

Journal of Creativity Student

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Fashion Students' Perception of QR Code Innovation in Argenta Nala Fashion Design

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Abstract

The development of digital technology encourages the birth of new innovations in the field of fashion design, one of which is through the use of Quick Response (QR) Code as an information medium and visual elements. This innovation not only serves as a means of accessing information, but also has the potential to enrich user experience, and innovative value in fashion products. This study aims to analyze the perception of Fashion Designers students towards the innovation of implementing QR Code in Argenta Nala fashion design, by reviewing the aspects of ease of use, readability, completeness of information, user experience, and clarity of appearance. The study uses a quantitative approach with a percentage descriptive method. Data was collected through the distribution of a closed questionnaire based on the Likert scale to Fashion Designers students who had taken the Tailoring course as research respondents by calculating the percentage of data to find out the respondents' perception tendencies. The results of the study show that the application of QR Code in Argenta Nala fashion design received positive perceptions from students, with a good to very good rating category on all indicators assessed with an average percentage of 92%. QR Codes are considered easy to use, easy to scan, able to present clear information, and provide an experience to users without overriding fashion aesthetics. This study concludes that QR Code has great potential to be developed into an effective information and product recognition medium in the development of technology-based designs that are functional and user experience-oriented, especially in the context of Fashion Design.

Keywords: perception, QR Code, Argenta Nala, innovation, digital technology

INTRODUCTION

The development of digital technology has driven significant transformation in the creative industry, including the field of fashion design. The integration of information technology in fashion design plays a role as a means of communication that is able to expand interaction between designers and users through the presentation of digital information that is easily accessible. Digital innovation allows the delivery of product information interactively and sustainably through easily accessible media¹. Quick Response (QR) Code has emerged as one of the most widely used technologies because of its ability to connect physical media with digital content quickly and efficiently². The application of QR Codes in product design and *fashion* is considered to be able to increase product added value through the presentation of relevant information. This condition shows the urgency of the use of QR Codes in fashion design in response to technological developments and the needs of the global creative industry.

¹ Mohammad I. Islam, "QR Code-Driven Pre-Consumer Waste Sorting in Garment Manufacturing," *Sustainable Production and Consumption* (2025): 1–14, <https://doi.org/10.1016/j.spc.2025>

² Maria Vorobchuk et al, "QR Code Design: From Digital Graphics to Environmental, Product and Fashion Design," *Journal of Graphic Engineering and Design* 15, no. 2 (2024): 51–57, <https://doi.org/10.24867/JGED-2024-2-051>

Argenta Nala is a ready-to-wear fashion design work that integrates digital technology innovations through the application of *Quick Response* (QR) Code as an information medium and visual elements in fashion. This fashion is designed by carrying the concept of techno-batik that combines modern aesthetics with cultural values, so that QR Code not only functions as a means of accessing digital information, but also becomes part of a design concept that supports fashion identity and narrative. Through the QR Code applied, users can access information related to Argenta Nala's design concept, philosophy, and creative process, so that fashion acts as an interactive communication medium between designers and users.

The use of QR Codes in design has been widely studied in the fields of graphic design and product design. Previous research explains that QR Codes can function effectively if they are designed by considering visual readability, module structure settings, and graphic composition balance so that the scanning function remains optimal without compromising aesthetic quality^{3 4}. The integration of QR Code as a design element is not only able to strengthen the design identity and innovative spirit of a product, but also pay attention to aesthetic suitability with the medium in which the QR Code is applied. Another study shows that QR Codes in *fashion design* can provide additional aesthetic value when adjusted to the character of the material and the concept of fashion design⁵. However, most of these studies still focus on non-textile products, so studies that directly link QR Codes to fashion design are still limited. These limitations emphasize the need for further research in the context of *fashion design*.

The aspect of ease of use is an important indicator in assessing the acceptance of the success of technology-based innovation. Research in the field of education and information systems states that QR Codes are considered effective if users can access information without complex technical and procedural barriers⁶. User perception of ease of use has a direct effect on the level of acceptance of digital technology⁷. Another study explains that complex and inconsistent QR Code designs have the potential to lower user comfort levels⁸. The findings show that ease of use should be a major concern in the application of QR Codes in fashion design, especially for users from non-technical circles such as fashion design students. This condition strengthens the significance of user perception research in the context of fashion education.

The readability and color quality of the QR Code are visual aspects that determine the effectiveness of the scan. International research shows that the success rate of QR Code scans is affected by color contrast not meeting readability standards⁹. Studies on *Color QR Codes* confirm that color variations can increase visual value, but also have the potential to reduce readability if not designed with the right technical principles¹⁰. Fashion media has complex material and color characters, so the application of QR Codes in fashion requires a different design approach than flat

³ Rafael Ávila-Muñoz, "Strategies and Guidelines for the Aesthetic Design of QR Codes," *Design Journal* 27, no. 1 (2024): 89–104, <https://doi.org/10.1080/14606925.2023.2289451>

⁴ Shang-Kuan Chen and Yen-Wu Ti, "A Design of Multi-Purpose Image-Based QR Code," *Symmetry* 13, no. 12 (2021): 2446, <https://doi.org/10.3390/sym13122446>

⁵ Mustafa, H et al., "The Aesthetical Impacts of Quick Response (QR) Codes in Apparel Design to Revitalize Handcrafts," *International Design Journal* 15, no. 1 (2025): 85–98.

⁶ Eman A. Masih et al., "Feasibility of Using QR Code for Registration and Evaluation of Learners," *Education and Information Technologies* 27, no. 4 (2022): 4871–4890, <https://doi.org/10.1007/s10639-021-10745-6>

⁷ EA Journals, "Development of QR Code-Based Authentication System," *International Journal of Computer Science and Information Technology* 17, no. 1 (2025): 22–34.

⁸ Mohammad González-Gómez et al., "Color QR Codes for Smartphone-Based Analysis," *Sensors* 25, no. 3 (2025): 1–15, <https://doi.org/10.3390/s2503>

⁹ Rafael Ávila-Muñoz, "Strategies and Guidelines for the Aesthetic Design of QR Codes," *Design Journal* 27, no. 1 (2024): 89–104, <https://doi.org/10.1080/14606925.2023.2289451>

¹⁰ Mohammad González-Gómez et al., "Color QR Codes for Smartphone-Based Analysis," *Sensors* 25, no. 3 (2025): 1–15, <https://doi.org/10.3390/s2503>

media¹¹. The limitations of previous research on textile media show that there are relevant research gaps to be studied further.

The completeness of the information presented through QR Code also affects user perception and experience. Previous research explains that QR Codes are considered valuable if they are able to present comprehensive, relevant, and supportive information for users to understand the product¹². Information about design concepts, philosophies, production processes, and cultural values can increase appreciation for fashion works¹³. Another study confirms that QR Codes that only serve as a link of basic and limited information tend to have less significant impact on the user experience¹⁴. The findings show the importance of assessing the completeness of information as an indicator of assessing QR Code innovation in fashion design.

Previous research shows that QR Codes have been used as an interactive information medium and innovative visual elements in various design contexts, including fashion, but existing studies still predominantly emphasize the technical aspects of implementation, information function, and visual aesthetics without placing the evaluation of user perception as the main focus of the analysis^{15 16 17}. This condition causes the understanding of the application of QR Codes in fashion design to not be thoroughly described. Therefore, research was conducted on user perception of QR Code innovations in fashion design.

These limitations show that there is a research gap related to the evaluation of the application of QR Codes in fashion media based on indicators (1) Ease of Use; (2) Readability; (3) Completeness of Information; (4) User Experience; (5) Clarity of Appearance, so this study aims to analyze the perception of Fashion Design students towards QR Code innovation in Argenta Nala fashion design to support the development of fashion design and oriented to user experience. This study focuses on the perception of Fashion students in the measurement of the five indicators to assess the effectiveness, reliability, and visual quality of QR Codes in the context of fashion design. The results of this research are expected to be useful for the development of technology-based fashion design that not only focuses on aesthetics, but also optimal user experience and information.

METHOD

This study uses a quantitative approach with a percentage descriptive method to analyze the perception of Fashion students towards the innovation of the application of *Quick Response* (QR) Code in Argenta Nala fashion design. The descriptive approach is used to describe research phenomena based on empirical data without manipulating variables, so that the results of the study reflect the conditions of respondents' perception objectively and factually¹⁸. The percentage descriptive

¹¹ Mustafa, H et al., "The Aesthetical Impacts of Quick Response (QR) Codes in Apparel Design to Revitalize Handcrafts," *International Design Journal* 15, no. 1 (2025): 85–98.

¹² ResearchGate Conference Paper, "Seven Ways How In-Store QR Codes Negatively Contribute to Customer Experience," *Proceedings of International Conference on UX Design* (2025): 1–10.

¹³ Sari, Rina, "Implementation of QR Code in Fashion Design Learning," *Journal of Learning Technology* 6, no. 2 (2021): 134–145.

¹⁴ Vogue Business, "Fashion's New Tech Essential: QR Codes," *Vogue Business*, June 2020.

¹⁵ Mustafa, H et al., "The Aesthetical Impacts of Quick Response (QR) Codes in Apparel Design to Revitalize Handcrafts," *International Design Journal* 15, no. 1 (2025): 85–98.

¹⁶ Anas, Ahmad, et al., "QR Code as Interactive Media: Visual Communication and User Engagement in Product Design," *International Journal of Interactive Design and Manufacturing* 17, no. 1 (2023): 89–101, <https://doi.org/10.1007/s12008-022-00987-4>

¹⁷ Hidayat, Rendi, and Budi Prasetyo, "Evaluating User Experience of QR Code-Based Information Systems," *Journal of Information Systems Engineering and Business Intelligence* 8, no. 2 (2022): 134–143, <https://doi.org/10.20473/jisebi.8.2.134-143>

¹⁸ John W. Creswell and J. David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed. (Los Angeles: SAGE Publications, 2021), 155–158.

method was chosen because it is suitable for perception research that aims to map the tendency of respondents' assessment of a study object¹⁹.



Figure 1. QR Code in Argenta Nala

The research was carried out at the Fashion Study Program, Faculty of Engineering, Semarang State University. The research population amounted to 83 Fashion Designers, with a sample of 55 respondents paying attention to certain criteria. In addition, the number of samples is considered sufficient to meet the sufficiency of data for descriptive analysis with coverage of >50% of the population, so that it is able to adequately represent the variation in student perception, because in survey research is an important factor in ensuring research findings²⁰. Sampling was carried out using *the proportionate stratified purposive sampling technique*, which is a sample selection technique that considers the proportion of subgroups in a population and is based on certain criteria that are in accordance with the research objectives²¹. The sample criteria include Fashion Planning students who have taken Tailoring courses, so that respondents have a relevant understanding of fashion.

The preparation of research instruments is in the form of a questionnaire based on indicators of ease of use, readability, completeness of information, user experience, and clarity of appearance^{22 23}. Each indicator is elaborated into five statements that represent important aspects of user perception of the application of QR Codes in fashion design, so that this total instrument consists of 25 assessment items.

¹⁹ Alan Bryman, *Social Research Methods*, 6th ed. (Oxford: Oxford University Press, 2021), 334–336.

²⁰ Rahman, Md Mizanur. "Sample size determination for survey research and non-probability sampling techniques: A review and set of recommendations." *Journal of Entrepreneurship, Business and Economics* 11, no. 1 (2023): 42-62.

²¹ Mumtaz Ali Memona et al., "Purposive Sampling: A Review and Guidelines for Quantitative Research," *Journal of Applied Structural Equation Modeling* 9, no. 1 (2025): 1–23, [https://doi.org/10.47263/JASEM.9\(1\)01](https://doi.org/10.47263/JASEM.9(1)01)

²² Eman A. Masih et al, "Feasibility of Using QR Code for Registration and Evaluation of Learners," *Education and Information Technologies* 27, no. 4 (2022): 4871–4890, <https://doi.org/10.1007/s10639-021-10745-6>

²³ Andi Sofyan Anas et al., "UI QR Code Design as a Product Catalog Digitization Solution to Improve SME Marketing," *Journal of Serving from the Heart* 4, no. 1 (2025): 1–8.

Data collection was carried out using a closed questionnaire where statements were measured using a four-level Likert scale, namely score 4 (if meeting 5 criteria from the assessment rubric), score 3 (if meeting 4 criteria from the assessment rubric), score 2 (if meeting 2-3 criteria from the assessment rubric) and score 1 (if meeting 1 criterion from the assessment rubric), which was used to identify student perceptions. The Likert scale is used to systematically measure respondents' perceptions and assessments through structured answer choices²⁴.

Data analysis is carried out using the percentage descriptive method, where the percentage of each response in each indicator will be calculated as an equation²⁵.

$$P_S = \frac{S}{N} \times 100\%$$

Description:

P_S : Percentage sub variable
 S : The sum of the values of each sub-variable
 N : Maximum total score

The percentage results are then categorized into interpretation in the criteria based on Table 1 with a likert scale conversion of 4.

Table 1. Perception Percentage Value

Percentage	Category
76%-100%	Excellent
51%-75%	Good
26%-50%	Less
0%-25%	Very Less

RESULTS AND DISCUSSION

This section presents a data analysis regarding the perception of Fashion Design students towards QR Code innovation in Argenta Nala fashion design based on five assessment indicators, namely ease of use, readability, completeness of information, user experience, and clarity of appearance.

Table 2. QR Code Innovation Perception Table

QR Code Innovation Indicators	Percentage	Category
Ease of Use	91%	Excellent
Readability	92%	Excellent
Completeness of Information	92%	Excellent
User Experience	92%	Excellent
Display Clarity	93%	Excellent

Student assessments show that the QR Code in Argenta Nala's fashion design is perceived as easy to use, has a good readability, and presents relevant information and supports understanding of the product. The assessment carried out through QR Code scanning is considered to provide added value in getting to know the concept and character of fashion design in a more interactive way. The clarity of the QR Code's display is also considered to be in line with the overall fashion design, so that it does not interfere with the aesthetics of the product, but rather strengthens the function of the QR Code as a visual and informative communication medium in fashion design works.

Ease of Use

The results of the study show that Fashion Planning students give a positive perception of the ease of use of QR Codes in Argenta Nala fashion designs. The percentage results showed that an average of 91% of respondents stated that the QR Code scanning process can be done directly through

²⁴ Josée L. S. T. Lavrakas, "Likert Scale," in *Encyclopedia of Survey Research Methods* (Thousand Oaks: SAGE Publications, 2020).

²⁵ Kurniawan Yudi et al. 2025. "The Development Media for Interactive Learning using Bots Api of Telegram Social Media on Harmonic Motion Materials for Class X of Senior High School". *Kasuari: Physics Education Journal (KPEJ)* 7(1) (2024) 1-12

a smartphone camera without the need for additional applications or complicated technical steps, which is why it is in the "excellent" category. This condition allows users to access product information quickly and efficiently, so that QR Code is perceived as a practical medium in the context of digital technology-based fashion design, as well as in the concept of convenience in information systems²⁶.

Table 3. Ease of Use Indicator Table

Score	Category	Frequency
76%-100%	Excellent	50
51%-75%	Good	5
26%-50%	Less	0
0%-25%	Very Less	0

Ease of use plays an important role in user acceptance of QR Code technology innovations in clothing. People tend to accept technology that makes it easier and can be used daily. QR Codes with a simple access mechanism are able to increase users' interest in interacting with digital information, especially when applied to non-controversial physical media such as design products²⁷. This perception of convenience makes QR Code a user-friendly communication medium.

The ease of use of QR Codes in Argenta Nala clothing also shows the ability of fashion to adapt to the development of increasingly sophisticated digital technology. Fashion is not only a visual object, but can also be an interactive medium that allows users to obtain information. The integration of QR Codes in fashion must prioritize the aspect of ease of access so that the technology can be accepted by users from various backgrounds²⁸. This shows that ease of use is a factor in the successful implementation of QR Codes in fashion design.

Readability

The results of the study showed that Fashion Planning students had QR Code readability in Argenta Nala's fashion design in the good category. As many as 92% of respondents gave ratings in the good to very good category. These results indicate that the QR Code in Argenta Nala's fashion design is considered easy to access and understand by users using *smartphone devices*. The size of the QR Code and the color contrast against the background of the fabric help scanning, so that digital information can be accessed without constraints, as is the principle of visual readability in two-dimensional code-based media²⁹. Here is a QR Code image applied to Argenta Nala's fashion design.

²⁶ Masih M.H. et al, "User Acceptance of QR Code-Based Information Systems: An Empirical Study," *Journal of Information Systems and Technology Management* 19 (2022): 1–15, <https://doi.org/10.4301/S1807-1775202219001>

²⁷ Djaniar Rina et al, "QR Code as an Interactive Information Medium in Product Design," *Journal of Design Research* 22, no. 3 (2024): 245–258, <https://doi.org/10.1504/JDR.2024.138912>

²⁸ Maria Vorobchuk et al, "QR Code Design: From Digital Graphics to Environmental, Product and Fashion Design," *Journal of Graphic Engineering and Design* 15, no. 2 (2024): 51–57, <https://doi.org/10.24867/JGED-2024-2-051>

²⁸ Maria Vorobchuk et al, "QR Code Design: From Digital Graphics to Environmental, Product and Fashion Design," *Journal of Graphic Engineering and Design* 15, no. 2 (2024): 51–57, <https://doi.org/10.24867/JGED-2024-2-051>

²⁹ Maria Vorobchuk et al, "QR Code Design: From Digital Graphics to Environmental, Product and Fashion Design," *Journal of Graphic Engineering and Design* 15, no. 2 (2024): 51–57, <https://doi.org/10.24867/JGED-2024-2-051>

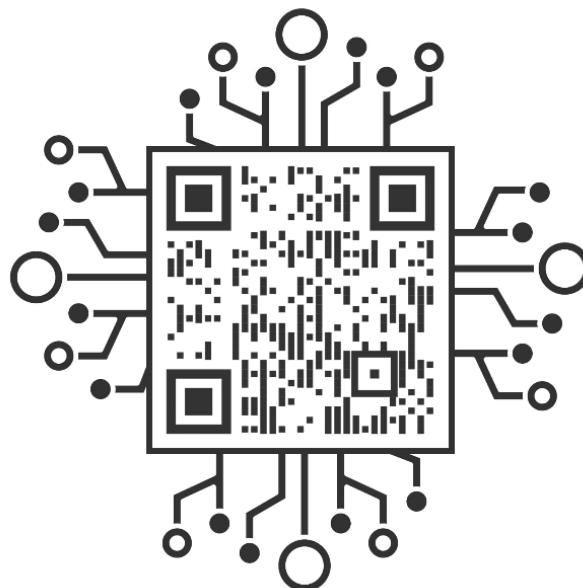


Figure 2. QR Code busana Argenta Nala

Table 4. Table of Readability Indicators

Score	Category	Frequency
76%-100%	Excellent	51
51%-75%	Good	4
26%-50%	Less	0
0%-25%	Very Less	0

Further analysis shows that textile media has its own challenges to QR Code readability. The readability of a QR Code is also influenced by the surface of the media and the quality of the visual contrast between the form of the code and its background. Therefore, the readability of fashion media requires consideration when compared to designs located in flat print media. The readability of the QR Code in Argenta Nala's fashion design is still perceived positively because the visual design elements of the fashion do not interfere with the basic structure of the QR Code. It is necessary to emphasize the importance of balancing the aesthetics of the design and the technical functions of the QR Code in order to keep the user experience optimal³⁰.

Completeness of Information

³⁰ Hsieh et al. "Design Factors Affecting QR Code Readability and Usability." *International Journal of Human-Computer Interaction* 36, no. 15 (2020): 1401–1412. <https://doi.org/10.1080/10447318.2020.1739887>



Figure 2. Information in the QR Code about Argenta Nala

The information presented through the QR Code on Argenta Nala fashion design shows fairly complete and relevant research results with an average percentage of 92%, which shows information indicating that the QR Code not only serves as an additional element, but also as a means of informative product communication and supports users' understanding of fashion design works. Respondents stated that digital content is able to provide an understanding of product identity, design concepts, and fashion visual characters. As the function of QR Code as a product information medium, the presentation of information has a broad meaning to the work, so that fashion is not only understood through physical visuals³¹.

Table 5. Table of Indicators for Completeness of Information

Score	Category	Frequency
76%-100%	Excellent	55
51%-75%	Good	5
26%-50%	Less	0
0%-25%	Very Less	0

Structured and easy-to-understand information helps users assess the product thoroughly. QR Code plays an effective role as a medium for conveying information if the content is arranged informatively according to the needs of users³². Thus, QR Codes function as a means of connecting communication between designers and users. The completeness of information in Argenta Nala's clothing still has opportunities for development, especially in the addition of narratives, and other supporters. These findings show that the completeness of information not only affects user understanding but also strengthens the innovative value of fashion.

User Experience

The results of the analysis show that the application of QR Code in Argenta Nala's fashion design provides a positive user experience for Fashion Design students. This experience brings a new experience and expands the way users interact with fashion in an informative and interactive way from initially just looking at it to accessing digital information independently, as well as the concept of user

³¹ Anas et al. "The Utilization of QR Codes as a Digital-Based Product Information Medium." *Journal of Information and Communication Technology* 9, no. 2 (2022): 85–94. <https://doi.org/10.31284/j.jitk.2022.v9i2.2456>

³² Djaniar et al. "Analysis of User Perception of the Application of QR Code as a Digital Information Medium." *Journal of Information Systems* 16, no. 1 (2024): 33–45. <https://doi.org/10.21609/jsi.v16i1.2024.3>

experience greeting digital product design³³.

Table 6. User Experience Indicator Table

Score	Category	Frequency
76%-100%	Excellent	50
51%-75%	Good	5
26%-50%	Less	0
0%-25%	Very Less	0

A positive user experience is influenced by the ease of access and quality of the information presented. QR Code allows users to obtain information without direct interaction with designers, making the product exploration process more flexible. QR Code-based systems are able to increase user engagement when designed with a *user-centered design*³⁴ approach. In this context, QR Codes serve as a bridge between physical products and digital experiences presented in the information in QR Codes.

The user experience resulting from the implementation of QR Codes on Argenta Nala clothing was considered relevant by 92% of respondents, which was in the "excellent" category. The integration of QR Codes in fashion design can create a multidimensional experience for users³⁵. These findings confirm that user experience is an important indicator in assessing the success of QR Code innovation in fashion products.

Display Clarity

The results of the study showed that students assessed the clarity of the QR Code display on Argenta Nala's fashion design in the "very good" category with an average percentage of respondents as much as 93%. Respondents stated that the placement of QR Codes does not interfere with the visual appearance of fashion and is still easily recognized as an information element. The integration of QR Code with fashion design is carried out proportionally, so that technical functions and visual aesthetics can go hand in hand, as well as the principle of visual integration in product design³⁶.

Table 7. Display Clarity Indicator Table

Score	Category	Frequency
76%-100%	Excellent	53
51%-75%	Good	2
26%-50%	Less	0
0%-25%	Very Less	0

The clarity of the QR Code's appearance is influenced by the suitability between the size, color, and position of the QR Code against the fashion design elements. The importance of visual contrast and simplicity of the background in maintaining the clarity of the QR Code's display on non-flat media has an effect on complex motifs that have the potential to reduce visual clarity. The clarity of the QR Code display on Argenta Nala's clothing reinforces the perception that digital technology can integrate functions without sacrificing design aesthetics.

³³ Norman, Don A., dan Jakob Nielsen. "The Definition of User Experience (UX)." *Nielsen Norman Group*, (2019). <https://doi.org/10.5555/ux.definition.2019>

³⁴ Hidayat, Rian, and Budi Prasetyo. "User Experience on QR Code-Based Information System." *Journal of Informatics* 11, no. 2 (2021): 101–110. <https://doi.org/10.30591/jpit.v11i2.2894>

³⁵ Maria Vorobchuk et al, "QR Code Design: From Digital Graphics to Environmental, Product and Fashion Design," *Journal of Graphic Engineering and Design* 15, no. 2 (2024): 51–57, <https://doi.org/10.24867/JGED-2024-2-051>

³⁶ Ávila-Muñoz, María. "Visual Integration of Digital Codes in Product Design." *Design Journal* 23, no. 4 (2020): 567–583. <https://doi.org/10.1080/14606925.2020.1760523>

CONCLUSION

Based on the results of the research, the perception of Fashion Designers students towards QR Code innovation in fashion design received a positive response from students, with an average score of 92%, which is in the "very good" category in all existing indicators. The data shows that the indicators of ease of use assessment obtained a percentage of 91%, readability of 92%, completeness of information by 92%, user experience by 92%, and clarity of display by 93%. Based on these results, QR Code has the potential to be applied as a medium for information, education, and product introduction in the development of digital technology-based fashion design, which in this study is Argenta Nala.

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