

Book Review

Drawing for Science, Invention and Discovery: even if you can't draw

Author: Carney, P. (2018).

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For me, this is a timely book from Paul Carney. Two of my Master's students have recently investigated how, and if, they could help their pupils overcome their drawing anxiety. Carney's book would have been a useful source. There has been little research about drawing anxiety and developing drawing skills to improve the cognitive processes that lie behind creativity and innovation. My students, Emma and Jaye, have drawn on work by Lane, Seery and Gordon (2010), who researched how freehand sketching can be developed as a competency, and Nicholl's work that built on his and McLellan's (2007) investigation into creativity. But they have found little published work that exemplifies how to combine drawing and creativity. Carney's book goes some way to redressing this; the book aims to connect creativity, drawing and innovation through explanation, exposition and exercises about nine processes, which Carney claims are the 'key cognitive processes that drive innovation, invention and discovery'. Carney's claim is that by recognising and understanding the cognitive process, along with undertaking exercises that develop these cognitive processes, drawing skills will improve and because drawing skills improve the reader will be a more creative engineer, scientist, mathematician or pioneer.

The current state of art and design education in England, and other countries, explains why this book is well-timed from a political and educational perspective. Carney is challenging ideas about the ways of thinking that cannot be taught through traditional academic subjects; art, design and other creative subjects are currently side-lined in the English curriculum (Hardy, 2017a; 2017b). Paul Carney has taught for over twenty years and is now an art education consultant with a website (www.paulcarneyarts.com) full of resources for art teachers and others interested in art education. Previously an advanced skills teacher in England and council member of NSEAD (National Society for Education in Art & Design), Carney is an art education consultant for different education sectors. This book is drawn from Carney's expertise and experience as an artist and teacher, and gives his book credence.

'Drawing for Science, Invention and Discovery' is a short (95 pages) and beautifully presented book, which is the norm for books from Loughborough Design Press. With eleven chapters, a forward by Professor Alice Roberts, and appendices, the book can be read in a few sittings, but if readers want to fully engage with the exercises then they need

to set aside several days over a few weeks, otherwise they will not gain from the book's intention of improving their cognitive processes. The foreword includes one of Robert's drawings and she uses this to exemplify the connection she has between physics and art. It gives a nice insight into how someone at the top of their field uses skills from different disciplines.

Chapter one in a concise introduction to the book, setting out Carney's objective to 'identify the mechanisms from which the world's greatest inventions and discoveries come about and to demonstrate that these can be illustrated, explained and taught through drawing' (page 10). This objective is the structure for the nine central chapters, which focus on a different trait that Carney thinks are behind the world's greatest innovations: observation, collaboration, knowledge, serendipity, methodical alternative viewpoints, trial and error, and visualising.

The nine central chapters are laid out in a similar fashion, making it easy for readers and aspirational creators to dip into. There is no need to read each chapter in turn. Also, because each trait is explored in three distinct ways, through case studies, discussion and exercises, there is no compulsion to read the whole chapter. To find out how a trait was used by artists or scientists, read the case studies; the discussion will help readers understand how people can develop a trait; or to playfully experiment, then try an exercise. The case studies are short and exemplify the trait; for example, Percy Spencer's serendipitous invention of the microwave oven because of his sweet tooth or the collaboration between a diverse group of two hundred people to produce a new interpretation of the Magna Carta. These are just long enough to give a taste of how the trait is used to invent and create. When these are at their best Carney provides notes on the margin directing readers to websites. Some case studies would have benefited from more detail or a reference for further reading. However, Carney clearly has an extensive knowledge of a numerous scientists and artists, and inventions and discoveries, so he never repeats examples between chapters. The exercises are well presented with easy to follow instructions, this leads the reader to 'having a go'. Carney's relaxed writing style helps with this, step-by-step instructions are provided for some and many have visual examples. These pictures are clear and the examples informative – they suggest that the exercises are achievable even for the most novice artist. The resources in the appendices are invaluable and most photocopy well. As mentioned, the visual appearance of this book is appealing; the graphics are clear and its presentation is clean, unfussy and accessible.

The inherent strength of this book is Carney's knowledge and experience of art, creativity and innovation. The nine traits are deliberate chapters and there is a sense that Carney has come to settle on these traits through his own journey of discovery and creativity. His confident writing, which some may find informal, gives weight to his choice and organisation of the nine traits. However, it is his dependence on his own experience, interpretations and discovery that some may argue is a flaw of the book. Because the content is drawn from Carney's experiences and understanding, the book may be lacking in rigor for some readers because there is no evidence to support his claims. However, I do

not hold that view. For me, this book is neither academic nor is it a textbook, instead it is a hybrid. Not based or driven by peer-reviewed research, but in experience and thoughtful reflection. Carney presents ideas and interpretations based on his reading and experience, supported by references and links to follow, with exercises he seems to have used when teaching and running professional development courses.

There was a fault line running through the book, from the front cover, through some chapters and onto the back over. I was confused about the target audience and purpose – who has Carney written this book for? Four reader audiences are mentioned in the book's blurb: scientists, mathematicians, engineers and pioneers; but some exercises refer to teachers and students. Is the book to be used by scientist who also teaches or lectures? Or is it for every one and anyone who wants to draw to discover, as the title suggests. I wondered if this was poor editing - Carney may be using exercises from his archive of resources designed for art teachers and their pupils and the exercises have not been reworked to fit the book's wider readership. The intention of the book was also confused by the title, the blurb and exercise which involved more than one person. The book's title suggests that readers will learn how to draw for science purposes, to invent and discover; however, the book's blurb talks more about understanding the cognitive processes and exercises. Then, some exercises need a teacher to manage the process or others to gain the fullest benefit. This is disappointing and, for me, this (minor) fault meant the book lost its direction at times.

As someone with some drawing skills and who understands that practice does improve drawing skills, I felt daunted by some exercises; so, others who are anxious about drawing and feel they cannot draw will probably feel this even more. For example, in chapter 8, Alternative Viewpoint, the exercises brought back my anxieties when I was asked to draw something from different perspectives; a valid exercise but intimidating. Yet, it is Carney's accessible writing, his belief in the traits and how they will improve anyone's creativity that will draw in an unconfident or inexperienced artist.

Overall though, this is a positive book, with energy and enjoyment emitting from the pages because of Carney's ideas and beliefs. He tells stories about familiar and unfamiliar scientists and artists to entice readers in, leading them gently to exercises that are, in the main, accessible. For those not interested in developing their creative skills but are interested in challenging the current dominance of knowledge-rich curricula in education it will be useful to read through the case studies, Carney presents arguments for the importance of drawing as an essential component of cognition. I will be recommending this book to Emma, Jaye and other students who are interested in understanding the cognitive processes that connect creativity, drawing and innovation.

References

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