

ASPECTS OF THE FORMATION OF FUTURE DESIGNERS' PROFESSIONAL COMPETENCIES

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Abstract: Changing demands of information users and development of information society caused the need of labor market for competent designers who have a set of skills: contextual, process, social, technical and digital, creative, skills of complex problem and task solving. This requires assessing the development of these competencies of designers in order to identify the highest priorities that need to be developed during the educational training programs. The aim of the article was to reveal the peculiarities of designers' competences development in the context of effective use of theoretical knowledge in practical activities. The research methodology was based on the structured interviewing of the designers in Germany and Poland.

Keywords: Designer Competencies, Graphic Design, Designers' Skills, Designers' Technical Skills, Designers' Social Skills.

1 Introduction

Changing demands of information users and development of information society caused the need of labor market for competent designers who have a set of skills: contextual, process, social, technical and digital, creative, skills of complex problem and task solving. In response to employers' needs, educational programs and directions of designer training are changing: universities focus on the student's ability to create a conceptual idea of a design product, technically implement it, and with the help of creativity ensure interaction of users with the final product.

However, in practice, educational institutions are not able to form a sufficient level of practical skills through theoretical presentation of the material, and it is difficult for a young designer to transform the acquired knowledge into practical skills. Besides, there is a problem of the designer's personal characteristics – ability to master one of the skills perfectly at the lack of competence in other tasks. For example, design studio managers note that a designer has a high level of technical skills and use of software, but has absolutely no skill in problem-oriented thinking and creativity. As a result, in practice there is a need to employ designers with different skills in order to achieve synergy in the product development process (website layout, mobile app, etc.). This leads to an increase in the cost of the design product, because the process involves human resources whose labor cost is a major expense in the design industry.

The above-mentioned points to the relevance of the study of designers' competencies development in the context of how to transform theoretical knowledge of a designer into practical skills and develop competencies required by the labor market.

The aim of the article is to identify the peculiarities of designers' competence development in the context of effective use of theoretical knowledge in practical activities.

2 Literature review

Graphic designers create visual concepts using computer software to communicate with users of information and interact with consumers of the design product. Organizations use design to display product concepts through colors, images, logos with embedded ideas or identity used in marketing and promotion (Bridges, 2013).

The academic literature explores the development of designer competencies, specifically creativity and creative thinking

(Dong, Zhu & Li, 2021), practical and creative skills, the ability to reflect and interpret the needs of customers and users of the final graphic product (Bresciani, 2019; Bonnardel et al., 2018), process management, conceptual design, technical design and software use (Dziobczenski, Person & Meriläinen, 2018).

The process management competency includes skills between personal communication and the ability for designers to work as part of a team (80% of design job postings employers need these skills). The conceptual design competence includes the ability to perform user-oriented design work, i.e. the specialist must be business-oriented to the problems of the customer of the design product. Technical design competence includes skills and knowledge in interface coding and product visualization. Software use competence includes proficiency in 2D software (Photoshop, Adobe Illustrator and InDesign). The personal characteristics of a designer are self-management, professionalism, aesthetics, and product development with visual meaning (Dziobczenski, Person & Meriläinen, 2018; Chiang, Idris & Chuen, 2019).

Heller (2015) discusses the issue of educators' priorities in teaching designers to develop technical design skills, the use of software more general skills (management, planning and design, complex problem solving). Educators are charged with encouraging design students to view and develop competencies and learn new skills beyond design education (Dziobczenski & Person, 2017). Employers in the design industry talked more about "practical experience" than on "academic qualifications" when recruiting graphic designers. The availability of informal training and curriculum, design software, and tools is causing an increase in the number of "self-taught" and "informally trained" graphic designers. Therefore, design educators and institutions of higher learning must reevaluate the role and importance of formal education for design practice (Chiang, Idris & Chuen, 2018) (table 1).

Table 1: The components of the graphic designers' competences

Group of competencies	List of competencies
1. Cognitive	1.1 Design Fundamentals 1.2 Industry Knowledge 1.3 Contextual Awareness 1.4 Multidisciplinary Knowledge 1.5 Business Fundamentals 1.6 Marketing Fundamentals
2. Functional	2.1 Technical Design Skills 2.2 Conceptual Design Skills 2.3 Interactive Design Skills 2.4 Advertising Design Skills 2.5 Software Skills 2.6 Graphic Print Production Skills 2.7 Project Management Skills
3. Individual	3.1 Aesthetic and Visual Sensitivity 3.2 Self-driven 3.3 Adaptability and Flexibility 3.4 Emotional Intelligence 3.5 Interpersonal Skills 3.6 Self-efficacy
4. Ethical	4.1 Professional Behaviors 4.2 Professional Expertise 4.3 Professional Values
5. Meta-competence	5.1 Creative Thinking Skills 5.2 Problem Solving Skills 5.3 Design Thinking Skills 5.4 Critical Thinking Skills 5.5 Reflective Thinking Skills 5.6 Communication Skills 5.7 Teamwork and Leadership Skills

Source: Bhebhe (2018).

Traditional graphic design (GD) education builds graduates' technical skills to prepare for entry-level employment. However, due to new challenges and expanding practical opportunities, graduates are expected to master a wide range of additional competencies outside of the traditional field. Bhebe (2018) categorizes the competencies of graphic designers into five components: cognitive, functional, personal, moral, and meta-competencies.

With the emergence of new concepts in design, particularly personalized graphic design in digital information art, professionals must have the skill set to address individual user needs (Gaimei & Xueling, 2019). Javan & Zeman (2018) talk about personalization in design: "The skills of graphic designers may be utilized in creating highly customized 3D-printed models." However, "the type of skills and thinking that students must evidence are difficult to define" (Giloj & Du Toit 2013). For example, Han & Bromilow (2010) argue for the importance of leadership development for executive designers. Wragg & Barnes (2016) argue for the development of "user-centered design" and the lack of competencies for designers to work from this approach.

Teachers to encourage the creativity of design students assert the need for openness in learning outcomes in order to adapt students to their own unexpected and unique solutions in designing artifacts. In higher education institutions, the assessment of designers is transparent and the learning process is detailed and in-depth in order to develop the student as a practical designer (Giloj & Du Toit 2013). In addition, the literature explores the effectiveness of different methods of training designers to develop them as practitioners. Ramadhani, Saide & Indrajit (2018) examine contextual learning (CTL) methods for students in graphic design to develop creativity (Ramadhani, Saide & Indrajit, 2018). Lowell & Moore (2020) propose to integrate authentic learning principles in a project to implement a design curriculum to develop students' skills: project management.

Thus, the scholarly literature examines the competencies required of a designer, the methods of teaching designers to develop them as practitioners, the concepts of contemporary design, and the relevance of designers' skills to these concepts. The process of developing designers' competencies and how a design professional is formed, how theoretical knowledge is transformed into practical skills, and how young novice professionals are prepared to apply theoretical knowledge in practice require detailed study.

3 Materials and research methods

The study used the OECD (2021) art competency classifications as the basis for assessing the competencies of novice designers (those employed in design for 1 to 5 years) and designers with 5 or more years of experience. The competency groups included: 1) basic process skills "2) social skills; 3) integrated problem solving skills; 4) technical skills; 5) system skills; and 6) resource management skills. In addition, the questionnaire contained a block of questions of socio-demographic characteristics of respondents.

The assessment of competences was carried out based on the method of structured interviews with the use of electronic questionnaires sent to designers of different design studios in Germany and Poland. The countries for the analysis were selected based on the differences in the design labor market: the number of employees in the field; the structure of employees; annual cash turnover in the field; the work of designers with foreign clients; the number of educational institutions (Table 2). The sample was formed randomly; each designer could take part in the survey at his or her own request.

Each skill was independently evaluated by the respondent on a scale from -1 to +1 depending on his or her own subjective feeling of need for the corresponding skill.

Table 2: Characteristics of the design market in Germany and Poland, 2018

Feature	Germany	Poland
Registered designers/design studios	-	-
Number of self-employed and employed	147,300 employed designers (in 2003 this figure was only 53,000), and another 94,600 self-employed.	8,000 designers professionally work in Poland, 6,500 are self-employed, and 1,500 are employed.
Employment structure, %	24 % graphic and communication design 19 % environmental and interior design, 7 % product and industrial design, and 50 % other specialized design fields.	35 % are graphic and communication designers, 30 % environmental and interior designers, 15 % fashion and textile designers, 10 % product and industrial designers, 5 % illustrators, and 5 % others.
The total annual turnover, euro	19 billion, which makes 0.31 % of the GDP (2.47 % considering all creative industries). The annual turnover per head is €130,600.	The total annual turnover per designer is in average € 14,000 with another €0.2 subsequent investment of each realized € of turnover.
Other specific	22.1 % of all designers work for international clients with a turnover of €885.1 m. Thus, design makes 4.8 % of a contribution to export.	10 % of all designers work for international clients. 3 is the average number of employees of a designer/design studio.
Number of universities	290 programs in 120 design schools on tertiary level exist, of which around 15 are private institutions.	There are 21 design schools, of which 9 are universities. There are approximately 1,500 graduates per year
Design policy	Regional policy	Regional policy
A national regional, local innovation, creative industries strategy exists	Yes, a national innovation strategy	Yes, a national innovation strategy

Source: European Design report (2018).

Positive values indicated a deficit of skills, and negative values indicated a surplus of skills. A greater absolute value was associated with a greater imbalance in skills. The results are shown on a scale from -1 to +1 (OECD, 2021).

4 Results

The survey involved 52 designers in Germany and 49 designers in Poland (age 20-25 years), 44 designers in Germany and 41 designers in Poland with more than 5 years of experience in

various fields of design. Among the respondents, 32.5% of designers are at the beginning of their careers at the age of 20-25 years. According to subjective assessments of young designers in Germany, basic process skills, social skills, and integrated problem-solving skills, as assessed competency values are more than 0 (Table 3). At the same time, the competencies of young designers in Germany are more developed according to the competencies of designers in Poland. Most of all young designers require skills in learning and process monitoring strategies, coordination, persuasion, negotiation, instruction (Table 3).

Table 3: Basic, Social and Complex Problem Solving Skills Needs in the design industry in EU, Germany and Poland in 2020 (age 20-25 years)

Skills		Germany, N = 52	Poland, N = 49
Basic Skills (Process)	Critical Thinking	0,277	0,336
	Active Learning	0,345	0,223
	Learning Strategies	0,416	0,509
	Monitoring	0,451	0,542
Social Skills	Social Perceptiveness	0,277	0,336
	Coordination	0,536	0,447
	Persuasion	0,452	0,532
	Negotiation	0,636	0,734
	Instructing	0,517	0,617
	Service Orientation	0,634	0,636
Complex Problem Solving Skills		0,678	0,727
Complex Problem Solving Skills	Complex Problem Solving	0,678	0,727

Source: OECD (2021).

Basic technical skills are well developed in designers (20-25 years old) in Germany and Poland (selection of software for work, installation, hardware support, recovery). However, skills that require more in-depth analysis are practically absent. According to subjective assessments of young designers, the most in need of development are technical skills: operational analysis, technological design, operational monitoring, control, decision-making, system analysis, and system evaluation (Table

4). However, resource management skills of young designers noticed how little they need in their work. This is explained by the presence of project managers (project managers), who carry out resource planning: financial, material, labor. Therefore, designers are little involved in the project management process (Table 4).

Table 4: Technical, Systems and Resource Management Needs in the design industry in EU, Germany and Poland in 2020 (age 20-25 years)

Skills		Germany	Poland
Technical Skills	Operations Analysis	0,877	0,915
	Technology Design	0,723	0,802
	Equipment Selection	0,005	0,005
	Installation	0,003	0,001
	Programming	0,417	0,501
	Operation Monitoring	0,632	0,729
	Operation and Control	0,616	0,721
	Equipment Maintenance	0,001	0,005
	Troubleshooting	0,409	0,513
	Repairing	0,004	0,004
Systems Skills	Quality Control Analysis	0,332	0,424
	Judgment and Decision Making	0,851	0,927
	Systems Analysis	0,605	0,702
Resource Management Skills	Systems Evaluation	0,611	0,718
	Time Management	0,223	0,341
	Management of Financial Resources	0,336	0,444
	Management of Material Resources	0,233	0,336
	Management of Personnel Resources	0,095	0,041

Source: OECD (2021).

Designers with more than 5 years of experience (Table 5) have a higher level of competencies compared to young designers, but they also highlight the need for skills development. In particular,

the designers considered the following to be the most needed skills: active learning and training in strategies, opinion making, negotiation, service orientation, and complex problem solving.

Table 5: Basic, Social and Complex Problem Solving Skills Needs in the design industry in EU, Germany and Poland in 2020 (age 26-35 years)

Skills		Germany, N = 44	Poland, N = 41
Basic Skills (Process)	Critical Thinking	0,177	0,236
	Active Learning	0,245	0,123
	Learning Strategies	0,216	0,309
	Monitoring	0,151	0,242
Social Skills	Social Perceptiveness	0,177	0,236
	Coordination	0,136	0,147
	Persuasion	0,252	0,232
	Negotiation	0,336	0,334
	Instructing	0,217	0,247
	Service Orientation	0,234	0,236
Complex Problem Solving Skills	Complex Problem Solving	0,378	0,327

Source: OECD (2021).

Designers with work experience also noted their own need to develop technical, systemic competencies and resource management skills (Table 6). Among the most necessary:

development of competencies in the field of technological design, decision-making, system analysis and evaluation.

Table 6: Technical, Systems and Resource Management Needs in the design industry in EU, Germany and Poland in 2020 (age 26-35 years)

Skills	Germany, N = 44	Poland, N = 41	
Technical Skills	Operations Analysis	0,377	0,415
	Technology Design	0,423	0,502
	Equipment Selection	0,002	0,002
	Installation	0,001	0,001
	Programming	0,117	0,201
	Operation Monitoring	0,232	0,329
	Operation and Control	0,316	0,421
	Equipment Maintenance	0,001	0,005
	Troubleshooting	0,109	0,113
	Repairing	0,004	0,004
Systems Skills	Quality Control Analysis	0,132	0,224
	Judgment and Decision Making	0,351	0,427
	Systems Analysis	0,305	0,402
Resource Management Skills	Systems Evaluation	0,211	0,318
	Time Management	0,123	0,241
	Management of Financial Resources	0,236	0,144
	Management of Material Resources	0,133	0,236
	Management of Personnel Resources	0,195	0,241

Source: OECD (2021).

Thus, the study shows the need for designers of different specialties in systemic skills development: both young designers and professionals with 5 years or more of experience noted the need to develop skills, especially skills of persuasion and negotiation and decision-making. This means that social and systems skills are the highest priority, because customer satisfaction depends on them. At the same time, technological design skills obviously also need constant development, which

can be explained by the dynamism of customer requirements and the personalization of design services.

Figures 1-2 reflect the prioritization of designers' skills development needs in Germany and Poland. Young designers in Germany consider operational analysis, decision-making and evaluation, technological design, complex problem solving skills as the most in-demand.

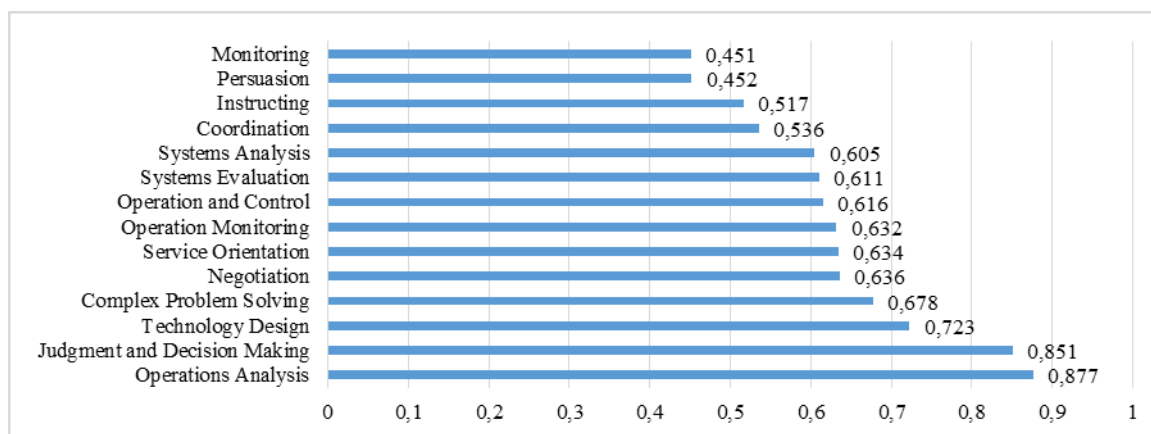


Figure 1 – Priority in the development of designers' competencies at the age of 20-25 years in Germany
Source: OECD (2021).

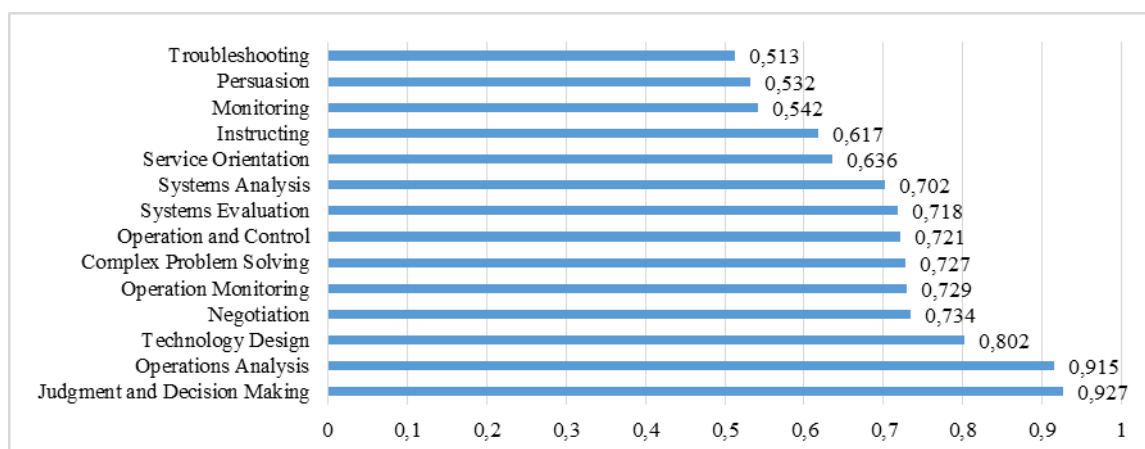


Figure 2 – Priority in the development of designers' competencies at the age of 20-25 years in Poland
Source: OECD (2021).

Young designers in Poland consider skills in evaluation and decision-making, operational analysis, technological design, negotiation, and operational monitoring to be the highest priority.

Designers with experience of working in Germany state that the most required skills are technological design, integrated problem solving, operational analysis, decision-making, and negotiation (Fig. 3).

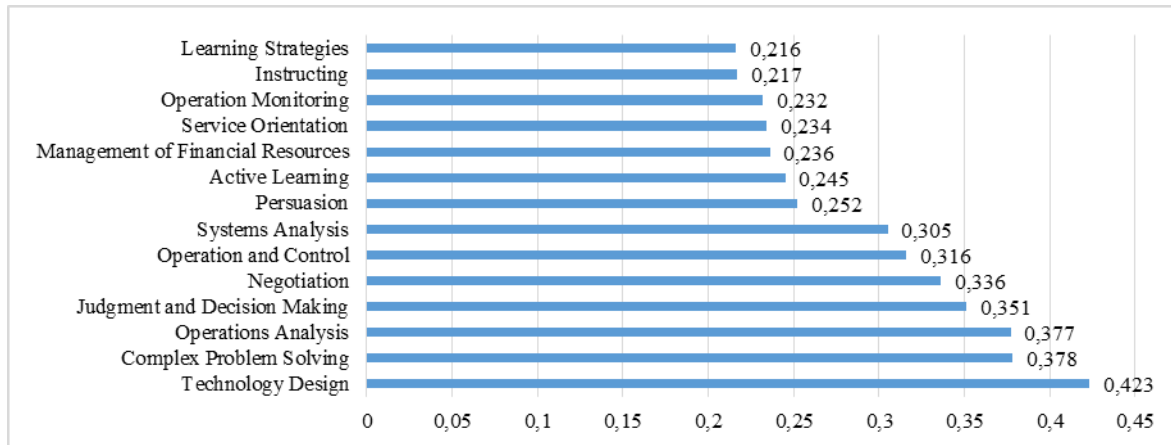


Figure 3 – Priority in the development of designers' competencies the age of 26-35 in Germany
Source: OECD (2021).

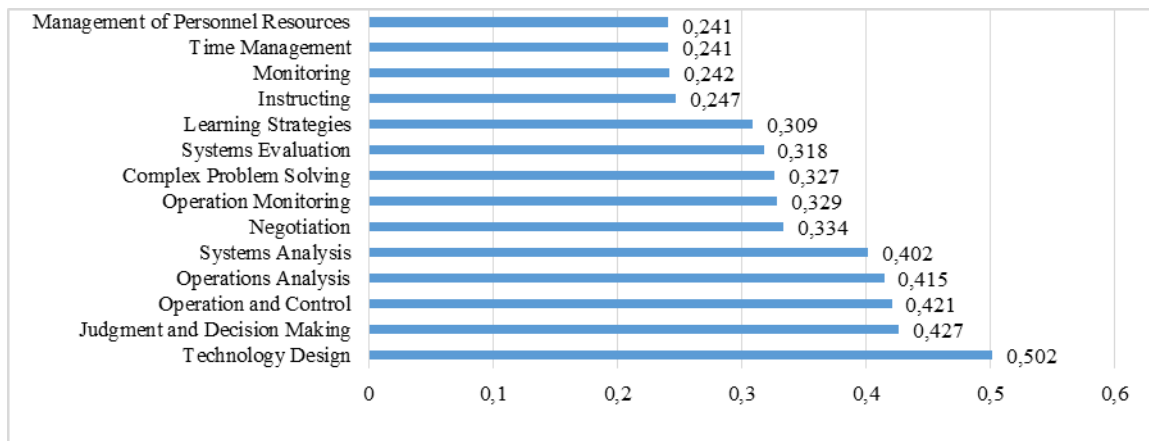


Figure 4 – Priority in the development of designers' competencies at the age of 26-35 in Poland
Source: OECD (2021).

Experienced designers in Poland suggest the following skills: technological design, decision-making, operations and control, operational analysis (Figure 4).

5 Discussion

This study reveals a shift in the skill set that younger designers and designers with seniority indicate is important. Young designers need to develop skills in operational analysis, decision-making and evaluation, technological design, complex problem solving and negotiation, and operational monitoring. Designers ages 26-35 claim to need to develop skills in technological design, complex problem solving, operational analysis, decision-making, and negotiation.

Dziobczenski & Galeotti's (2017) study identified the following groups of designers' skills: (1) Conceptual Design skills, referring to that support and build the foundation for the design project; (2) Project Management skills, referring to how designers manage their projects and deadlines; (3) Software skills, referring to the digital tools necessary to perform design work and lastly (4) Technical Design skills, which are skills carried by graphic design professionals and are directly related to design projects (Dziobczenski & Galeotti, 2017). Dziobczenski & Galeotti (2017) found the greatest importance of conceptual design skills: briefing, business (marketing/branding) skills, concept design skills, idea generation skills, market trends

skills, problem-solving skills, research (users, competitors) skills. The results of this study also confirm the importance of conceptual skills, particularly integrated problem-solving skills. Dziobczenski & Galeotti (2017) state that project management skills are the third most important for designers (client relationship skills, leadership skills, presentation skills (internal and external stakeholders), project management skills, teamwork skills). In this study, through highlighting other project skills, this group is the least needed for young designers and designers at the age of 26-35 because of the presence of a project manager who performs the mentioned functions.

Software skills rank fourth in Lowell & Moore (2020) and Brill (2016), specifically 2D software (Adobe Suite, Corel Draw, etc.), 3D software (3D Studio, Maya, etc.), coding skills (Java, PHP, HTML, CSS, etc.), office skills (Microsoft Word/Excel/PowerPoint etc.), Web development software (Adobe Dreamweaver, etc.). However, this study found important for all groups of designers technological design skills, with the most basic software skills also being the least important. Dziobczenski & Galeotti (2017) state that technical Design skills directly related to the work (project) of graphic designers received the second highest ratings (3D modelling skills, illustration skills, layout (grid, compositions, colors) skills, motion design skills, photo manipulation skills, photography skills, Production (printing/materials) skills, typography skills).

This also correlates with our research findings about the importance of technological design skills.

The evaluation of conceptual design skills, process control skills, software proficiency, and technical design skills allows us to determine the usefulness of each and make changes to educational programs with an emphasis on the most useful ones. As Lewis & Bonollo (2002) argue, market expectations should play a key role in shaping design education practices. Regarding the latter, knowledge of company expectations for design skills can help practitioners and students improve and shape their skills in the future according to the results of this study.

The results of the study show a difference in how designers see the set of skills needed at the beginning of their careers and as they gain experience. For example, experienced designers rated «technological design» skills significantly higher. Siu (2009), Dziobczenski & Galeotti (2017) state the operational role of designers at the beginning of their careers, so it is the technological design, operational analysis, and complex problem solving skills that designers with experience should prioritize. Previous research regarding required skills for graphic designers found that 2D software, teamwork, and project planning were the most mentioned skills in job postings in the UK (Dziobczenski and Person, 2017). In comparison, previous research by scholars suggests a need for strategic skills in graphic designers (Alonso-García et al., 2020; Bakarman, 2005; Lin et al., 2020), where professionals expand roles and responsibilities to areas such as business strategy, innovation management, branding, and service design. However, this study found a low level of need for strategic skills, because the role of strategic leadership is assigned to project managers who manage resources and have the appropriate skills.

6 Conclusion

This study reveals a shift in the skill set that younger designers and designers with seniority indicate is important. Young designers need to develop skills in operational analysis, decision-making and evaluation, technological design, complex problem solving and negotiation, and operational monitoring. Designers at the age of 26-35 claim to need to develop skills in technological design, complex problem solving, operational analysis, decision-making, and negotiation. Survey results confirm the importance of conceptual skills, particularly integrated problem solving. Resource management skills are the least necessary for young designers and designers at the age of 26-35 because of the presence of a project manager who performs these functions. Technological design skills are important for all groups of designers, with the most basic software skills being the least important.

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Primary Paper Section: A

Secondary Paper Section: AM