

Index

Aboriginal and Torres Strait Islander technologies, 13-16, 17 abstraction, 145-6 action card games, 168 design briefs, 50, 55 evaluation, 267 food and fibre production, 174 food specialisations, 174 pedagogical approaches, 296 preferred futures, 77, 80 sustainable technologies, 21 technology perceptions, 11, 12 values-based design, 264 actual zone of development, 265, adhesion technologies, 5-7 affective aspect (assessment), 261 agency, of children, 73, 77, 128, 262, agentic approach in assessment, 262 in systems thinking, 20 air transport, 61 Aizenberg, Joanna, 7 Alcorn, Allan, 5 Apple Computers, 4 appropriate technologies, 17-21, apps, 126, 128, 160 architect's studio (role-play), 113-17 art galleries, 244-6 assessable moments, 266 assessment affective aspect of, 261 agentic, 262 cultural-historical approach, 258, future-focused approach, 264–5 in-the-moment, 261 interaction and, 256-7, 271-6 learner's experience of, 261–2 lenses, 258-61, 262-4 of quality, in technologies education, 268 personal knowledge and, 257-8 potentive, 265 practices, 255-7 proximal, 265, 266 spaces for, 271-6 taxonomy, 257 technological, 256-7 types, 255 Atari, 5 Australian Curriculum achievement standards, 255 computational thinking defined,

content descriptions, 255 cross-curriculum priorities, 102 Australian Curriculum: Technologies achievement standards, 134, 139, aims, 25-6, 55, 125, 145 apps, 160 concepts, 71 content descriptions, 36-28 contexts, 8 creating designed solutions, 100 creating preferred futures, 78, 79, 82, 119-20 design briefs, 49 design decisions, 62 engineering principles and systems, 204-5, 219 food specialisations, 173-4, 188 force, 218 high technology, 8 learning area content, 24-6 materials and technologies specialisations, 204-5, 216, 219, 221 preferred futures, 72–3 project management in, 48, 235-6 project work in, 231 robots, 161 website, 27 Years 5 and 6 band level descriptions, 155 see also Design and Technologies; Digital Technologies Australian Curriculum website, 26-7 authentic tasks, 232-3 automation, 146 automobile industry, 22 Autumn, Kellar, 6 axes, 14 bags, 262-4 Barlex, D., 22-3, 42-3 basket construction, 15 biomimetics, 5-7 biomineralisation, 7 bird wings, 62-3

birthday parties, planning for,

blocks, 56-9, 111-13, 226-30,

Bob the Builder (magazine), 297

box constructions, 32, 227

block coding, 148-9, 154

196 - 8

291 - 2

board room, 214

books, 228, 229

Book Week, 134-9

board games, 274-6

blindness, 7

cafés, 194-6, 248 cakes, 172, 188 Canberra, 95 canteens, 194 capability curriculum, 261 card games, 168 care, creating a system of, 139-43 careers, future orientation in, 98 cars, 22 cat cake, 172 catwalk, 46-7, 184-5 cellular phone technology, 7 Centre for Appropriate Technology, 17 chefs, 195 children agency of, 73, 77, 262, 291-2 assessing, 254-67 conceptualising futures and, 73-6 as digital natives, 126-7 drawing skills, 69 holistic engagement of, 250-1 need to be tech savvy, 128 perceptions of technology, 9-13 teaching technology to, 29 technological experiences of, 74-6 technology use, 126 view of the future, 76-9 chocolate, 188 Christmas, 99-100 class newspapers, 242-4 classroom setting bridge-building, 221-6 changing part of, 269 computational thinking, 134-9, 147, 155-60 Conceptual PlayWorld, 155-60, 214-18 creating designed solutions, 99-102 design briefs, 60-9 digital technologies, 160-1, 165 engineering principles and systems, 214-20, 221-6 fashion, 185 fibre production, 185-6 food specialisations, 192-3, 196-200 force, 218-20 Foundation, 139-42 Foundation to Year 2, 99-102, 198-200

boys, play and, 290-2

bridge-building, 221-6

buddy programs, 236 bug catchers, 299

brain train, 109

bush survival, 55

149



> kite-making, 66-9 learning environment, 276-85 paper planes, 60-6 planning for preferred futures, play as creative design, 113-17 project management, 239-41 STEM (Science, Technology, Engineering and Mathematics), 155-60 technology education integration, 33-42 tinkering activities, 285-9 Year 1, 280-2 Year 3, 185-6 Year 6, 80-2, 160, 184-5, 214-18 Years 1 and 2, 82-6 Years 2 and 3, 239-41, 286-8 Years 3 and 4, 113-17, 134-9, Years 5 and 6, 160-1, 194-6, 239-41, 277, 282-3 client-based projects, 181 clocks, 286-8 clotheslines, 107 coding, robots, 153 collaboration, 62-3, 209 collective designing, 108 communication, 27-8 communities engagement with, 212–13 perceptions of technology in, 12 community project approach, 232-6 history, 231 holistic engagement through, 250 - 1in a classroom setting, 239-41 in an early childhood setting, 236 - 9community projects evaluation, 232, 234, 246 in a classroom setting, 239-41 management of, see project management pedagogy of critiquing in, 233 computational thinking coding and, 147 conceptual framework, 152 Conceptual PlayWorld, 155-60 core concepts, 149-52 defined, 145 early childhood, 153-4 historical accounts of, 145-7 in a classroom setting, 134-9, in an early childhood setting, 165 - 70parents' views of, 148

progression of, 150 see also programming computer clubhouses, 124 computers Apple, 4 Microsoft, 5 simulations using, 146 concept maps, 165 concepts contexts and, 21, 23-4 of technological knowledge, 24 Conceptual PlayWorld designing a city, 218 fashion industry, 184 food specialisations, 198-9 for technologies, 296, 300 healthy eating, 199 in a classroom setting, 155-60, 184-5, 218 pedagogical characteristics, 301 STEM learning, 300 Wild Robot, The (Peter Brown), 160, 300 consequence thinking, 20 contexts concepts and, 21, 23-4 of designing, 42, 105 contextual assessment lens, 260-1, 262 - 4contracts, 234 COVID-19 pandemic, remote schooling, 121 creative design, play as, 111-17 creativity collective, 108 cultural-historical approach, 108 described, 108 fostering environments for, 109 in design and technologies, 102, 107-10 as job skill, 98 learning environments supporting, 276-85 process, 109-10 creatures, lonely, 86-9 critical approach engineering principles and, 210 issues-based, 241 critical thinking, 98 cross-curriculum priorities, 102 cubby building, 280–3 cultural assessment lens, 260-1, 262 - 4cultural-historical approach to assessment, 258, 264 to creativity, 108

culture, technology and, 13-17

curriculum documents (general) digital technology in, 148 supporting creativity, 110 technological concepts in, 24 see also Australian Curriculum; Australian Curriculum: **Technologies** Cutkosky, Mark, 6 damper, 199 data, gathering and analysing, 136-7 de Mestral, George, 6 debates, 163-4 debugging, 158, 166, 167 decisions, design, 62 design(s) assessment taxonomy and, 257 biomimetics and, 5-7 collective, 108 contexts, 105 decisions, 62 dimensions, 272 drawing, 114-17 generating, 42–3, 52–6, 63 imagination and creativity in, 102 iterative approach to, 64, 261 plans for, 117 skills progression, 69 technological knowledge and, 22 values-based, 97, 262-4 Design and Technologies

173-4, 182, 188 high technology, 8 Knowledge and Understanding strand, 79, 204 Processes and Production Skills strand, 37-8, 61, 63, 66, 67, 232, 236 project management in, 236 design briefs analysing, 51-6 Australian Curriculum: Technologies, 49 bush survival, 55 closed, 44-5, 49-50, 55, 305 comparing, 48-51 components, 42 creating, 55-6 environmental audit, 272 evaluating, 43-51 fairy tales, 83, 228, 273-4

Furbies, 139-43

classroom integration of, 36

creativity and imagination in,

food and fibre production, 6,

content structure, 26

107-10

described, 25

INDEX



> design briefs (cont.) greeting cards, 52 hats, 53 in a classroom setting, 60-9 in an early childhood setting, 56-9 kite, 66-9 for mini-enterprises, 246-7 musical instruments, 54 nursery rhymes, 273-4 open, 45-7, 49-50, 51, 55, 305 paper planes, 65–6 programming, 163 for a puppet play, 83 songs and, 229 stories and, 83, 228-9, 273-4 teacher preparation for, 50 three little pigs, 57-9 design principles, 207 engineering, 207-13 design processes assessment during, 273 engineering, 208, 220 in a classroom setting, 113-17 in an early childhood centre, 111-13 design questions, 91-3 ecodesign approach and, 96-8 framework for stimulating, 96, of design solutions, 95 quality, 96-8 design studios, 106 design technologies problem-based technology, 294 teacher-framed technologies, 294 design thinking, 33-42, 110 designer competence, 255 designers, 102-5 development, zones of, 265, 266 diaries, 77, 80, 232 digital design practices, 152 digital documentation, 123 digital entries, 126-7 digital environments, questions about, 92 digital narratives, 126 digital play, 127 digital systems, 137-8 digital technologies ethics and, 123-5, 163-4 in a classroom setting, 160–1, 165 in everyday life, 121-3 myths about, 126-8 place of in community, 125 problem-based technology, 295 teacher-framed technologies, 294 use in the community, 123

Digital Technologies content structure, 26 described, 25 high technology, 8 Knowledge and Understanding strand, 129-31, 133, 138, 155 Processes and Production Skills strand, 28, 39-131, 132, 138 strands, 129-31 digital tools, 212 digital toys, 139-42, 165-7 see also robots disruptive technologies, 97-8, 182 documentation, digital, 123 drawing about the future, 76-7, 79-80 block constructions, 227 designs on paper, 114-17 orientation, 57-9, 114 skills progression, 69, 225-6 techniques, 116–17 DUPLO blocks, 111-13

early childhood setting children's play in, 290-1 computational thinking, 165-70 design briefs, 56-9 fibre production, 187 materials and technologies specialisations, 226-30 planning for preferred futures, 74-5, 86-9 play as creative design, 111-13 project management, 236-9 robots, 165-7 volunteers in, 56 Early Years Learning Framework computational thinking, 168–70 digital technologies in, 168-9 engaging with, 59 on digital devices, 129 Outcome 4, 89, 169 Outcome 5, 27-8, 99 play in, 110 technologies and, 27-9 ecodesign teaching, 96-8, 99-100 eco-development, 17 eggs, 199 Ellen MacArthur Foundation, 181 engineering appropriate technologies, 210 defined, 202 design principles, 207-13 design processes and, 208, 220 engaging girls in, 201 food, 189

habits of mind, 207

problem-based learning in, 209, as a profession, 201, 202-3, 207, 211 project-based learning in, 210 project management in, 235 sustainability in, 210 engineering principles and systems digital tools, 212 force, 218-20 in a classroom setting, 213, 218 - 20in curriculum, 204-5 knowledge associated with, 206 teaching approaches, 207 engineers, types of, 202-3 Engineers Australia, 203, 212 enterprises (mini), 246-8 environment acting for the, 76-9 auditing the, 272 community projects, 239–41 questioning the created, 93-5 environments for assessment, 271-6 for creativity, 109 for learning, 104-5, 254, 268-70, 276-85 e-textiles, 181-2 ethics as assessment dimension, 260 digital technologies and, 123-5, 163 - 4fashion and, 179-80 evaluation of bridge-building unit, 224-5 of community projects, 232, 234, of design briefs, 43-51 of kite designs, 66-9 of paper plane designs, 66-7 of self, 272 of teaching programs, 266-7 exploded plans, 117 exploitation, of poor countries, 17 exploratory activities, 165

fabrics, 179
Fair Labor Association, 179
fairy tales, 82–6, 228, 239, 273–4
family members, as volunteers, 56, 269–70
fashion
background information, 175–84
ethics and, 179–80

in a classroom setting, 184-5

marketing and, 181

extended tasks, 165

320 INDEX



| sustainability and, 177–8, 179, |
|--------------------------------------|
| 183–4 |
| Featherston, Grant, 102–3 |
| Featherston, Mary, 102–5 |
| fibre production |
| background information on, 175–84 |
| in a classroom setting, 185–6 |
| in curriculum, 173–4, 182 |
| in an early childhood setting, 18 |
| fibres, 180–1 |
| financial reports, 115 |
| |
| finger puppets, 185–6 |
| flight, understanding, 60–9 |
| food |
| designing with, 192 |
| learning about, 190–1 |
| takeaway, 193 |
| food and fibre production, in |
| curriculum, 188 |
| food engineering, 189 |
| food literacy, 190–1 |
| food politics, 192 |
| food production, in curriculum, |
| 173–4, 182 |
| food specialisations |
| background information on, |
| 187–92 |
| in a classroom setting, 192–3, |
| 196–8, 200 |
| in curriculum, 188 |
| food technologies, 14, 191–2 |
| force, 218–20 |
| Ford, Henry, 22 |
| formative assessment, 255 |
| Fox-Turnbull, W., 21 |
| |
| Freddo frog challenge, 163 |
| French knitting, 186 |
| frequency-hopping spread spectru |
| (FHSS), 4 |
| Fuller, Bob, 6 |
| Furbies (toys), 139–42 |
| furniture, 102–3 |
| Future Fabrics Virtual Expo, 182 |
| futures |
| assessment focused on, 264–5 |
| children conceptualising, 73–6 |
| children's view of, 76-9 |
| drawing about, 76–7, 79–80 |
| in a classroom setting, 80–6 |
| in an early childhood setting, |
| 74–5, 86–9 |
| orientation, in careers, 98 |
| preferred, see preferred futures |
| futures technologies, 296, 303-4 |
| |
| games technologies, 5 |

```
Geckskin, 6
gender
  play and, 290-2
  technology and, 285-90, 291-2
  engineering and, 201
  play and, 290-2
  technology and, 285-9, 290,
    291 - 2
'Goldilocks and the Three Bears',
    228
Google Earth, 158
greeting cards, 52
group time, 268
Gumbo, M.T., 14, 15-16, 21
'Hansel and Gretel', 274
Hastings-Monash School-
    Community Science and
    Technology Challenge, 10-11
hats, 53
healthy eating, 189, 198-9
hexadecimal code, 158
high technology, 8, 11
Hills Hoist clothesline, 107
Home Economics Institute of
    Australia (HEIA), 187
home visits, 280
how things work, 10-11
human movement, 218-20
'Humpty Dumpty' (nusery rhyme),
    273
icy pole sticks, 114
  about technology, 22
  of technology, 22
ideas books, 236, 237
imagination
  cultural-historical approach,
  defining, 107
  in design and technologies, 102,
    107-10
  in play, 110
  learning environments
    supporting, 276-85
Imagination Room, 277-80
Imagine a City (Elise Hurst), 214
Indigenous technologies, 13-16,
    17, 21
infants, 27-9
information technology, 5
inquiry-based approaches, 298-9
interaction, 127, 128, 256-7, 271-6,
    285-9
interpersonal assessment lens,
     259-60
```

```
interviews, 80-2, 236, 237, 280
Invention Room, 277
inventions, 107-8
investigating and producing, 60-2
investigation booklets, 222-4
iPad, 126, 166
'Jack and Jill' (nursery rhyme), 274
'Jack and the Beanstalk', 82-6, 239
Jarvis, T., 9
jigsaw approach (patterns), 178
job skills, 98
Jobs, Steve, 4
Kim, Sangbae, 6
Kinderbot, 166
kite-making, 66-9
knitting, 185-6
knowledge, engineering, 206
Knowledge and Understanding
    (curriculum strand)
  data representation, 131, 138
  Digital Technologies, 129–31
  privacy and security, 133
  teaching ideas, 131
  technologies and society, 79
Kravtsova, E.E., 265
Lamarr, Hedy, 4, 61
language, gendered patterns of, 288
Lapland, 16
learning areas, combining, 227
learning environments, 104-5, 254,
    268-70, 276-85
learning planning, in technologies,
lens technologies, 7
life-cycle analysis, 20, 183
'London Bridge is Falling Down', 229
Maker Movement/Education, 129
manufacturing, 22
marketing, 181
materials
  analysis approach to, 20
  engineering, 208, 216
materials and technologies
    specialisations
  bridge-building, 221-6
  in a classroom setting, 221-6
  in curriculum, 204-5, 221
  in an early childhood setting,
    229
  Years 1 to 4, 221-6
mazes, 148, 166-7
Merinomink™, 180–1
Microsoft, 5
mind maps, 197, 216, 218, 219
```

INDEX

mini-enterprises, 246-8

Gates, Bill, 5



> mobile phone technology, 7 model boats, 213 model-making, 75, 113-17, 225 motivation, for learning, 220 Mr Grumpy's Outing (John Burningham), 228 multiplicative thinking, 178

musical instruments, 54

nanotechnology, 189 NASA, 6 New Zealand, curriculum in, 148 newsletters, 32 newspapers, 196, 242-4 nursery rhymes, 273-4 nutritional audits, 193

observation, drawing from direct, 116 'Old MacDonald Had a Farm', 111-13

oral planning, 75

paper dolls, 178-9 paper planes, 60-6 Parker, Andrew, 7 pattern-making, 176, 177, 178 pedagogical approaches, to technologies education, 294-6 pedagogies for technologies education, 269, 270 of critiquing, 90, 208, 233 of materiality, 183-4 of the studio, 106 signature, 105 personal assessment lens, 259 perspectives, 262-4 photographs, 10, 168 plan-view orientation (drawing), 57-9, 114 planning Conceptual PlayWorld, 157-8 for a birthday party, 196-8 for preferred futures, 74-5, 80-2, 86 - 9for student interaction, 271-6 for technologies learning,

home experiences featuring, 74-6 plants (science activity), 300 play

as creative design, 111-17 as design thinking foundation,

digital, 127

engineering principles and, 229 gender and, 290-1

indoor, 290 plans for, 229 technologies integrated into, 28 playgrounds, 220

Pong (video game), 5 popcorn holders (design brief),

44-5, 49-50 possum fur, 180-1

potential zone of development, 265 potentive assessments, 265

preferred futures (concept), 72-3 in a classroom setting, 80-6 in curriculum, 78, 79, 82, 119-20

in an early childhood setting, 74-5, 86-9

teaching, 73, 78 Prensky, Marc, 126

preschool-aged children, 27-9

Princess Smartypants (Babette Cole),

problem-based approaches, 294, 295, 298

problem-based learning, 209, 210 problem-solving

computational thinking and, 145-6 design solutions and, 96-7

problem zones, 96 process diaries, 232

Processes and Production Skills

(curriculum strand) classroom integration of, 33-5, 36 collaborating and managing, 67 content descriptions, 36-28 Digital Technologies, 129-31

evaluating, 66, 138 generating and designing, 63 investigating and defining, 61

privacy and security, 132, 138 producing and implementing, 66 professions, 8, 160, 184, 201, 237-9

programming, 160-1, 166-7 see also computational thinking

progress, technology and, 11 project-based learning, 209-10 project management, 235-6

art galleries, 244-6 class newspapers, 242-4

in a classroom setting, 239-41 in curriculum, 48, 235–6

in an early childhood setting, 236-9 mini-enterprises, 246-8

progression in, 241-2 projects

client-based, 181

in curriculum, 231 see also community projects proximal assessments, 265, 266 proximal zone of development, 265, 266

puppets, 82-6, 185-6

questions, 10-11, 18, 80-2, 94, 165 see also design questions

radio signals, 4 radio stations, 134-9

radios, 136

recipes, 172, 188-9, 199-200

recycling thinking, 12, 20 reflection, student, 261

reindeer herding, 16

Rennie, L., 9

reports, 68, 238

resources, for technology education, 14

restaurants, 194

classifying, 165 coding, 153

Conceptual PlayWorld, 153, 160

debates around, 163-4

Furbies, 139-42

in a classroom setting, 160-1, 165

investigation of, 93

programming, 160-1, 166-7 Rogoff, Barbara, 258

role-play, 113-17, 291-2

Rosie's Walk (Pat Hutchins), 228

'S' approach (design), 42 satisficing zones, 96

school canteens, 194 science activities, 248, 299

scrambled eggs, 199

ScratchJr, 147, 148-9, 150-1, 154

screen time, 127

Seemann, Kurt, 13

self-evaluation, 272

sewing, 176-7 signature pedagogies, 105

skills, job, 98 Skype, 127

snowmobiles, 16

social embeddedness, of technologies, 13-16

social interactions, 127

social media, 211-12, 216 social value, of technology, 11-13

sociocultural approach (assessment),

258, 264 songs, 229

Star Tracker App, 154

steel axes, 14



> STEM (Science, Technology, Engineering and Mathematics), 2, 3, 5, 289 in the classroom, 214–18 STEM-oriented approaches, 295, STEM RealWorlds, 300 Stickybot, 6 storyboarding, 187 structured tasks, 165 studio-based approaches, 295, 298-9 studios, design, 106 summative assessment, 255 superhero catwalk (design brief), 46 - 7sustainability, 188, 196 creativity for, 108 fashion and, 177-8, 179, 183-4 in a classroom setting, 115 in engineering, 210 Sustainability (cross-curriculum priority), 102 sustainable technologies, 17-21 Sydney, 95 systems thinking, 20, 77, 134-9 tacit knowledge, 211 takeaway food, 193 teacher-framed technologies, 294, 297 - 8teachers design brief preparation by, 50 on sustainable technologies, 19 on teaching technology, 23, 29 on technology, 2 teaching approaches, to technologies education, 294-305 technacy, 13-16 technologies education changes in, 29 content knowledge, 21-7, 256 pedagogical approaches to, 294-305

pedagogical critique of, 270

question types supporting, 94 resources available for, 14 social embeddedness in, 13-16 technologists, 3-8 technology/ies children and, 9-13, 74-6, 126 community project approach in, 232-6 cultural dimensions, 13-17 disruptive, 97-8, 182 domination of, 127-8 food, see food technologies high, 8, 11 issues-based approach to, 241 people behind, 3-8 professions and, 8 social interactions and, 127 society and, 79 teacher reflections on, 2 technology transfer, 16-17 techno-toys, 165-7 see also robots tessellations, 178 theatre, block area as, 227, 228 'Three Billy Goats Gruff', 274 three-dimensional planning, 75 three little pigs, 57-9 tinkering activities, 285-9 tinkering club, 10-11 tinkering tables, 136, 285-6 toddlers, 27-9, 111-13, 167-70 touchscreen interfaces, 126 toys, 129, 139-42, 165-8 see also robots TPACK (Technological Pedagogical Content Knowledge), 24 travel agencies, 247 two-dimensional planning, 75

Unifix® Cubes, 114

values

as assessment dimension, 260 in design, 97, 262–4

values-based approaches, 296, Velcro®, 6 verbs, 218 video games technologies, 5 visual documentation, 124 volunteers, 56, 250, 269-70 Vygotsky, L.S., 107, 108, 110, 265 wall charts, 33-5 wardrobe wonders (design brief), 45-7, 49-50 waste reduction, 177-8 'The Wheels on the Bus' (song), Where the Wild Things Are (Maurice Sendak), 228 whirlybird pattern, 62 Who Sank the Boat? (Pamela Allen), 228 wicked problems, 97 Wild Robot, The (Peter Brown), 97, 160 Williams, John, 23-4 windmills, 219, 220 Wing, Jeanette, 145-7 wireless technology, 4 wish lists, 236, 237 women, in engineering, 203 wood working, 239 Wooranna Park Primary School, 104 Wozniak, Steve, 4 writing, in design and technologies, Y charts, 161, 282

yarn, 180-1

YarnCAD, 180-1

zero-waste design practices, 177-8

zones of development, 265, 266

zoo investigations, 248

Zulu Mama Chair, 15