

Analyzing the Alignment of Fashion Graduates' Knowledge Competencies with Industry Demands

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Abstract: The ever-changing nature of the fashion industry demands that Diploma 4 in Fashion Technology graduates possess not only creative and technical skills but also a solid foundation of knowledge competences that comply with industry standards. The purpose of this study is to assess the alignment between students' and graduates' knowledge competences and the demands of the fashion industry. Utilizing a mixed-methods approach, quantitative data were gathered through questionnaires delivered to big and medium-sized industries in the Special Region of Yogyakarta, Indonesia. The subjects of the study included department heads, as well as students and graduates of Universitas Negeri Yogyakarta's D4 Fashion Technology program. Qualitative data were collected through interviews, while data analysis techniques consisted of descriptive statistics and thematic coding. The data show that the level of connection between industry demands and graduates' knowledge abilities is 82%, which is considered highly relevant. This implies that graduates have a solid theoretical understanding of design principles, garment construction, and material knowledge, as well as basic production and fashion technology principles, in-depth analysis of both custom-made and ready-to-wear garments, and fashion quality testing. Through interviews with students, an additional competency was added, namely understanding of creating using the Clo3 program. On the other hand, the industry determined that mastery of theoretical concepts in publicity analysis, promotion, and communication technology as a branding medium is deemed less important for fashion graduates. The level of relevance mentioned above shows that the current curriculum is in accordance with industry requirements. Nonetheless, ongoing renewal is necessary to ensure increased relevance for current industrial practices. The study underlines the significance of increasing collaboration between vocational program study and the fashion industry in order to connect intellectual capabilities with real-world standards. Such connection is critical for increasing graduate employability and ensuring the competitiveness of vocational fashion education.

Keywords: fashion industry, mixed methods, knowledge competencies, relevance of competencies, vocational education.

Introduction

The fashion industry is undergoing a rapid transformation due to technological innovations. Developments in Artificial Intelligence, augmented and virtual reality (AR/VR), blockchain, and Industry 4.0/5.0 technologies are reshaping the design, production, and retail processes in fashion, resulting in new skillset demands for the workforce in this sector. These developments underscore the need to re-evaluate the education received by prospective fashion professionals to ensure that graduates possess relevant knowledge.

This becomes even more critical when considering the evident gap between academic preparation and employer expectations for graduates (Allsop & Cassidy, 2019; Kampakaki & Papahristou, 2020; Luo et al., 2022). Employers demand that graduates entering the workforce are not only equipped with practical skills but also possess a deep foundational knowledge, both general knowledge in the field of fashion and knowledge required for specific roles within the fashion industry. Consequently, the Diploma 4 of Fashion Technology program is expected to produce graduates whose knowledge aligns with industry expectations.

This gap is not solely a matter of “practical skills”, several studies have found that theoretical/conceptual aspects, such as understanding the end-to-end production flow and operationalizable sustainability principles, are often not sufficiently mastered or are not taught in an integrated manner within the curriculum (Nguyen, 2023). The industry has reported challenges in recruiting D4 graduates who can meet the required competency standards, particularly in terms of knowledge mastery. Employers often highlight gaps such as insufficient understanding of production workflows, a lack of theoretical foundation in clothing product development, and limited digital skills. These mismatches result in high training costs and longer adaptation periods, which pose significant obstacles to organizational efficiency and productivity.

Existing literature indicates that discussions regarding the alignment of competencies between education and industry are not new. Various studies have evaluated graduate competencies using holistic measurements that integrate three main dimensions: knowledge, skills, and attitudes (Frazier & Cheek, 2016; Jacobs & Karpova, 2019, 2023; Romeo & Lee, 2013; Varra, 2021). Other studies also tend to emphasize practical or technical competencies such as machine operation or pattern-making skills (Bicho et al., 2022; Wang et al., 2025), while other research focuses on soft skills, including communication, teamwork, and discipline (Nashikhah et al., 2018; Sadachar et al., 2019). Although these studies provide very valuable insights, research specifically addressing knowledge dimensions as an object of evaluation remains limited.

Previous studies have largely combined knowledge with skills and attitudes as a single measurement unit, while the contribution of knowledge as an independent competency has been less explored. Moreover, there is still a lack of concrete evidence indicating which elements of knowledge remain relevant, which have become obsolete, and what new knowledge should be introduced to keep pace with industrial transformation. Addressing this gap is crucial to ensure that vocational education in the fashion

sector produces graduates who are not only skilled but also theoretically competent and adaptable to the ever-evolving demands of the industry. Therefore, this study aims to assess the alignment between students’ and graduates’ knowledge competencies and the knowledge competencies required by the fashion industry. Unlike previous studies that evaluated graduates’ competencies comprehensively, this study focuses solely on the knowledge dimension, excluding the dimensions of attitudes and practical skills. By isolating knowledge as an independent variable, this study aims to provide a more precise diagnosis regarding the relevance and sufficiency of the theoretical material taught at the higher education level. For this reason, it is necessary to draft a knowledge competency profile required by the industry and a knowledge competency profile possessed by Diploma 4 students. The draft will be based on the D4 Fashion Technology Curriculum, the KKNi in the Garment Industry, the KKNi in Fashion Technology and Design, which are also aligned with the Ministry of Education’s Six 21st Century Skills (6C) and 21st Century Skills, as well as the ILO’s Global Framework on Core Skills for Living and Working in the 21st Century.

Materials And Methods

This study takes a mixed methods approach, combining quantitative and qualitative methodologies to gather more comprehensive data. The Sequential Explanatory Design was utilized for the research, which included qualitative methods in the first phase and quantitative methods in the second phase. After collecting quantitative and qualitative data, the process proceeds by mapping the knowledge and their relevance. This research will be carried out in medium and large-scale fashion enterprises in the Special Region of Yogyakarta, and the D4 Fashion Technology program at Universitas Negeri Yogyakarta, as it was founded in 2019 and has a graduate profile that is relevant to the industry under consideration for study. Additionally, D4 Fashion Technology at Universitas Negeri Yogyakarta already has alumnae. The population in this study consists of

the fashion industry in Yogyakarta, represented by the managers of each work section, business owners, and D4 Fashion technology students.

This study used a questionnaire to collect data on the identification and mapping of industry-required knowledge. The questionnaire is also used to obtain data on students' perceptions of their knowledge. Another technique used is the interview, the interviews were conducted after the dissemination of questionnaires in the industry and students. This technique used to further examine the knowledge competences required by the fashion industry, the knowledge competences that D4 students should have that were not mentioned in the questionnaire, and feedback from the fashion industry for developing knowledge competences for D4 Fashion Technology students.

The instruments used in this study were validated using two methods: construct validity testing and content validity testing. Following the collection of judgments, the content validity coefficient was calculated using Aiken's method to obtain each item's validity rating (V value). The validation ratings for the research instruments ranged between 0.933 and 1, indicating that they were valid. The concept validity was then tested using the Explanatory Factor Analysis (EFA) method. The analysis results were based on the KMO value, as well as the Bartlett's Test and Significance values. The EFA test yielded a KMO value greater than 0.5, suggesting that the sample adequacy condition was fulfilled. Bartlett's Test

confirmed correlations among variables with a significance level of <0.05 .

Next, the requirement that must be met in factor analysis is an MSA value ≥ 0.4 . SPSS result indicates that all variables have MSA values > 0.4 , making them acceptable for factor analysis. Based on the SPSS result in the communalities table, all variables had extraction values greater than 0.40, indicating that they are capable of explaining the components. The rotation component matrix table shows Loading Factor values of ≥ 0.4 , indicating that all items are included in the factor analysis. Overall, the objects are evenly distributed and classified based on their respective criteria. This study uses Cronbach's Alpha to determine the reliability of the instrument. The SPSS output indicates that the reliability testing yielded values ranging from 0.88 to 0.94, thus confirming that the instrument is reliable.

Data analysis

The data analysis techniques used are descriptive statistical analysis and thematic coding. The descriptive statistical data presentation contains descriptive statistical metrics for each statement item. Furthermore, MS Excel was used to show the data and measure the percentage of statement item score accomplishments. After collecting the percentage score for each instrument item, the following step is to determine the category for each competency item. Accomplishments scores are expressed as percentages, with the highest value being 100% and the lowest 0%.

Table 1. Interval and Category.

No	Interval		Category
1	$Mi + 1,5 SDi$	$< x \leq$	$Mi + 3 SDi$ Highly Required/Proficient
2	Mi	$< x \leq$	$Mi + 1,5 SDi$ Required/Proficient
3	$Mi - 1,5 SDi$	$< x \leq$	Mi Less Required/Proficient
4	$Mi - 3 SDi$	$\leq x <$	$Mi - 1,5 SDi$ Not Required/Proficient

Explanation:

Mi : Ideal average = $1/2 \times (\text{highest score} + \text{lowest score})$

SDi : Ideal standard deviation = $1/6 \times (\text{highest score} - \text{lowest score})$

X : score achieved

Total highest score: Number of items $\times$ highest answer = $136 \times 4 = 544$

Total lowest score: Number of items $\times$ lowest answer = $136 \times 1 = 136$

The interpretation of the competency item percentage results is considered acceptable if each item achieves a minimum percentage of >62.5% in the important/adequate/good category (Dumo, 2018). The competency profiles of the industry and D4 Fashion technology students are then compared to determine competency relevance, with the relevance results expressed as a percentage (%) using the following formula (Fakhrunnisaa & Munadi, 2019).

$$\text{Relevansi} = \frac{KAD}{KDD} \times 100\% \quad (1)$$

Description:

KAD: The number of competencies categorized as proficient

KDD: The number of competencies required by the fashion industry

Based on the results of competency relevance percentages, they are then classified into several criteria, divided into 4 categories: Highly Relevant (76-100%), Relevant (51-75%), Quite Relevant (26-50%), and Not Relevant (0-25%) ((Fakhrunnisaa & Munadi, 2019; Wagiran, 2013)). Furthermore, qualitative data analysis is performed interactively and constantly until the data is saturated. Data analysis is separated into three steps: a. data reduction, summarizing, selecting important

points, and identifying themes and patterns; b. data presentation in the form of concise explanations and tables; and c. making conclusions based on the study findings.

Results And Discussion

Identification of Competencies Required by the Fashion Industry

The instrument regarding competencies required by the fashion industry was assessed by 33 respondents from 3 fashion industries. The knowledge dimension comprised 11 competency items, with a minimum score of 1 and a maximum score of 4 for each item, resulting in a score range from the assessment of 33 respondents of 33 to 132, thus the mean (Mi) was 82.50 with a standard deviation (Sdi) of 16.50. Descriptive statistical analysis showed that the mean obtained was 98.09 and the standard deviation was 14.50. The data acquisition for the 11 competency items yielded a maximum total of 118 and a minimum of 73. Based on this data, the range size was determined to be 45, with 5 classes and an interval length of 10. The data analysis results indicated that out of the 11 competency items, 3 were categorized as highly needed, 6 as needed, 2 as moderately needed, and none were categorized as less needed.

Table 2. Data Frequency from Knowledge Required by the Industry

No	Interval		Category	Frequency
1	$Mi + 1,5 SDi < \chi \leq Mi + 3 SDi$	$107.25 < \chi \leq 132$	Highly Required	3
2	$Mi < \chi \leq Mi + 1,5 SDi$	$82.5 < \chi \leq 107.25$	Required	6
3	$Mi - 1,5 SDi < \chi \leq Mi$	$57.75 < \chi \leq 82.5$	Less Required	2
4	$Mi - 3 SDi \leq \chi \leq Mi - 1,5 SDi$	$33 \leq \chi \leq 57.75$	Not Required	0
			Total	11

The percentage results for the knowledge dimension overall fall into the "Required" category with a score of 55%, followed by the "Highly Required" category at 27%, and lastly the "Less Required" category at 18%, bringing the total percentage to 100%. The knowledge dimension

obtained a maximum score of 118 from a total possible maximum of 132 and a minimum score of 73 from a total possible minimum of 33. The average score was 98.09, resulting in an average percentage of 74%, which falls into the "Less Required" category.

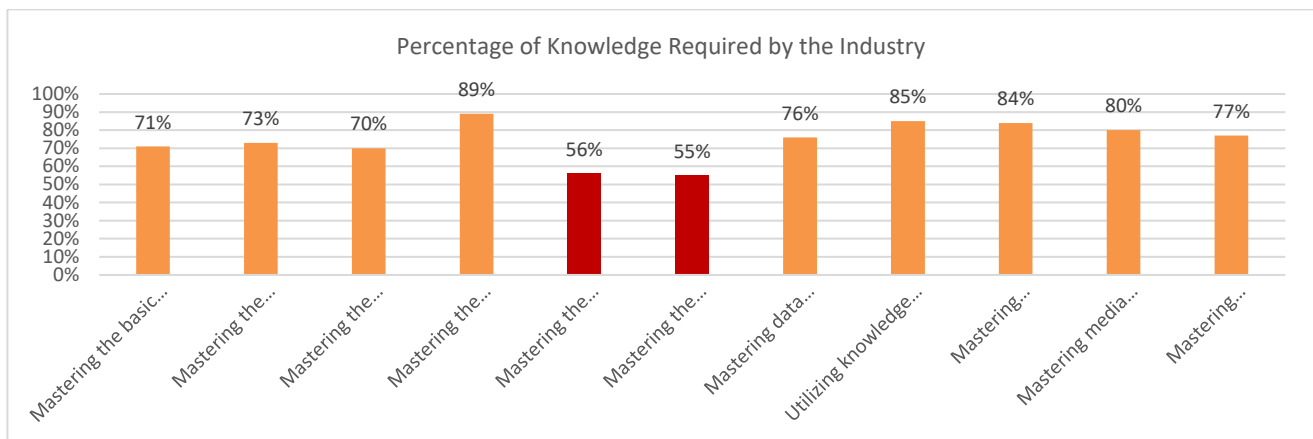


Figure 1. Percentage of Knowledge Required by the Industry.

The determination of competencies required by the fashion industry is based on the results of quantitative data analysis, where a competency item is considered necessary for the industry if it falls into the 'required' category with a percentage greater than 62.5%. According to the percentage data, 9 competency items fall into the category "Required" by the fashion industry, while 2 items, namely 1) Mastering the theoretical concept of publication promotion analysis and 2) Mastering the theoretical concept of operating communication technology as a branding medium, fall into the "Not Required" category. Meanwhile, there is no additional qualitative data from the industry. Thus, the following is the profile of knowledge sub-competencies needed by the fashion industry:

- Mastering the basic principles of fashion production and technology to be able to align them with factual issues.
- Mastering the theoretical concepts in the field of fashion design, patterns, cutting, sewing techniques along with embellishments.
- Mastering the theoretical concepts in conducting in-depth analysis for both custom-made and ready-to-wear garments.
- Mastering the theoretical concepts of fashion quality testing.
- Mastering data analysis concepts.
- Utilizing knowledge and technology in problem-solving.

- Mastering information literacy (analyzing limited information).
- Mastering media technology literacy in completing work tasks.
- Mastering technology, information, and communication literacy (software and hardware).

Identification of Competencies Mastered by D4 Fashion Technology Students

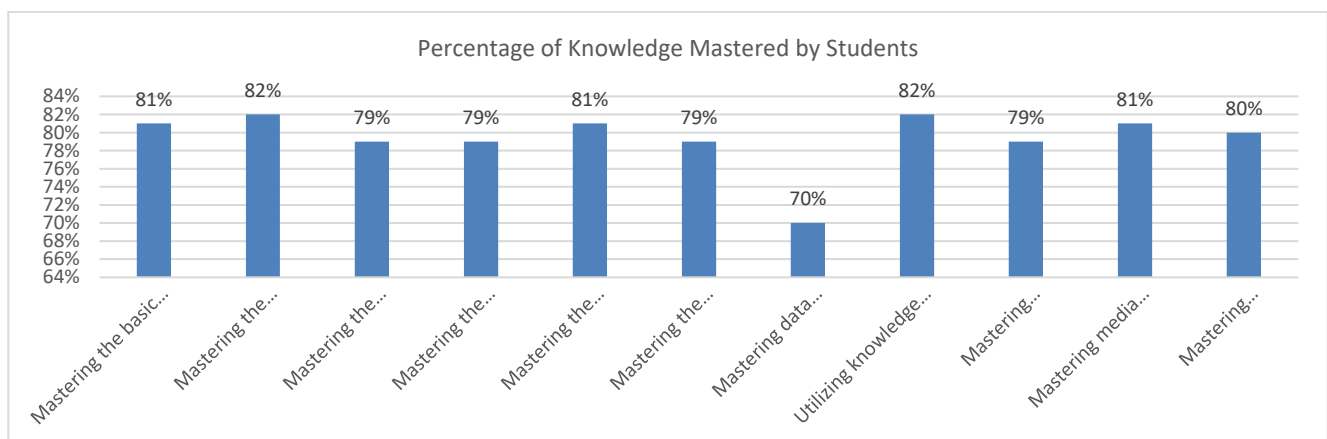
The research instrument for the knowledge dimension mastered by Fashion Technology students was evaluated by 54 respondents. The knowledge dimension consists of 11 competency items, with a minimum score of 1 and a maximum score of 4 for each item. The total scores from the 54 respondents ranged from 54 to 216, resulting in a mean (Mi) of 135 with a standard deviation (Sdi) of 27. Descriptive statistical analysis showed a mean of 171.55 and a standard deviation (Sd) of 7.03. The scores obtained for the 11 competency items ranged from a minimum of 152 to a maximum of 178. Based on this data, the range was determined to be 26, with 5 classes and an interval length of 6. Data analysis revealed that out of the 11 competency items, 3 were categorized as highly needed, 8 were categorized as needed, and none fell into the categories of moderately needed or less needed.

Table 3. Data Frequency of Knowledge Mastered by Students

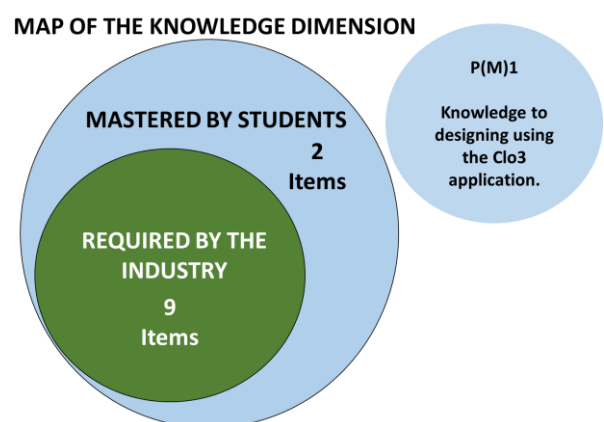
No	Interval		Category	Frequency
1	$Mi + 1,5 SDi < \chi \leq Mi + 3 SDi$	$175.5 < \chi \leq 216$	Highly Proficient	3
2	$Mi < \chi \leq Mi + 1,5 SDi$	$135 < \chi \leq 175.5$	Proficient	8
3	$Mi - 1,5 SDi < \chi \leq Mi$	$94.5 < \chi \leq 135$	Less Proficient	0
4	$Mi - 3 SDi \leq \chi \leq Mi - 1,5 SDi$	$54 \leq \chi \leq 94.5$	Not Proficient	0
			Total	11

The percentage results for the knowledge dimension possessed by students are overall fall into the category of “Proficient”, with a score of 88%, followed by the very “Highly Proficient” category at 12%, resulting in a total percentage of 100%. The Knowledge Dimension achieved a maximum score of 178 out of a total maximum of 216 and a minimum score of 152 out of a total

minimum of 54. The average score obtained is 171.55, resulting in an average percentage of 79%, which falls into the “Proficient” category. Based on the percentage data, 11 competency items are categorized as possessed by Diploma 4 students, with 1 additional qualitative data item, namely designing using the Clo3 application.

**Figure 2.** Percentage of Knowledge Mastered by Students.

The relevance level of the knowledge sub-competency is $9/11 \times 100\% = 82\%$, thus it can be stated that the relevance of the knowledge required by the industry with that possessed by students is Very Relevant. The following is a visualization of the classification of knowledge competencies as a reference in determining the relevance level of competencies.

**Figure 3.** Map of the Intersection of Knowledge Dimensions Required by the Industry and Possessed by Students

On the competency map and the classification of knowledge dimensions, out of 11 competency items, 9 are knowledge competencies required by the fashion industry and possessed by D4 Fashion Technology students. There are no competencies required by the fashion industry that are not possessed by D4 Fashion Technology students, and there are 2 competencies that are not required by the fashion industry but are possessed by D4 Fashion Technology students. Furthermore, there is 1 competency proposed by students as an additional competency.

Discussion

The research results for the Knowledge dimension required by the fashion industry showed the highest percentage in the competency item of mastering theoretical concepts of fashion quality testing at 89%, and the lowest percentage in the

competency item of mastering theoretical concepts of operating communication technology as a branding medium at 55%. There are two items that fall into the category of not required as they achieved below 62.50%. Based on the interview results, the industry stated that promotion and branding have their own divisions and are not limited to fashion graduates; rather, they emphasize on relevant qualifications and portfolios. However, the exclusion of this competency item cannot be used as a basis to generalize that all fashion industries do not require this competency, because only a small portion of the industry was the subject of the research. Therefore, it does not rule out the possibility that this competency is needed in other fashion industries that were not accessible to the researchers.

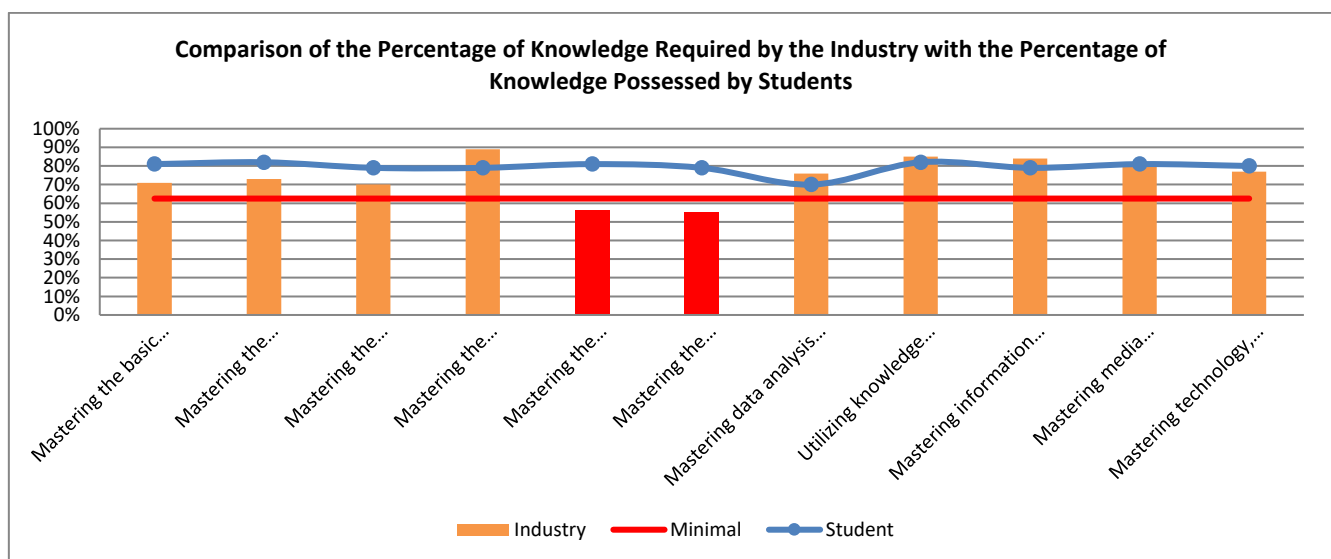


Figure 4. Comparison of the Percentage of Knowledge Required by the Industry with the Percentage of Knowledge Possessed by Students.

In many fashion companies, especially medium and large-scale ones, promotional, publicity, and branding tasks are typically handled by specialized divisions such as marketing communications and brand strategists, rather than by personnel with a fashion design background (Jackson & Shaw, 2009), vocational fashion graduates are usually placed in technical areas such as design, production, or quality control. Therefore, although students possess theoretical concepts of promotion

and branding, the industry does not regard these as core competencies required for entry-level positions for vocational graduates.

Vocational education often combines technical and conceptual aspects to foster a holistic understanding, including soft skills and managerial competencies such as promotion and branding. This approach is implemented to ensure that graduates are prepared to become young entrepreneurs, as many fashion management

programs encourage students to develop their personal brands or independent businesses, which indeed require concepts of promotion and branding. However, for fashion graduates who wish to pursue a career in public relations, publication promotion, and media branding, it is essential to master these concepts, as they equip them with the necessary skills to understand consumer behavior (McKelvey, 2015; Mitterfellner, 2019), build and manage brand identity (Kohrs,

2021), adhere to ethical practices (Dallabona, 2024), and develop cross-functional expertise (Hurst et al., 2010). A comprehensive understanding of these areas is crucial for creating effective marketing strategies and achieving long-term success. This can be accomplished by starting to build a portfolio, joining communities that discuss publication promotion and media branding, interning in relevant departments, and considering to obtain relevant certification.

Table 4. Qualitative Data on Mastery of Theoretical Concepts of Promotion and Branding

Informant	Theme	Description Findings	Key Quotes
DG1	Mastering the theoretical concepts of publication, promotion and media branding	These two areas of knowledge are not generally required for all sections but only for specific parts.	... there is already a dedicated team, and it is usually not the students from the fashion department who fill this role; however, as long as the qualifications match, anyone is welcome to apply for the promotion and branding team.

On the other hands, the research findings regarding the dimension of knowledge possessed by students, which showed that all competency items fall into the "Proficiency" category, the differences between the conditions in the industry and among students indicate that although there is a mismatch on two items, the D4 Fashion Technology curriculum can be considered aligned with industry needs, taking into account that the other items have been taught and are mastered by the students. The competency with the highest percentage result is the ability to master theoretical concepts in fashion design, pattern making, cutting, sewing techniques, and embellishments at 90%, while the lowest percentage is in the competency of mastering data analysis concepts at 70%.

Graduates who master the theoretical aspects of fashion are usually also capable of developing a critical perspective on fashion works (Simončič, 2023). This theoretical foundation is essential for creating designs that are not only aesthetically appealing but also culturally and socially relevant. Furthermore, students will be enabled to engage in innovative practices. Additionally, related to the mastery of data analysis concepts, which are also considered important. Data analysis provides

valuable insights that can enhance decision-making processes in the fashion industry (Tamborrini et al., 2021). The integration of data analytics has been shown to significantly improve students' design skills, particularly in functional, aesthetic, and creative aspects (Elfeky & Elbyaly, 2023).

In addition, there is one additional competency, which is designing with the Clo3D application (P(M)1). As the fashion industry increasingly adopts digital tools, proficiency in applications such as Clo3D becomes crucial for students. Students must be prepared by aligning their skills with the latest industry standards and practices (Papachristou & Zolota-Tatsi, 2024). Clo3D enables students to create and visualize their designs in a three-dimensional space, enhancing creative thinking and visualization skills. Clo3D supports digital prototyping, allowing students to simulate fabric behavior, test comfort, and render designs. This capability is essential for understanding how different fabrics and patterns will move in real life (Hu, 2021). This additional competency has the potential to be an industry-required skill and requires thorough confirmation with industry stakeholders.

These suggestions can be used as input for learning at universities, as stated in several

previous studies. Universities need to fulfill their role within the triangular relationship, which includes: appropriate admission standards as a gateway to producing high-quality and consistent students; secondly, an academic curriculum that provides sufficient space for reflection and the application of learning from work experiences, so that in the third role, it can enhance student performance (Kenayathulla dkk., 2019; Pang dkk., 2019). The industry believes that there is substantial potential for the development of graduate competencies, which, if combined with practical industry experience, should help close the competency gap (Gawrycka dkk., 2020). Through cooperation between universities and industries, these industry needs can be developed and nurtured in students (Pang dkk., 2019, with the ultimate goal of producing competent graduates who possess the necessary skills to contribute and enhance company competitiveness.

Conclusions

The knowledge competencies required by the fashion industry consist of 9 competency points, while the knowledge competencies possessed by D4 Fashion Technology students consist of 11 competency points, with 1 additional competency that has not been studied whether it is needed by the industry, thus it can become a subject of further research and can be considered for integration into learning and the curriculum in D4 Fashion Technology. The level of relevance between the competencies needed by the industry and those possessed by students falls into the category of very relevant, with an achievement percentage of 82%. Based on this level of relevance, it can be stated that graduates of the Diploma 4 in Fashion Technology have the knowledge competencies that align with industry requirements. Furthermore, continuous research and development in the curriculum to align the needs of the campus and the industry still need to be conducted periodically to ensure that students' competencies remain relevant. This level of relevance can then be used to identify which knowledge competencies need to be further enhanced.

Conflict of Interest: The authors declare that there are no conflicts of interest concerning the publication of this article.

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