0.101	**0.132**	**0.211**
Value per item	**90.0 %**	**90.0 %**	**100.0%**	**100.0%**	**90.0 %**	**100.0%**	**100.0%**	**90.0 %**
Defuzzification value (≥ α= 0.5)	0.847	0.827	0.917	0.847	0.833	0.900	0.903	0.843

Results in Table 3 shows that six activities met all acceptance criteria: Experiment, Science Project, Simulation/Role Play, Visit to Research Sites, Model Construction, and Drawing and Colouring. These activities demonstrated high expert agreement (90–100%) and high defuzzification values (0.827–0.917).

Two items namely Hands-on Activities and Environmental Activities are exceeded the d value threshold (0.262 and 0.211, respectively), indicating some inconsistency in expert responses despite reasonably strong defuzzification scores. Experts suggested that both activities needed clearer procedures and stronger alignment with psychological well-being outcomes. They recommended refining these activities to ensure that emotional expression, cooperation, and self-regulation are explicitly embedded in their implementation.

The overall pattern indicates that experts prioritise experiential and interactive activities that foster engagement, exploration, creativity, and socioemotional growth. These findings reinforce the importance of designing technology-based tasks that are hands-on yet developmentally sensitive for preschool learners.

Research Question 4: What assessment methods in the MPTKP are appropriate according to expert consensus?

Appropriate assessment methods are crucial to evaluate the effectiveness of the Teaching Module for Technology and Psychological Well-Being (MPTKP). For this purpose, expert opinions were analysed using the Fuzzy Delphi Method (FDM) to determine the assessment methods that meet the consensus.

Table 4
MPTKP Evaluation Method

EXPERT	**ITEM**		
	18	**19**	**20**
1	0.241	0.280	0.054
2	0.115	0.149	0.054
3	0.440	0.403	0.054
4	0.153	0.114	0.054
5	0.241	0.280	0.054
6	0.153	0.114	0.054
7	0.241	0.280	0.054
8	0.241	0.114	0.054
9	0.440	0.149	0.338
10	0.115	0.403	0.101
	ITEM		
	18	**19**	**20**
d value per item (d ≤ 0.2)	**0.238**	**0.229**	**0.087**
Percentage per item	**80.0%**	**80.0%**	**90.0%**
Defuzzification value (≥ α= 0.5)	0.800	0.773	0.930

Three assessment methods were evaluated—Formative Assessment, Summative Assessment/Teacher Reflection, and Observation (Table 4). All three met the defuzzification criterion (0.773–0.930) and received moderate to high expert agreement (80–90%).

Observation received the strongest support (d = 0.087, 90% consensus, defuzzification = 0.930), reflecting its suitability for monitoring young children's behaviour, engagement, and emotional responses in naturalistic settings. Experts recommended that Observation be used as the primary assessment method, complemented by Formative Assessment and Teacher Reflection for a more holistic evaluation.

This aligns with early childhood assessment principles, where continuous, contextual, and play-based assessment is emphasised over formal testing.

Table 5

Summary of document analysis findings: financial expenditures

Aspect	Preschool A	Preschool C	Preschool D
Expenditure focus	A total of RM2,960 (80%) is allocated for learning materials, RM740 (20%) for teaching aids, and no budget is allocated for technology.	An allocation of RM100 is designated for computer maintenance, while greater amounts of RM200 each are assigned for field trip programs and maintenance of play equipment.	RM493.50 is allocated for the purchase of stationery items such as pencils, crayons, erasers, and A4 paper, with no purchases related to technology.
Technology Readiness	No purchases were made for technological equipment such as computers, tablets, or digital software.	The purchase of capital assets (new technological equipment) is not permitted.	There is no plan to purchase technological equipment; basic stationery needs are prioritized.
Teacher Expertized Training	The absence of technological equipment has also limited opportunities for technology-related training.	Low allocation for technology has resulted in limited emphasis on specialized training in technology use.	No initiatives for technology training were undertaken because technological needs were not prioritized in the budget.
Students Learning Experience	Students are at risk of not experiencing interactive and engaging learning through technology.	Technology-based learning experiences are affected due to a lack of facilities.	Students are limited to traditional learning activities without technological support that could enhance engagement.
Psychology Well-Being	The lack of technological tools affects activities that could more effectively stimulate students' emotions, confidence, and interest through visual and interactive means.	The absence of digital equipment makes it difficult for teachers to conduct technology-based activities that support students' psychological aspects, especially in the post-COVID period.	Students are not exposed to learning methods that support psychological well-being, such as reflective, interactive, or emotion-based application activities.

The analysis of financial documents from Preschools A, C, and D (Table 6) revealed consistently low investment in technological resources. All three preschools prioritised traditional learning materials and basic maintenance, with no significant allocation for digital equipment such as tablets, computers, or software. Limited budgets also resulted in minimal provision for teacher training related to technology integration.

This lack of technological readiness directly affected children's learning experiences. Without access to digital tools, opportunities for interactive, engaging, and psychologically supportive learning activities are substantially reduced. This is especially concerning in the post-pandemic context, where digital literacy and emotional resilience have become increasingly important.

Regarding on impact on Students' Psychological Well-Being, interview and observation data substantiated the document analysis, showing that i) children had limited opportunities for engaging, visual, or interactive digital learning, ii) teachers faced challenges due to insufficient training, and iii) socioemotional development activities that leverage technology were largely absent. These gaps highlight how inadequate infrastructure and insufficient training can hinder preschoolers' psychological well-being particularly their confidence, motivation, emotional expression, and social interaction.

Overall interpretation and discussion from results across FDM analysis, interviews, observations, and document analysis converge to indicate a significant need for a structured technology–psychological well-being teaching module. Triangulation strengthens the validity of the findings, demonstrating that: i) Experts recognise the need for intentional and developmentally appropriate technology integration aligned with socioemotional outcomes, ii) Current preschool environments lack sufficient technological resources and training, limiting meaningful digital engagement, and iii) Children's psychological well-being is insufficiently supported in existing digital teaching approaches.

The validated objectives, content, activities, and assessment methods provide a robust foundation for the MPTKP prototype. The findings emphasise that any technology-based module for preschoolers must address emotional regulation, social relationships, engagement, and meaning-making core elements of the PERMA model.

4. Implications of the Study and Future Recommendations

The findings of this study present several important implications for early childhood education, particularly in enhancing technology integration that supports children's psychological well-being. In terms of teaching and learning, the Technology–Psychological Well-Being Teaching Module (MPTKP) provides a structured guide for preschool teachers to introduce developmentally appropriate technology-based learning experiences. Early exposure to basic technological tools helps prepare children for Year One, especially in science and technology subjects that increasingly require foundational digital literacy. This is consistent with Gjelaj, Buza, Shatri, and Zabeli (2020), who highlight that purposeful and developmentally appropriate technology exposure can stimulate children's cognitive development, creativity, and curiosity. Although large-scale implementation has not yet been conducted, expert validation suggests that PERMA-based activities—such as digital storytelling, mindfulness colouring, and collaborative digital tasks—may enhance children's motivation, engagement, and self-confidence by positioning technology as a medium for socioemotional development.

The study also carries significant implications for policy and curriculum development. The MPTKP can be used as a reference for the Curriculum Development Division (BPK) and Teacher Education Division (BPG) in refining preschool learning standards, resource guidelines, and teacher

training modules that integrate technology with psychological well-being. This is aligned with OECD (2021) recommendations that early childhood systems should cultivate emotional well-being and social relationships alongside digital competencies to better equip children for future learning.

In relation to teacher professional development, the findings highlight the need to strengthen teachers' competencies in technological skills as well as socioemotional pedagogy. Teachers require training that supports them in implementing PERMA-oriented digital activities, facilitating emotional expression and regulation through technology, and using observation and formative assessment tools to monitor children's psychological well-being. The MPTKP provides a foundation upon which targeted professional development programmes can be designed.

Finally, the study highlights implications for technological infrastructure and resource planning. Document analysis revealed that preschools lacked adequate technological facilities and structured funding to support technology-based activities. Such limitations restrict opportunities for meaningful digital learning and hinder teachers' ability to implement activities that support children's psychological well-being. Consequently, there is a critical need for targeted budget allocation at the school, district, and national levels to ensure access to essential digital resources—such as tablets, projectors, and basic educational software. Without such investment, the implementation of holistic, technology-supported learning will remain uneven across preschool contexts.

5. Future Research Recommendations

Based on the findings and limitations of this study, several recommendations are proposed to guide future research on the development and refinement of the MPTKP. First, future studies should involve a larger and more diverse sample of preschools across various states, including urban, rural, and underserved areas, to enhance the generalisability of the module's usability and relevance across different educational contexts. As digital technologies continue to evolve, subsequent research could also examine the integration of emerging tools such as augmented reality (AR), interactive mobile applications, and child-friendly digital learning platforms to determine whether these innovations further enhance the module's capacity to support engagement, emotional expression, and creativity. In addition, expanding the measurement focus beyond general aspects of psychological well-being such as positive emotions, engagement, social relationships, and self-confidence to more nuanced constructs like emotional regulation, empathy, resilience, and creativity would offer a deeper understanding of the module's impact, particularly through the use of validated psychometric instruments or structured observation frameworks. Longitudinal or experimental research designs are also recommended to determine whether the module produces sustained effects on children's socioemotional development and to strengthen causal inferences regarding its effectiveness when compared with existing teaching practices. Finally, future research should incorporate iterative module refinement based on teachers' reflections and children's observable responses during classroom implementation, as such feedback can provide valuable insights for improving activity clarity, assessment strategies, and adaptability to different learning environments.

6. Conclusion

This study set out to address key issues related to technology integration in preschools, the need for a structured technology-based psychological well-being module, and the validation of the MPTKP through expert consensus. Findings from interviews, observations, and document analysis revealed substantial constraints in preschool technology readiness, including limited facilities, insufficient teacher training, and a lack of structured pedagogical resources to support socioemotional

development. These challenges underscore the necessity of a module that intentionally integrates technology with psychological well-being principles. The expert consensus obtained through the Fuzzy Delphi Method confirmed the relevance and suitability of the module's objectives, content components, activities, and assessment methods, providing a strong foundation for the development of an evidence-informed teaching module.

The MPTKP represents a meaningful contribution to early childhood education by offering a structured, developmentally appropriate framework for integrating technology in ways that promote positive emotions, engagement, relationships, meaning, and accomplishment. While the findings suggest that the module has potential to enhance children's socioemotional experiences and support teachers in implementing technology-based activities, these conclusions remain preliminary and require further empirical testing with preschool children. The study also highlights broader implications for curriculum refinement, teacher professional development, and resource planning, as the integration of technology for psychological well-being must be supported through adequate infrastructure and targeted training.

Given the study's scope and the limited number of participating preschools, the findings should be interpreted cautiously. Future research involving broader samples, longitudinal designs, and classroom implementation is needed to establish the module's effectiveness and scalability. Overall, the study provides an important foundation for strengthening early childhood pedagogy through the ethical, purposeful, and psychologically supportive use of technology, contributing to the development of more holistic and future-ready learning environments for young children.

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