7.3.3 Product

The evaluated product in E2 was ChairDNA 1.2 (described in the chapter **The ChairDNA Design Tool**). For this purpose, ChairDNA had to be necessarily used with Rhinoceros.

7.3.4 Participants

The group of participants of E2 was composed by 10 Portuguese design practitioners, with recognized experience in chair design. The participants list is displayed in **Appendix 7.B.4**, while the consent forms are available in **Appendix 7.B.5**. The selection of the participant's group comprised three main criteria:

1) The study population was defined upon the target population of ChairDNA, which contemplates chair designers. This population was narrowed to Portuguese chair designers, according to the convenience sampling method Marshall (1996); because the sessions were conducted on the field, a criteria of proximity had to be adopted, in order to save resources. Consequently, the study characterizes the chair design of a specific region, which, although is not the main focus of the study, may be considered a contribution of the same.

2) Beyond the regional criteria, the study population only addresses designers with recognized work in the chair design domain. The study population was extracted from five sources, comprising winners of two international design competitions (Branco 2012; Praquin 2013) and authors represented in three Portuguese design exhibitions (Coutinho 2015; Parra 2011; Experimentadesign 2011). The study population is composed by 31 individuals, and the database can be consulted in the **Sample** chapter.

3) From the study population, ten individuals were available to participate in the study (32%). According to Macefield (2009), this is an acceptable number to gather significant qualitative and quantitative results. Incidentally, the participants group comprise a heterogeneous representation of the study population, regarding gender, age, workplace district, and employment type.

The participants profile was analysed in terms of their (i) demographic profile, (ii) CAD software skill level and (iii) expertise on chair design.

The demographic profile of the participants is illustrated in **Fig. 7.11**, including data related to: (i) the workplace city/town and district, (ii) gender, (iii) age, (iv) employment, and (v) education level. The workplace of the participants was geographically distributed along the following districts: Lisbon (6), Porto (2), Aveiro (1), and Leiria (1). Participants were mostly male (8 participants; 80%) and were aged between 26 and 56 (with a mean age of 39), being the majority in

their 30s. Regarding the employment type, four participants worked in a design studio, two accumulated the functions of teacher and designer, one worked in a furniture manufacturing company (Adico[3]), one was a freelance designer, one worked in an advertising agency and other in a technology company. The participant's education level contemplated the following degrees: all participants were graduated (nine in Design and one in Architecture); four also held a Master degree (three in Design and one in Drawing) and two also held a PhD degree (in Design).[4]

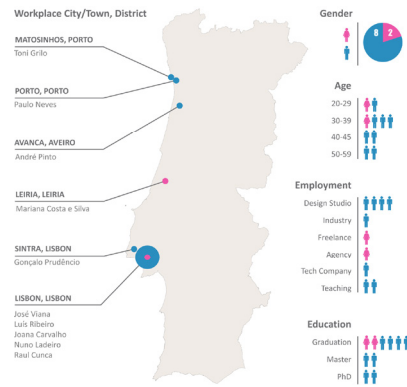

Fig. 7.11 E2 participant's demographic profile

[3] Adico's website: http://www.adico.pt

[4] The participant's academic degrees were undertaken at the following seven institutions: Faculty of Architecture – University of Lisbon (*Faculdade Arquitectura – Universidade de Lisboa*); *Faculdade Belas-Artes – Universidade de Lisboa*; *Universidade Lusíada* (Lisbon); *Universidade de Aveiro*; *Escola Superior de Tecnologia e Gestão – Instituto Politécnico Viana Castelo*; *Domus Academy* (Milan); and *École Boulle* (Paris).

Fig. 7.6 Envisioned materials of E1 resulting designs (left) and materials as a constraint (right – INC data)

Thirteen 3D printed scale models, generated with the aid of ChairDNA 1.1, are presented in **Fig. 7.7**. Two models also generated with ChairDNA are not shown (**S4** and **S10**) because they broke during or after printing, and the design **S6** was not printed. The scale models were printed from one of the two following technologies, available at the faculty Lab: Fused Deposition Modelling technique (FDM) and 3D Printing technology (launched by Z Corporation). The majority of the participants used the former technology, since it was the cheapest option. The printers comprised some restrictions that obligated nearly half of the participants to make changes in the 3D model, mostly to increase the thickness of the frame or, in one case, to refine the union between the parts of the chair.

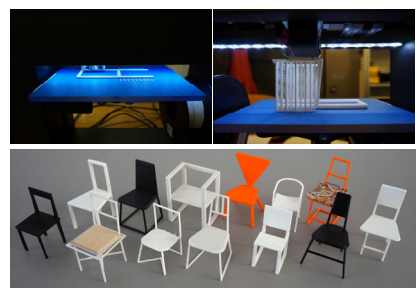

Fig. 7.7 Above: the solution S12 being printed; below: thirteen E1 resulting scale models (author's photos)

Other results obtained from the user test, comprising the analysis of some generation sequences and the types of resulting designs are available in **Appendix 7.A.9**.

ChairDNA Usability

The evaluation of the ChairDNA 1.1 usability and usefulness was mostly done through five-point Likert scale questions, where the lower score (1) corresponded to 'strongly disagree' and the higher score (5) corresponded to 'strongly agree'. The results are presented in the present section and the subsequent section in the format (Mean; Standard Deviation).

In general, the participants revealed a positive overall appreciation of the ChairDNA 1.1 usability (**Fig. 7.8**, left). The results are, from best to worst: ease of learning (4.27; 0.80 – INC), ease of use (3.87; 0.74 – INC), overall coherence (3.80; 0.68 – INC), user experience (3.13; 0.83 – INC), efficiency on the response speed (3.07; 1.16 – INC), and flexibility in adapting to the user needs (2.93; 0.46 – INC). The low appreciation regarding ChairDNA 1.1 efficiency was justified by a poor performance, recurrent crashes, and inability of the program to save states of the solution. The ChairDNA flexibility in adapting to the user's needs was also poorly evaluated, which may be a situation to consider in future developments.

The ChairDNA 1.1 commands were positively evaluated (**Fig. 7.8**, right), in relation to their terminology (4.13; 0.83 – INC), distribution in the interface (4.20; 0.77 – INC), quantity (3.13; 0.74 – INC), and activation sequence (4.13; 0.64 – INC). The dissatisfaction of the users regard-