

Chapter Title in Title Case in Trebuchet 20 pt

*First Name other Initials Last Name Author 1, First Name other Initials Last Name Author 2, and First Name other Initials Last Name Author 3
in 14 pt italic, right aligned*

This is the abstract section in which the authors describe in 150-250 words maximum what the reader can expect from their chapter.

Keywords: *up to six keywords, please select from Engineering Education Taxonomy – version 1.3 by Finelli (2021) unless not possible.*

1 Section Header 1, 14 pt, bold, numbered

Please use this template to write your chapter. Please do not change anything in the settings or *Styles* defined by Word of this file. By using this template, you will make the final formatting much easier for us, as this will not be done by the publisher. This section contains all the formatting instructions and Section 2 includes the Chapter Overarching Writing Instructions. Section 3 contains the instructions by the Part editors. Each chapter ends with a few mandatory sections for all chapters: *Further Reading and Resources, References, Contributor Statement*. Please see these sections for instructions.

1.1 Subsection header 2, 12 pt, bold, italic, numbered

This is the second level of possible headers

Subsubsection, header 3, 12 pt, bold, not numbered, sentence case

This is the third and final sublevel of possible headers.

Unnumbered sections

For unnumbered sections, such as References, there is an Unnumbered header 1 Section in the Styles menu.

1.2 Formatting Instructions

The body text is in **Tahoma**, 12 pt, single-spaced, justified with all margins set at 2,54 cm. All headers are in Trebuchet and all section headers and lower levels use sentence case. Only use italic, do **NOT** underline, except for hyperlinks. Each chapter should be between 6000 and 7000 words, inclusive of references, exclusive of authors biographies.

1.3 Examples in textbox

As the handbook is aimed at practitioners, examples will greatly benefit them. Therefore, examples will be highlighted in a textbox, created by making a single cell, page width table with a slightly different background colour as listed in the example below. All examples are numbered per chapter as shown below.

Example 1: title

Here is where one explains how something was implemented. The example should be attractive yet concise but contain enough information for the reader to understand what worked or did not work. For more details refer the reader to the References or the Further Reading and Resources section, where links to more details can be included. In Examples, Tahoma, 12 pt, justified is used.

1.4 Citations and Endnotes

Citations must be in text only, using italics and double quotation marks. When using a citation, please refer to the specific part of the source after the citation only, as shown in this example: "*Institutions of Higher Education can learn much from studying their alumni*" (Saunders-Smiths, 2008, p.145)

Please also refer to specific parts of a source when referring to data, figures or other details that would be difficult to find in the source without more information. Guidance on how to cite specific parts of a source can be found in the APA Style Blog on citing specific parts of a source (American Psychological Association, 2022).

Please use endnotes (not footnotes), if you require them, which should be used for discursive purposes to expand on the textⁱ.

1.5 Language and Use of Generative AI

The handbook will be written in English using British spelling conventions, please use grammar and spelling checker software when writing. We will be writing in the active tense, please avoid using passive tense.

The handbook is focused on a European context. Please ensure your work is also understandable within a European context and avoid using vocabulary that is specific to a certain region. For instance, use *second-year student* instead of *sophomore* and *secondary education*, instead of *high school*. For more information on European context and the European Qualification Framework (EQF) we suggest you consult: the [Wikipedia page on EQF](#) ('European Qualifications Framework', 2024) as this is more accessible than the EQF webpages it refers to.

The discussion on the use of generative AI scientific publications is still ongoing hence we ask that you do not use Generative AI for writing or when creating illustrations.

1.6 Tables and Figures

Tables and figures should be used selectively and must be carefully chosen. Only include tables or figures when they are necessary for the reader's understanding of the chapter. Tables that simply list long data sets must not be included. It is preferred to summarise findings in the body of the chapter by citing the main takeaways over tables with data.

Tables

Tables must be no wider than text width, and its captions must use the table captions style (12pt, Tahoma, Italic, left aligned). Each table must be numbered using chapter number and table number (e.g., Table 2.1) and have an appropriate caption to go above the table. Table content is 12 pt, Tahoma, left justified, with the table header in Italic, the subheader in bold and table content as normal. Please, do not use automatic captions, keep your table length to a maximum of 1 page, and if possible, avoid landscape tables. All tables must be editable in Word.

Use the following Table style: Only horizontal top and bottom lines for the table and bottom line below the table header. Use no other lines in the table.

Table 1.1: A suitable caption for each table must be provided, left justified, italic, 12pt

Table Header

Table subheader

Table text

Figures

Figures must also be no wider than text width and not exceed one page. Any text in a figure should use a sans serif font and be readable (ideally also 12 pt, Tahoma). To avoid figures floating around your document, we ask you to embed figures in a borderless table as illustrated in Figure 1.1 below. All figures must be centred. Each figure must be numbered using chapter and figure number (e.g., Figure 2.1a) and have an appropriate caption, using the figure captions style (12pt, Tahoma, centred, italic), listed in the table row underneath the figure. Please, do not use automatic captions (left. All figures must be at least 300 dpi to be included. Each image must also be supplied separately in .png, .jpeg or .tiff file format.



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by Saunders-Smiths, 2018



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Figure 1.1: Examples of how to include and attribute

In line with accessibility standards, please ensure each illustration has an appropriate Alt-Text to allow those with a visual disability to hear the description of the image. See *Further Reading and Resources* below for resources on how to do this. If your Alt-Text says for illustration purposes only, your figure will be removed as only relevant figures will be included.

In line with our publisher’s standards on copyright, each figure must also be attributed using the guidelines set out in their manual for attributing images in open textbooks (de Jong 2022). In Fig. 1.1 and the *References* section, we show you how to attribute the three types of images listed in this manual within the handbook using *the shorter attribution* version. We recommend creating your own images or using Creative Commons or Public Domain images only and not using copyrighted images as obtaining formal permission may take a lot of time and will be your responsibility as authors.

1.7 Indexing, Glossary, and Vocabulary Use

Index

Using the yellow highlighter in Word, please highlight all relevant terms in your text that should be added to the Index at the end of the book, each time they are used in context. This aids us in the final formatting of the book. Please only include words for indexing that are directly relevant to the subject matter, scope, and audience of the handbook. If an indexed word is arbitrarily used in passing, it should not be indexed. E.g., **inclusion** used to be discussed in terms of diversity, equity, and inclusion is indexed, but when talking about the *inclusion* of a skill in a course, the word inclusion should not be included.

Glossary

A glossary of terms will also be included in the book, listing all key definitions of the included competencies and skills as well as other key definitions. The editors will issue all authors with a first version at kick-off and provide updated versions each time authors receive their reviewers’ comments during the project. Please send any

suggestions for additions to the glossary to your part editor. All proposals will be discussed by the editorial team before deciding on inclusion.

Vocabulary Use of Transferable Competencies and Skills

In this handbook, we will use the term *Transferable Competencies and Skills*. As already indicated by UNICEF (2019) many different names for transferable skills, such as transversal, 21st century, soft skills, etcetera exist. In engineering literature (Leandro Cruz et al., 2020, Craps et al., 2021), other terms used are professional, employability, and non-technical skills. In the context of this handbook, we will use the term transferable competency and skills. UNICEF defines transferable skills and competencies as those that are needed to adapt to various life contexts and that people can potentially transfer to different social, cultural or work settings (UNICEF, 2022). It subdivides these into Cognitive, Social and Emotional skills (UNICEF, 2019). Although in the English language, distinctions in definition can be made between the words: competency, competence, and skills, in many other languages, only one word exists for all three terms (Kearns et al., 2016, Guerrero & Del Los Rios, 2012). As this handbook is intended for an international audience, we will use the umbrella term of competencies and skills.

A background on the many different definitions of transferable competencies and skills and the use of the words: competence, competency, and skills will be discussed in Chapter 1.2 of the handbook.

2 Chapter Overarching Writing Instructions

Please structure your chapter in a concise, informative, and engaging way for the reader. Please note these points to avoid your chapter resembling a journal article or thesis-like text:

Avoid headings such as 'Methodology' or 'Methods', 'Literature Review', 'Research questions', 'Data and Findings', 'Results' etc with large amounts of unintegrated and dense data within, as these appear very journal-like. Book chapters should include information on data and methodology only where relevant to the wider argument and broader implications for the chapter; data should be interwoven to back up points and contribute to one overarching narrative. Always keep in mind the context of the book aims and overall themes/argument. Theming your chapter thematically is always preferable.

Avoid the inclusion of an appendix wherever possible, there is no need to include surveys or large amount of data. If needed, consider including links to these in the *Further References and Resources* section.

3 Section instructions Part 2

This section contains the part-specific instructions as created by the part editors. They will specify headers which in this template have been formatted as 'Heading 2' in the Styles Pane for readability, but when writing the chapter you must change to 'Heading 1'. Split sections into relevant equivalent subsections using sub-headings if necessary.

3.1 [Heading 1] Abstract and Keywords

Please provide an abstract and aim for 150 words with a 250 words hard limit.

Please provide up to a maximum of 6 keywords.

3.2 [Heading 1] Definition

For this subchapter, instead of beginning with a traditional introduction, please start by providing a comprehensive definition (i.e. your concept) of the skill you are covering. This approach ensures a shared understanding among readers before delving into your argument and forms of implementation in education. Your definition section may include any of the following elements:

- **Concept:** Clearly articulate the core concept of the skill, explaining its fundamental aspects and purpose.
- **Theoretical reference:** Include relevant theoretical frameworks or models that inform the skill, citing key scholars or seminal works in the field.
- **Etymology:** If applicable, briefly discuss the origin of the term or concept, including any evolution in its meaning over time.
- **Systematic approach:** Explain how this skill fits into broader skill taxonomies or competency frameworks, if relevant.
- **Relation to other skills:** Highlight any connections or interdependencies with other related skills or competencies.
- **Key components:** Break down the skill into its essential components or sub-skills, if applicable.
- **Contextual variations:** If the skill's definition or application varies across different contexts (e.g., academic, professional, cultural, discipline), briefly note these distinctions.

Aim for clarity and conciseness in your definition, ensuring that it provides a solid foundation for the subsequent discussion in your subchapter. This approach will help readers grasp the essence of the skill and make an informed decision whether it is relevant for them.

3.3 [Heading 1] Argument

For this section, please provide a comprehensive argument supported by empirical evidence to demonstrate the importance of the skill for engineers and engineering education and how it should/can be developed. You may consider any or all of these guidelines:

- **Method:**
 - Clearly describe the research method that is used to investigate the skill (e.g., literature review, case study, survey).
 - How was the method applied to gather evidence?
- **Empirical Evidence:**
 - Present relevant data, statistics, or findings.
 - If you present your own data, please ensure relevance for readers.
- **Importance for Engineers:**
 - Explain how the skill contributes to engineering practice.
 - Discuss its relevance to current industry trends or societal challenges.
- **Importance for Engineering Education:**

- Describe how the skill aligns with educational objectives or competency frameworks.
- Discuss its role in preparing students for future engineering careers.

Please focus on the skill you are covering and ensure that your argument is well-supported by the evidence presented, and directly answers the question of why this skill is important for both practicing engineers and engineering education.

3.4 [Heading 1] Forms of implementation

This section should provide practical guidance for educators who wish to incorporate the skill into their teaching. You may cover any or all of the following aspects:

- Context:
 - Specify whether the implementation is suitable for individual courses or entire programs.
 - Clarify the level of study: undergraduate, postgraduate, or mixed.
 - Discuss how the skill can be progressively developed across different levels.
- Level of study and progression:
 - Explain how the skill can be introduced and developed at different academic levels.
 - Provide suggestions for scaffolding the skill development from basic to advanced levels.
- Teaching methods:
 - Introduce a range of suitable teaching methods for developing this skill.
 - Explain the rationale behind each method and its effectiveness (this may build on *3.4 Argument/research*).
 - Include and discuss both traditional and innovative approaches where applicable.
- Course design:
 - Offer examples of course structures or modules that effectively incorporate the skill.
 - Discuss how to integrate the skill development into existing curricula.
- Practical examples:
 - Provide concrete examples or case studies of successful implementations.
 - You may build on any lessons learned or best practices from these examples in *3.6 Recommendations/learnings*.
- Challenges and solutions:
 - Address potential challenges in implementing the skill in engineering education.
 - Offer practical solutions or strategies to overcome these challenges.
- Resources:
 - Suggest resources (e.g., textbooks, online materials, tools) that can support the teaching of this skill. Please ensure availability on publication date and beyond.
- Adaptability:
 - Discuss how the implementation can be adapted to different institutional contexts or constraints.

If you want to address assessment strategies, we are happy to connect you with the respective authors.

Aim to provide clear, actionable guidance that practitioners can readily apply in their own teaching contexts.

3.5 [Heading 1] Recommendations for implementation/learning

This section should provide practical insights and guidance based on experience and research. You may cover any or all of the following aspects:

- Key recommendations:
 - Offer a concise list of top recommendations for implementing the skill in engineering education.
 - Explain the rationale behind each recommendation and provide evidence.
- Dos:
 - Provide a list of best practices.
 - Explain why these practices are effective and how they contribute to successful skill development.
- Don'ts:
 - Highlight common pitfalls or mistakes to avoid.
 - Explain the potential negative impacts of these mistakes on skill development or student learning and provide evidence.
 - Share mistakes you made and what you learned from them.
- Lessons learned:
 - Share insights gained from past implementations or research.
 - Discuss how these lessons can inform future practice.
- Attention points:
 - Identify critical factors that require special attention during implementation, e.g. the role of institutionalisation.
 - Explain why these factors are crucial and how they impact the success of skill development.
- Adaptability considerations:
 - Discuss how recommendations might need to be adjusted for different contexts (e.g., class size, available resources, institutional culture).
- Student perspective:
 - Include insights on how students respond to different approaches.
 - Offer suggestions for addressing common student challenges or concerns.
 - Provide strategies on how to include students when implementing.
- Continuous improvement:
 - Suggest methods for evaluating and refining the implementation over time.
- Practical examples:
 - Illustrate recommendations with brief, concrete examples or case studies.
 - Use these examples to demonstrate both successful approaches and lessons learned from challenges.

Please ensure that your recommendations are evidence-based or grounded in well-documented experience. The goal is to provide clear, actionable guidance that helps other educators successfully implement the skill in their teaching practice.

3.6 [Heading 1] Further readings

References for further reading should provide depth, current scholarship, and diverse perspectives on the discussed skill. Choose up to three sources that offer readers pathways to expand their understanding beyond the chapter's immediate scope and have practical value (cf. *4 Further Reading and Resources*)

3.7 [Heading 1] References

cf. *References*

4 Further Reading and Resources

Please list any further reading and resources in this section using APA style (7th edition) referencing. When using a reference management system, please disconnect any links to the reference manager system before submitting. See the suggestions for further reading below for more information.

American Psychological Association. (2024). APA Style common reference examples guide. <https://apastyle.apa.org/instructional-aids/reference-examples.pdf>

American Psychological Association. (2022). Citing specific parts of a source [Blog]. <https://apastyle.apa.org/style-grammar-guidelines/citations/basic-principles/parts-source>

de Jong, M. (2021). Manual for attributing images in Open Textbooks. Edusources. <https://edusources.nl/materials/30604767-cfa2-407c-ac4d-42a00ba2897e/manual-for-attributing-images-in-open-textbooks>

European Qualifications Framework. (2024). In Wikipedia. https://en.wikipedia.org/w/index.php?title=European_Qualifications_Framework&oldid=1253363851

Finelli, C. (2021). Engineering Education Research Taxonomy. Version 1.3. <https://taxonomy.engin.umich.edu/taxonomy/>

Harvard University, Digital Accessibility Services (n.d.). Write helpful Alt Text to describe images | Digital Accessibility. <https://accessibility.huit.harvard.edu/describe-content-images>

Scribbr. (n.d.). How to Cite in APA Format (7th edition) | Guide & Generator. Scribbr. <https://www.scribbr.com/citation/generator/apa>

TU Delft Library. (n.d.). CRediT and collaboration. TU Delft. from <https://www.tudelft.nl/en/library/support/library-for-researchers/publishing-outreach/credit-and-collaboration>

References

All references should follow APA style, 7th edition. See the APA Style manual (American Psychological Association 2020) for further details. The APA Common Reference Examples Guide (American Psychological Association 2024) has been added to the section Further Reading and Resources as well as the link to the online Scribr APA reference generator. Do not forget to include references for any illustrations you have used, such as Šiman (2008).

American Psychological Association. (2020). Publication manual of the American Psychological Association (7th ed.). <https://doi.org/10.1037/0000165-000>

American Psychological Association. (2024). APA Style common reference examples guide. <https://apastyle.apa.org/instructional-aids/reference-examples.pdf>

Craps, S., Pinxten, M., Knipprath, H., & Langie, G. (2021). Different roles, different demands. A competency-based professional roles model for early career engineers, validated in industry and higher education, *European Journal of Engineering Education*, <https://doi.org/10.1080/03043797.2021.1889468>

Cruz, M. L., Saunders-Smiths, G. N., & Groen, P. (2020). Evaluation of competency methods in engineering education: a systematic review. *European Journal of Engineering Education*, 45(5), 729–757. <https://doi.org/10.1080/03043797.2019.1671810>

de Jong, M. (2021). Manual for attributing images in Open Textbooks. Edusources. <https://edusources.nl/materials/30604767-cfa2-407c-ac4d-42a00ba2897e/manual-for-attributing-images-in-open-textbooks>

Guerrero, D., & De los Ríos, I. (2012). Professional Competences: A Classification of International Models. *Procedia - Social and Behavioral Sciences*, 46, 1290–1296. <https://doi.org/10.1016/j.sbspro.2012.05.290>

Kearns, S. K., Mavin, T. J., & Hodge, S. (2016). *Competency-based education in aviation: Exploring alternate training pathways*. Ashgate.

NISO CRediT Working Group. (2022). ANSI/NISO Z39.104-2022, CRediT, Contributor Roles Taxonomy. NISO. <https://doi.org/10.3789/ansi.niso.z39.104-2022>

Saunders-Smiths, G. N. (2008). Study of Delft aerospace alumni [PhD thesis, Delft University of Technology]. <https://repository.tudelft.nl/record/uuid:c85e8096-48ad-47d6-944b-d9f99f358b5a>

Šiman, V. (2008). Overall view of Oosterscheldekering surge barrier [Photograph]. <https://commons.wikimedia.org/wiki/File:Oosterscheldekering-pohled.jpg>

UNESCO. (2023 April 20). Information Literacy. <https://www.unesco.org/en/ifap/information-literacy>

UNICEF. (2019) Global Framework on Transferable Skills. UNICEF. New York. <https://www.unicef.org/media/64751/file/Global-framework-on-transferable-skills-2019.pdf>

UNICEF LACRO. (2022). The 12 Transferable skills. UNICEF, Panama. <https://www.unicef.org/lac/media/32441/file/The%2012%20Transferable%20Skills.pdf>

Contributor Statement

The publisher and the handbook make use of CRediT (Contributor Roles taxonomy), a new international standard to recognise people's contributions to output. By doing so, we can better indicate and acknowledge people's contributions to a chapter. In practice, this means that instead of mentioning people in the acknowledgements their contributions will be further specified using the 14 roles identified in CRediT (see Table 2.1)

Table 1.2: CRediT Contributor Role Taxonomy as defined by NISO Credit Working Group (2022)

<i>Role</i>	<i>Definition</i>
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims.
Data curation	Management activities to annotate, scrub data and maintain research data (for initial use and later re-use).
Formal analysis	Application of statistical, mathematical, computational, or other formal techniques to analyse or synthesize study data
Funding acquisition	Acquisition of the financial support for the project leading to this publication.
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection
Methodology	Development or design of methodology; creation of models.
Project administration	Management and coordination responsibility for the research activity planning and execution.
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools.
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components.
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.
Validation	Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs.
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.
Writing - original draft	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).

Writing - reviewing and editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages.
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We therefore ask that at the end of each chapter, a Contributor Statement is included, using Table 1.3, below, informed by the definitions of the ANSI/NISO Z39.104-2022 standard (NISO CRediT Working Group 2022) in Table 1.2.

Table 1.3 CRediT Contributor Statement [Delete all unused rows]

Conceptualization	<i>Please list all names (authors and others)</i>
Data curation	
Formal analysis	
Funding acquisition	
Investigation	
Methodology	
Project administration	
Resources	
Software	
Supervision	
Validation	
Visualization	
Writing - original draft	
Writing - reviewing and editing	

For more information and examples of such statements, please visit the CRediT and collaboration website of TU Delft Library as listed in the *Further Reading and Resources* section.

Authors' Biography

For each author, please provide their OrcidID and a short, 30 to 50-word biography (listing author name, affiliation, research interests, key expertise or key achievements) separately, which will be printed in the front matter of the book. For instance:

Author name (OrcidID) is a full professor in a topic at a university in a town in a country. Their primary research interests/key expertise/key achievements are that they are an author in this handbook.

ⁱ This is where endnotes will go. Endnotes will appear at the end of the document and will also be Tahoma 12 pt, justified.