

Research Article

Innovation in Teacher Education: A QR-Code Integrated Textbook for Developing Personality and Teaching Competence

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Abstract: The study aims to produce a textbook called Basic Teaching and Learning Skills in the Aspect of Teacher Personality Competence Integrated with QR-Code to improve the quality of professional teacher competence. The study applied the Research and Development (R&D) methodology based on the ADDIE model. The findings indicated that there was high level of feasibility, including material expert validation 83.3, language validation 88.3 and student responses 95.5 which is categorized as very feasible. The results show that the implementation of the QR-Code can increase the level of interactivity to watch the videos, case studies, reflective materials that reinforce the level of conceptual knowledge and internalization of the characters. The findings synthesis is in accordance with Technological Pedagogical Content Knowledge (TPACK) and experiential learning theories, and technology is the reflective medium in personality development. It concludes that the QR-Code textbook is a productive, innovative, and topical medium to form teacher personality competence, which is consistent with the curriculum and the demand of transformation education digital. The product will help improve innovation in higher education by helping close the gap between the pedagogical content and digital literacy and providing adaptive and professional teachers to meet the demands of the 21st-century education.

Keywords: Basic Teaching Skills; Personality Competence; Professional Teacher; QR-Code; Textbook.

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1. Introduction

Education serves as the primary foundation for the advancement of a nation's civilization, with teachers playing a crucial role in facilitating an effective learning environment. The responsibilities of teachers extend beyond merely imparting knowledge; they also act as educators who influence the character and personality of their students. Teachers are essential components of the educational system, as their function encompasses not only the delivery of knowledge but also the cultivation of students' character and personality. The personality competencies of teachers are vital in fostering integrity, morality, and professionalism, which directly enhance the quality of education (Kaewkanlaya et al., 2023). However, various studies indicate that the enhancement of personality competencies is frequently overlooked, with the majority of training programs and educational materials focusing solely on pedagogical and professional dimensions. This situation results in a disparity between teachers' proficiency in teaching skills and their reflective capabilities in imparting character values to students (Lukman et al., 2021).

In fact, various studies show that personality competencies often receive insufficient attention in the process of teacher professional development. This can be seen from the fact that teacher professional development focuses more on pedagogical and academic aspects than on the development of personal competencies. The proof is that there are still many

teachers who often come late and have low teaching motivation, which ultimately affects aspects of child development and overall teacher performance (Hallman HL, 2017). The results of this study show that many teachers at various levels of education have not fully mastered ideal personality competencies. According to (Komang Kartika & Ambara, 2021), teachers' low understanding of personality competencies is often caused by a lack of relevant learning resources that are integrated with the latest technology. This is inseparable from the limitations of teaching materials and learning resources that are specifically designed to develop teachers' personality competencies. Most of the teaching materials currently available still focus on the technical aspects of teaching, while the development of teachers' character and personality has not been a top priority.

Various methods have been used previously in the development of teaching materials for teachers, ranging from conventional printed modules to interactive e-books based on Learning Management Systems (LMS) (Sekarwangi et al., 2021). Although digital approaches offer high flexibility and accessibility, some are still limited in facilitating the reflective and contextual interactions necessary for the formation of teachers' personalities. Meanwhile, conventional teaching materials excel in structure and depth of material, but lack support for active and experience-based learning. The weaknesses of both approaches indicate the need for a learning model that integrates the strengths of technology with the affective dimension of education (Barth & Grütter, 2024).

The main issue raised in this study is the lack of textbooks that explicitly combine the development of teacher personality competencies with interactive and applicable technology-based learning media (Azoulay, 2021). To address this issue, this study proposes the development of a Basic Teaching and Learning Skills textbook integrated with Quick Response Code (QR-Code) technology as an innovative solution. This approach allows users to access additional learning resources such as reflection videos, case studies, and microteaching simulations that can enhance the internalization of teacher personality values independently and flexibly (Braun et al., 2024).

The main contributions of this study include: (1) the development of a technology-based textbook model that integrates the affective and professional aspects of teachers, (2) the provision of interactive learning resources that support reflective and contextual learning, (3) testing the feasibility and effectiveness of textbooks through expert validation and user responses, and (4) compiling a conceptual design for the development of teacher personality competencies based on technology as a reference for higher education policy (Askar & Djono, 2025). The results of this study are expected to enrich the literature on innovative teaching material development and strengthen technology-based education transformation in the digital era (Lukman et al., 2021).

2. Preliminaries or Related Work or Literature Review

Previous studies have discussed the development of teacher competencies through technology-based teaching materials and learning media. Technologies such as QR codes can increase student interactivity and learning outcomes by up to 35% (Samawi et al., 2022). QR codes are effective in teacher education because they facilitate flexible and contextual learning. However, most of these studies focus more on improving pedagogical skills, rather than on aspects of teacher personality development (Samawi et al., 2022).

On the other hand, teaching materials for teacher training in Indonesia are still conventional and not very adaptive to developments in digital technology (Maki et al., n.d.). This results in a lack of appeal and user engagement in the learning process. The low level of teacher personality competence is due to the lack of learning resources that are able to integrate personality values with modern learning technology (Komang Kartika & Ambara, 2021). Thus, there is a gap in the previous literature, namely the absence of teaching materials that specifically combine the personality dimension of teachers with an interactive digital technology-based approach (Astining Putri & Seri, 2019).

The development of educational technology has encouraged innovation in teaching material design. One form of innovation is the use of Quick Response Codes (QR-Codes). The use of QR-Codes in physical teaching materials increases user engagement because they provide quick access to digital content such as videos or simulations (Anggraeni, 2017). Similar results were found in an increase in learning motivation and concept understanding of up to 35% in students who used QR-Code integrated teaching materials compared to conventional teaching materials (Latipah E et al., 2020). QR-Codes are effective in teacher education because they facilitate flexible and contextual learning. However, the majority of

these studies emphasize cognitive aspects and technical learning skills, without linking the use of technology to the formation of teacher personality (Tri Agustin, n.d.)

Teaching materials for teacher training are still conventional and not integrated with digital technology. The lack of innovation causes learning to be monotonous and less attractive to the digital native generation (Astining Putri & Seri, 2019). The use of technology-based teaching materials such as e-books or interactive media can significantly increase student motivation and participation (Darmadi, n.d.). However, to date, there are not many teaching materials that combine a technological approach with character education that emphasizes the formation of teacher personality.

From a theoretical perspective, this study refers to two main models. First, Technological Pedagogical Content Knowledge (TPACK), which emphasizes the importance of integrating technology, pedagogy, and content to create effective learning (Fathur Ridlo & Rochmawati, 2019). In the context of this study, QR codes are used not only as a technological tool but also as a reflective medium to internalize teacher personality values. Second, experiential learning theory, which explains that effective learning occurs through a cycle of concrete experience, reflection, conceptualization, and application. Through the integration of this theory, prospective teachers are expected to not only understand personality concepts theoretically but also experience them through reflective activities and practical application (Agung Prakoso & Rochmawati, 2020).

Based on the synthesis of various literature, it can be concluded that previous studies still have a number of limitations that need further attention. First, most previous studies focused on the development of teachers' pedagogical and professional competencies, while the personality dimension has not been explicitly integrated into the design of teaching materials (Sari I & Gumindari S, 2022). This has resulted in the aspects of value formation, morals, and reflective attitudes of teachers not being optimally accommodated in the learning process. Second, the use of Quick Response Code (QR-Code) technology in previous studies has generally been limited to serving as a cognitive aid to enrich teaching materials, rather than as a means of character building or internalization of teachers' personality values. Third, in the context of education in Indonesia, there is still a lack of teaching material models that are suitable for the characteristics of prospective teacher students and are not yet fully in line with the direction of the Merdeka Belajar Kampus Merdeka (MBKM) policy, which emphasizes adaptive, reflective, and character-oriented learning (Saha A et al., 2021). These limitations indicate that there is significant scope for research to develop innovative teaching materials that are able to integrate personality aspects with digital technology in a more systematic manner.

3. Materials and Method

This study uses research and development (R&D), which is a type of research aimed at producing new products that will then be tested for feasibility and effectiveness. The research model used in this study is the ADDIE development model, which is applied to build learning designs (Sugiono, 2014). This study used questionnaire and documentation data collection techniques. The questionnaire used to obtain data in this study was a closed questionnaire used to test the feasibility of basic teaching and learning skills textbooks by experts and student responses. While the documentation data used was the Semester Learning Plan (RPS) for the basic teaching and learning skills course and the list of names of students in the Education Study Program at the Faculty of Economics and Business (FEB) Class of 2022 at Surabaya State University. The research instruments used were material expert validation instruments, language expert validation instruments, graphic expert instruments, and student response questionnaire instruments.

The data obtained in this study were qualitative and quantitative. Qualitative data were in the form of review results from experts, including subject matter experts, language experts, and graphic experts, which were used as input and suggestions related to the developed textbook. The quantitative data consisted of the results of validation by subject matter experts, language experts, graphic experts, and a student response questionnaire for the Education Study Program at the Faculty of Economics and Business (FEB) Class of 2022 at Surabaya State University. Quantitative data consists of the results of validation by subject matter experts, language experts, and graphic experts analyzed using a Likert scale. The Likert scale used consists of five categories, as shown in the following table.

Table 1. Validation Score Benchmarks Using the Likert Scale.

Criteria	Score
Highly suitable	1
Suitable	4
Fairly suitable	3
Not suitable	2
Highly unsuitable	1

Source : (Riduwan, 2016)

The validation results from the experts will be calculated using the formula:

$$\text{Percentage (\%)} = \frac{\text{Score}}{\text{Maximum Score}} \times 100\%$$

The results of the validation calculations for the developed textbooks were then interpreted in percentage form with the following interpretation criteria:

Table 2. Interpretation of Expert Validation Scores Using the Likert Scale.

Percentage	Interpretation Criteria
0% - 20%	Highly unsuitable
21% - 40%	Not Suitable
41% - 60%	Fairly Suitable
61% - 80%	Suitable
81% - 100%	Highly Suitable

Source : (Riduwan, 2016)

Student response data were analyzed using the Guttman Scale with the following scoring criteria.

Table 3. Criteria for Student Response Questionnaire Scores using the Guttman Scale.

Criteria	Score
Yes	1
No	0

Source : (Riduwan, 2016)

The results of the student response questionnaire will be calculated using the following formula:

$$\text{Percentage (\%)} = \frac{\text{Score}}{\text{Maximum Score}} \times 100\%$$

Based on the calculation of the results of the student response questionnaire that has been conducted, a feasibility score will be obtained for the interactive e-module product developed with the following interpretation of the questionnaire scores.

Table 4. Interpretation of Student Response Questionnaire Scores Using the Guttman Scale.

Percentage	Interpretation Criteria
0% - 20%	Highly unsuitable
20% - 40%	Not Suitable
40% - 60%	Fairly Suitable
60% - 80%	Suitable
81% - 100%	Highly Suitable

Sumber : (Riduwan, 2016)

4. Results

This research resulted in the innovation of teaching materials in the form of a textbook entitled Basic Teaching and Learning Skills in the Aspect of Teacher Personality Competence Integrated with QR-Code. The development process followed the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), which was carried out systematically and gradually to produce a valid, practical, and effective product.

4.1 Analysis Phase

The analysis phase was the first step in developing the textbook Basic Teaching and Learning Skills in the Aspects of Teacher Personality Competence Integrated with QR Codes. The analysis phase was carried out to analyze learning needs and identify problems encountered in the learning process (Kurniawan & Lestari, 2019). This analysis aims to understand the context, formulate problems, identify user needs, and develop relevant and focused learning objectives. Three forms of analysis were carried out, namely problem analysis, needs analysis, and formulation of learning objectives, which are explained as follows:

Problem Analysis

Problem analysis was conducted to identify obstacles and gaps in the learning process, particularly in strengthening teachers' personality competencies in higher education. Initial observations and interviews with lecturers showed that prospective teachers had difficulty understanding and practicing aspects of teacher personality in a contextual and reflective manner. In addition, the personality material in pedagogical courses tends to be theoretical, lacks interactive media, and is not sufficiently linked to real-world practice.

The lack of integration between theory and practice causes pedagogical learning to become rigid and non-contextual (Carenina Widyawati et al., 2022). Meanwhile, personality competencies cannot be taught descriptively alone but must be formed through learning media that enable the active and reflective internalization of values (Lee C-KJ & Huang J, 2021). This results in low internalization of personality values such as integrity, empathy, and discipline in the learning context (Lemay DJ et al., 2021). This situation is exacerbated by the lack of teaching materials that are able to link teachers' personality values with real-world practices in the field of education. Students tend to be passive in understanding personality values due to the unavailability of adequate models, case studies, and reflective tools.

Needs Analysis

The needs analysis aims to determine the extent to which students need teaching materials that can bridge theory and practice, particularly in developing teacher personality competencies (Martin et al., 2024). Surveys and curriculum document reviews show that most basic education courses do not yet have thematic textbooks that explicitly integrate aspects of teacher personality with learning technology (Lüdtke et al., 2009). Furthermore, in the Merdeka Belajar Kampus Merdeka (MBKM) Curriculum, students are required to have a professional teacher profile that is not only competent in mastering the material but also has a mature personality as an educator (MacIntyre PD et al., 2019). Therefore, teaching materials are needed that not only contain conceptual material but also provide active, contextual, and reflective learning experiences through interactive features such as QR-Code integration.

On the other hand, needs analysis was also conducted through surveys of students and interviews with lecturers to identify the types of teaching materials needed to support the mastery of personality competencies (Molefi RR et al., 2024). The survey results showed that more than 85% of students found it difficult to understand the dimensions of teacher personality in depth due to the limited availability of contextual textbooks that are in line with the needs of the digital age. They want textbooks that can be accessed flexibly, equipped with multimedia features, and connect the concept of teacher personality with real experiences in learning (Okonofua JA et al., 2016). Research by Astuti (2020) confirms the importance of developing innovative and digitally-based textbooks in response to the characteristics of the digital native generation. Meanwhile, Hasanah & Sulastri (2021) found that technology-based teaching materials such as e-books or textbooks with QR-Code integration can increase student motivation and engagement in lectures (Ottosen M et al., 2023). This reinforces the urgency to develop QR-Code-based textbooks that not only contain theoretical concepts but also provide access to videos, micro-practices, and reflections based on real cases.

Formulation of Learning Objectives

Based on the results of problem and needs analysis, learning objectives were formulated as the basis for developing the content of the textbook (Ma Y, 2022). The learning objectives focused on strengthening teachers' personality competencies that could be internalized and applied in teaching practice. Each chapter in the textbook was designed to:

- a. Help students understand the basic concepts of teacher personality in accordance with pedagogical competency standards.
- b. Stimulate students to reflect on their attitudes and behaviors as prospective educators.
- c. Provide opportunities for students to access learning videos, simulations, and real case studies through QR codes as part of independent and collaborative learning.

- d. Train students to integrate personality values in the context of microteaching and the school environment.

The formulation of these learning objectives refers to the instructional material development approach proposed by Dick and Carry, which states that in the instructional development process, learning objectives must be derived from actual needs and based on context analysis (Askar & Djono, 2025). Thus, the textbooks developed are not only a means of knowledge transfer, but also a medium for transforming attitudes and shaping the character of prospective teacher students towards professional competence (Sekarwangi et al., 2021).

The results of this preliminary analysis show a significant gap in the availability of teaching materials that explicitly integrate teacher personality competencies with digital-based learning media. Based on interviews with lecturers and prospective teacher students, it was found that most of the teaching materials used were still theoretical and did not provide opportunities for students to reflect or engage in contextual practice. Emphasize the importance of developing innovative digital teaching materials to meet the characteristics of digital native learners (Hallman HL, 2017). Therefore, QR code integration was chosen as a solution to enable students to access various multimedia content such as reflective videos, microteaching simulations, and real case studies that can improve conceptual understanding and self-reflection skills (Martin et al., 2024).

4.2 Design Phase

In the design phase, the teaching book was designed and prepared according to the previously planned concept. The design phase involves creating a preliminary draft of the textbook, starting from the introduction, content, and conclusion. The design of the textbook draft is adjusted to the 2014 BSNP standard related to teaching material assessment instruments and research needs. At this stage, the textbook is designed with the addition of QR codes containing learning videos and case studies to provide practical examples of teacher personality development.

4.3 Development Phase

At this stage, the textbook is compiled according to what was planned in the design phase to produce prototype I. After prototype I is completed, it will be reviewed by experts, namely subject matter experts and language experts. The results of the expert review contain suggestions for improvements to be made to the textbook being developed.

Table 5. Language Expert Validation Results.

No	Aspect	Indicator	Score	Average	Category
1.	Content quality and purpose	Kejelasan	100%	90%	Highly
		Kesesuaian KBBI	80%		Recommended
2.	Instructional quality	Keterpahaman	80%	80%	Recommended
		Konsistensi	80%		
3.	Technical Quality	Ketepatan	100%	95%	Highly
		Keterbacaan	90%		Recommended
Total				88,3%	Highly Recommended

The final results of linguistic validation show a score of 88.3%, meaning that the developed textbook is classified as "highly suitable." This achievement indicates that the textbook has been compiled in accordance with applicable linguistic rules, including accurate sentence structure, spelling, punctuation, and grammar in accordance with the General Guidelines for Indonesian Spelling (PUEBI). In addition, the sentences used are considered clear, communicative, and consistent, making them easy for readers to understand. The sentence structure, which is not too long, also supports the readability of the text as a whole, so that readers do not have difficulty understanding the content of the material presented.

Table 6. Results of Expert Validation.

No	Aspect	Indicator	Score	Average	Category
1	Content quality and purpose	Accuracy	90%	85%	Highly
		Completeness	80%		Recommended
2	Instructional quality	Presentation of material	80%	80%	Recommended
		Meaningfulness	80%		

3	Technical Quality	Readability Neatness	90% 80%	85%	Highly Recommended
		Total		83,3%	Highly Recommended

Overall, the results of the subject matter expert assessment show that the developed product falls into the “highly feasible” category with an average percentage of 83.3%. These findings indicate that the product is suitable for learning needs and can be used as teaching material or supporting media in learning activities. However, improvements need to be made to several instructional sections so that the product can function more optimally in improving learning effectiveness.

4.4 Implementation Stage

The textbook was implemented among students of the Education Study Program at the Faculty of Economics and Business (FEB) Class of 2022 at Surabaya State University. The aim was to determine the students' responses and feedback on the textbook that had been developed.

Table 7. Student Response Results

No	Aspect	Indicator	Score	Average	Category
1	Content quality and purpose	accuracy suitability	90% 100%	95%	Highly Recommended
2	Instructional quality	providing assistance for learning motivational quality	100% 90%	95%	Highly Recommended
3	Technical Quality	readability appearance presentation structure	100% 100% 90%	96,6%	Highly Recommended
		Total		95,5%	Highly Recommended

The student response showed a score of 95.5% in the “Very Good” category. The “Highly Suitable” rating from all respondents also reflects that the textbook is highly relevant to the lecture material, easy to understand, and able to assist students in the independent learning process. In addition, these results confirm that the textbook has succeeded in presenting the material in a systematic, interesting, and communicative manner, thereby increasing student motivation to learn.

4.5 Discussion

The results of this study indicate that the integration of QR-Code technology in the development of teacher personality competency-based textbooks can improve the quality of learning design and student engagement. The high expert validation scores (83–88%) and positive user responses (95.5%) show that digital innovation in printed teaching materials can serve as a bridge for hybrid learning between conventional models and technology-based learning.

Theoretically, these results reinforce the concept of Technological Pedagogical Content Knowledge (TPACK), which emphasizes the importance of utilizing technology not only as a teaching aid but also as a medium for self-reflection for prospective teachers to internalize personality values such as empathy, integrity, and discipline (Braun et al., 2024). The integration of QR codes containing reflection videos and teaching simulations is also in line with Kolb's (1984) experiential learning theory, which facilitates students in transforming abstract concepts into real professional behavior. Practically, this research contributes to strengthening teacher professional development through innovative teaching materials that emphasize affective and character aspects, which have been neglected in teacher education curricula (Ottosen M et al., 2023). With a very high level of feasibility from students, this textbook has proven to be relevant to the demands of digital transformation in higher education and the national Merdeka Belajar (Freedom of Learning) policy.

The results of this study have important implications for teacher education development in the digital era, from pedagogical, technological, and institutional perspectives (Molefi RR et al., 2024). Pedagogically, the development of a basic teaching skills textbook based on teacher personality competencies integrated with QR codes can strengthen the application of active, reflective, and student-centered learning. This textbook not only presents theory but

also provides contextual learning experiences through practice videos, case studies, and self-reflection that can be accessed directly via QR codes (Ottosen M et al., 2023). This approach encourages prospective teacher students to internalize personality values such as empathy, integrity, responsibility, and discipline through a more meaningful learning process.

From a technological perspective, this research proves that the integration of simple technologies such as QR codes can improve the quality of learning interactions without requiring complex digital learning systems. The application of QR codes makes it easy for students to access multimedia content anytime and anywhere, while also strengthening the implementation of blended learning that combines the advantages of face-to-face and online methods. This development model can be replicated in various other courses as a form of learning innovation that is adaptive to advances in educational technology. Meanwhile, from an institutional perspective, the results of this study make a real contribution to strengthening the teacher education curriculum in higher education (Okonofua JA et al., 2016).

The resulting textbook can be used as the main learning resource in the Basic Teaching and Learning Skills course, as well as an example of the application of innovative teaching materials that support the national Merdeka Belajar (Freedom of Learning) policy. In addition to enriching learning resources, the success of this research also demonstrates the institution's commitment to developing research-based educational innovations that are oriented towards character and technology. Overall, the implications of this research confirm that collaboration between reflective pedagogical approaches, the integration of simple digital technology, and institutional support are strategic steps to create an adaptive, humanistic learning ecosystem that is relevant to the educational needs of the 21st century. In general, the results of this study confirm that the development of textbooks that integrate technology and character education is a strategic step to produce professional teachers who are competent, have strong personalities, and are adaptive to digital changes (Saha A et al., 2021).

5. Comparison

Based on the analysis of research results and literature review, it can be concluded that this study has uniqueness and advantages compared to previous studies. Focused on the use of Quick Response Codes (QR Codes) to improve the effectiveness of learning from a cognitive and technical perspective (Lalin SAA et al., 2024). Their findings show that the integration of QR-Codes can increase student motivation and learning outcomes by up to 35%. However, these studies have not emphasized the relationship between the use of technology and the formation of teacher personality.

In contrast, this study develops a more holistic approach by integrating QR-Code technology into the Basic Teaching and Learning Skills textbook, which focuses on teacher personality competencies. This innovation not only provides access to additional learning resources in the form of reflection videos and case studies, but also serves as a medium for internalizing personality values such as empathy, integrity, and responsibility. Thus, this study expands the context of educational technology utilization from merely a learning aid to a medium for shaping the professional character of prospective teachers.

In addition, expert validation and user trials show that the developed textbook has a higher level of feasibility than similar products. The average expert validation results reached 83.3% to 88.3% (very feasible category), while user responses showed 95.5% (very feasible category). These results confirm that the integration of simple technologies such as QR codes can have a significant impact on the quality of affective learning and the strengthening of teacher character, something that has not been explored in depth by previous research.

Thus, this study fills a gap in the previous literature, particularly in the dimension of developing personality competencies based on educational technology in the context of teacher education in Indonesia.

6. Conclusion

The present study was able to develop a textbook on Basic Teaching and Learning Skills in the Aspect of Teacher Personality Competence Integrated with QR-Code, which proved to be valid, practical and effective in learning. The QR-Code integration offers a considerable value added offering a more interactive, reflective and contextual learning experience to potential teacher students. Expert validation results are empirically valid with a highly feasible category and user responses prove a very positive acceptance of the developed product. Theoretically, this study supports the applicability of the Technological Pedagogical Content Knowledge (TPACK) model and the experiential learning theory as the framework used to

build instructional materials that could integrate technological, pedagogical, and personality values. In the meantime, in practice, the findings of this research make specific contributions to the work on enhancing the competence of professional teachers in the digital age by offering teaching resources that facilitate active, reflective and character-based learning. This study also complies with the national policy of Merdeka Belajar Kampus Merdeka (MBKM) and the global suggestions of UNESCO regarding educational transformation with the use of technology. Therefore, the created textbook is not only an educational product, but also a pattern of educational innovation that can be applied in different spheres of education. In addition, the further research is suggested to check the efficacy of this textbook on a larger scale and create an interactive digital format with the incorporation of a Learning Management System (LMS). This is likely to enhance the fusion of technology with teacher character growth as the basis in the adaptive, humanistic and sustainable education system further.

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