

Index

A

AAPG. *See* American Association of Petroleum Geologists (AAPG)
Abdal-Haq, I., 35
Academic qualifications, 3
Ackermann, R.V., 7, 101–108
Active-learning strategies, 113, 115, 120, 129
Adult learners, 8, 95–98, 100, 114
Alternative conceptions, 281, 292
Alumni, 89–91, 225–227, 235
American Association of Petroleum Geologists (AAPG), 104
Application exercises, 132, 142
Applied geoscience, 29, 103–104
Architecture, 91, 242
Ash, M., 18
Assessments, 9, 17, 30, 64, 65, 70, 74, 120, 125, 141, 143, 145, 164, 181, 199–203, 205–208, 210, 211, 253, 255, 266, 275–294
Assessment triangle, 280–283
Assignment, 30, 38, 56, 65, 87, 97, 112, 115, 117–120, 125–127, 130–132, 135, 137–142, 151, 153, 165, 192, 193, 202, 203, 226, 227, 234, 239
Asynchronous electronic surveys, 204, 205
Ausubel, D.P., 113

B

Bachelors, 29, 95, 237
Backward design, 276–280, 292
Badía, D., 9, 253–272
Bardar, E.M., 284
Barrows, H., 225

Bayfiel, N., 253–272
Beane, R., 156
Beckman, M., 216, 218
Blue Skies Research, 104
Bologna declaration, 239, 250
Bologna process, 3
Bonnati, E., 46
Bowring, S.A., 8, 223–235
Business, 12, 102–105, 107

C

Campus building, 77–79, 88, 89, 91
Career building, 37
Carmichael, P., 163–185
Case study, 24–26, 30, 40, 56–66
Cejda, B.D., 216
Cernusca, A., 253–272
Chan, M.A., 77–92
Chang, H., 32
Charlesworth, S.M., 191
Chow, D.S.L., 206
Clary, R.M., 7, 111–145
Coate, K., 65
Cobden, L.J., 6, 21–28
Colloquium, 106
Communication, 9, 14, 16, 31–37, 71–75, 88, 99, 100, 116, 176, 177, 190, 193, 195, 201, 219, 224, 229, 244, 246, 247, 251, 287, 288
Communities of practice, 294
Complexity, 56–59, 61–63, 180, 223
Computing, 5, 24
Concept inventories, 9, 275–294
Conference presentations, 9, 215
Constructivism, 113

- Constructivist, 35
 Corporate environment, 102
 Course assessment, 30, 275–294
 Coursework, 39, 116, 156, 191, 193, 199–203, 207–208, 210, 215–220, 234
 Creative project solutions, 126
 Critical awareness, 255, 269
 Curriculum (curricula), 7, 9, 41, 55–67., 65, 66, 70, 72, 78, 96, 121, 133, 149, 150, 155, 156, 160, 164, 184, 189–195, 216, 219, 239, 253, 275–279, 288, 291–294
 Cyganiak, R., 174
- D**
- DBER. *See* Discipline Based Education Research (DBER); Discipline Based Science Education Research (DBER)
 DeBoer, G., 113
 Decision trees, 269
 de Janeiro, R., 46
 Department, 11, 13, 37, 38, 40, 45, 46, 55–62, 64–67, 69, 78, 79, 81, 84, 88–92, 100, 106, 118, 119, 158, 173, 203, 219, 223, 224, 226, 238
 DeVellis, D.R.F., 283
 Directed-community model, 32
 Discipline, 4, 5, 14, 37, 56, 58–63, 65–67, 69–75, 77–79, 87, 88, 91, 92, 97, 99, 102, 104, 149, 159, 163, 173, 174, 177, 185, 190, 195, 200, 215–217, 219, 220, 226, 234, 254, 272, 275, 278, 279, 293
 Discipline-Based Education Research (DBER), 5, 69, 73, 275, 278
 Discipline-Based Science Education Research (DBER), 69–75
 Discipline-specific, 159, 195, 200, 226
 Displays, 7, 77–92, 95, 112, 115, 118–120, 126, 134, 136–138, 176, 180
 Dissemination, 189–195, 218, 220
 Dissertation, 44, 48, 64, 95, 98, 99, 183, 189, 192, 193, 195, 246
 Distance learners, 95–100
 Distance-learning students, 98
 Downes, H., 95–100
 Dwyer, C., 57
- E**
- Early-career scientist, 21
 Earth surface processes, 30, 31, 33–35, 37, 40
 Earth system, 78, 87, 177, 223, 224, 233
 East Pacific Rise, 46, 48
 Ecological and land use gradient, 257
 Educational mission, 92, 234
 EHEA. *See* European Higher Education Area (EHEA)
 e-Journal, 64, 190, 191
 Electronic surveys, 204, 205
 Electron microprobe (EMP), 8, 150–153, 157, 160
 Electron microscope, 156
 Employment, 4, 21, 63, 64, 66, 67, 95, 102, 103, 156, 173, 185, 192, 264
 Environmental education, 71, 111, 165, 167, 170, 186, 253, 255
 Epstein, A.W., 223–235
 European Higher Education Area (EHEA), 3, 237–239, 249, 254
 Evaluation, 7, 8, 9, 120, 125–134, 150, 155, 165–171, 173, 183, 185, 204, 209, 210, 211, 219, 229, 232, 233, 266, 270–271, 279, 280
 Ewing, R., 31
 Experiential, 79, 88, 89, 92
 Experiment, 25, 32–35, 39, 220
- F**
- Face-to-face students, 96, 97, 100
 Faculty, 3–5, 8, 12, 13, 17, 44, 50, 55–67, 69, 74, 77, 79, 85–92, 101, 102, 104–108, 156, 164, 165, 170, 186, 192, 215–220, 224–227, 229, 231, 233, 234, 275–278, 283–287, 289–294
 Feedback, 8, 23, 25, 27, 36, 102, 117, 120, 127, 129–132, 135, 189, 191–195, 199–211, 276, 277, 284, 289, 290, 292, 293, 295
 Feedforward, 201–204, 207, 208, 210
 Field-based research, 6, 37, 64
 Field classes, 30, 31, 33, 34, 35, 37, 96, 97
 Field experience, 118, 131, 231, 232, 254
 Field investigations, 115, 131, 134–136
 Field trip, 31, 34, 38, 41, 46, 90, 124, 129, 140, 152, 164–167, 183, 186, 192, 206, 225, 229, 231–232, 234
 Fieldwork, 22, 30, 39, 40, 43, 45, 56, 63, 64, 163–165, 167, 183, 185, 192, 193, 247, 248, 255, 272
 Fillat, F., 253–272
 Final year, 7, 9, 57, 58, 64, 98, 99, 189, 192, 193, 242, 246, 249, 250
 Fossil Freeway project, 111, 112, 117–125, 127–135, 137, 142–145
 Fossils, 61, 78, 81, 83–87, 89, 90, 97, 111–145, 223, 294

Foster, I.D.L., 191
Fox, E., 46, 48

G

GCI. *See* Geoscience Concept Inventory (GCI)
Geocognition, 7, 69–75
Geological engineering studies, 239, 240
Geological sense of place, 111, 134, 136
Geophysics, 30, 79, 88, 92, 96, 202, 204, 207, 209
Geoscience Concept Inventory (GCI), 281, 284–287, 291–294
Geoscience data repository, 176, 177
Geoscience education research, 7, 69–75, 113
Gilbert, S.F., 190
Global citizens, 219, 233
Globalisation, 6, 14, 16
Global Research University (GRU), 13–18
Gómez, D., 253–272
Government agencies, 22, 231
GRU. *See* Global Research University (GRU)
Guertin, L., 215–220

H

Halstead, J.A., 215
Hambrick, D.Z., 280
Harvey, C.F., 223–235
Hattie, J., 38
Healey, M., 40, 60, 189
Heath, T., 172
Hensel, N., 216, 218
Heritage, 91, 241, 247, 249, 263, 264
Hmelo-Silver, C.E., 225
Human constructivism, 113
Humboldtian universities, 17

I

The Idea of a University, 11, 12, 14, 16
Imbrie, P.K., 283
Improving capacities of expression, 255, 269
Industry-university research ties, 104–105
Informal learning, 114, 115
Informal science education, 114, 128, 219
Informal science sites, 128, 219
Information and communication technologies, 244–246, 251
Inquiry, 4, 7–9, 11–13, 18, 30, 35, 37, 40, 58–62, 65–66, 69, 74, 78, 111–145, 215–220, 269
Inquiry based learning, 35, 37, 61–62, 65, 113, 217

Instructional tools, 86–87, 283
Interactions between ecological, social and economic aspects, 267
Interactive media, 164
Interactivity, 209, 211, 251
Interdisciplinary, 5, 7–9, 63, 72, 74, 75, 91, 92, 114, 115, 125–127, 130, 131, 135, 136, 165, 171, 206–208, 210, 216, 219, 220, 224, 233, 238, 253–272
International framework, 253–272
International journals, 71, 73, 241, 250
International scientific journals, 207
Internship, 7, 29, 101–108
Introductory-level, 37, 86, 151, 159, 160, 216–220
Introductory-level courses, 23, 217, 218
Itinerant course, 254, 256, 257, 272

J

Jardeleza, S.E., 275–294
Jenkins, A., 7, 38, 55–67, 189
Jerolmack, D., 30–33, 36
Johnson, K., 111, 112, 117, 119, 134, 137, 142
Journal papers, 14, 15
Journal publications, 7, 24, 65, 69, 71, 74, 75, 190, 241, 275
Journals, 5, 14, 24, 29, 43, 63, 69, 106, 189, 207, 215, 230, 241, 275
Justice, J., 37

K

K-12, 117, 125, 129, 135
Kastens, K., 46
Kerr, C., 13, 14, 16
Key indicators of environmental changes, 255
Krajcik, J., 277

L

Langer, E.J., 113
Learning community, 223–235
Learning technologists, 5, 119
Lecture tools, 201, 204–206, 286, 287
Lecturing, 22, 65, 201, 204–206, 209, 210, 251
LEED-certification, 79
Libarkin, J., 7, 9, 69–75, 275–294
Linked data, linked web of data, 8, 163–186

Linked Web of Data, 172–174, 176–180, 183, 185, 186
 Lipson, A., 224
 Litherland, K., 163–185
 Local environments, 7, 111–145

M

Macdonald, K.C., 6, 43–50
 MacGregor, L., 7, 101–108
 Maps, 97, 98, 117–119, 125–128, 142, 165, 170, 174, 176, 179–181, 183, 185, 186, 218, 219
 Marginson, S., 6, 11–18
 Marine geology, 45
 Marsh, H.W., 38
 Martin, R., 31, 34
 Masters, 29–41, 116, 117, 121, 239, 256, 272
 Mathematical skills, 208, 210, 211
 McElhinny, T.L., 275–294, 291
 McNutt, B., 6, 29–39
 Mentor, 36, 102–105, 107, 108, 215, 226, 227
 Metadata records, 180
 Meteorological office, 173
 Micro-blogging, 172
 Mid-Atlantic Ridge, 45–46
 Mid-Ocean Ridge, 44
 Mika, P., 172
 Mitchell, I.J., 113
 Modelling, 22, 24, 25
 Moodle, 245, 246, 250
 Multi-criteria analysis, 269
 Multidisciplinary, 5, 58, 208, 210, 223, 224, 234, 238, 241, 249, 275
 Multiversity, 13, 14, 16
 Museum, 77–79, 82, 90–92, 112, 115–118, 120, 124, 129, 137–140, 176, 219, 230

N

National Aeronautics and Space Administration (NASA), 13, 31, 59, 173
 National oil companies, 104
 National Science Foundation (NSF), 5, 14, 15, 45, 49, 78, 150, 154, 157
 Neves, L., 9, 237–251
 Newman, J.H., 11, 12, 14, 16
 Novak, J.D., 113
 NSF. *See* National Science Foundation (NSF)
 Nuttall, A-M., 163–185

O

Ocean observatories, 49
 Oceanography, 43–45, 49, 117, 218
 Oil and gas industry, 7, 101–108
 Online, 7, 8, 17, 77, 81, 111–145, 154, 155, 173, 178, 182, 191, 201, 203–206, 209, 218, 219, 224, 247, 275, 285–287
 education, 17
 learning, 8
 Ontology, 72, 177, 180
 Opportunities, 13, 21–23, 27, 32, 36, 38, 39, 43, 44, 45, 46, 48, 49, 50, 57, 58, 66, 71, 75, 78, 91, 92, 97, 102–103, 106, 107, 111, 113, 117, 124, 129–131, 133, 137, 156, 164, 166, 171, 179, 183, 184, 185, 186, 189, 192–195, 217–219, 224, 229, 231–233, 237–251, 255, 272, 275, 284, 290
 Outreach, 5, 87, 89, 91, 92, 219, 230, 231

P

Paleoenvironment reconstruction, 111, 123–124
 Paleontology, 84, 113, 115, 116, 123, 131, 133
 Patton, M.Q., 283
 Peer learning, 44
 Peer review, 73, 193, 284
 Peer-reviewed publications, 7, 215
 Pereira, D., 9, 237–251
 PhD, 106
 Podolsky, D.M.W., 99
 Postdocs, 21–23, 26–28, 44
 Practical, 14, 22–27, 79, 131, 229, 242, 243, 253, 288
 Prensky, M., 185
 Problem-based learning (PBL), 8, 225, 226
 Professional societies, 105
 Programmatic assessment, 287–291, 294
 Project based learning, 234
 Publication, 7, 8, 24, 26, 27, 31, 41, 59, 64, 65, 69–75, 98, 99, 173, 177, 181, 183, 190, 191, 192, 194, 195, 215, 241, 246, 247, 275, 278, 279, 280

Q

Quantitative skills, 206, 208–210
 Questionnaire, 165, 166, 209, 271
 Quick response (QR), 87

R

- Real-life scenarios, 253
- Remotely operable instruments, 149–160
- Research and development, 7, 9, 62, 171, 230
- Research articles, 6, 30, 31, 36, 37, 38, 39, 44–46, 64, 206–211
- Research-enhanced learning, 7–8
- Research-enhanced teaching, 3–9, 211
- Research-implicit teaching, 3–9
- Research instrumentation, 150–156, 160
- Research instruments, 8, 149, 150
- Research-intensive, 4, 6, 8, 9, 16, 17, 43, 50, 57
- Research literature, 57, 206, 207, 210, 211
- Research profile, 39, 43
- Research submersible, 48, 49
- Research-teaching nexus, 3–7, 9, 12, 13, 17, 18, 35, 37–38, 40, 62
- River, 45, 80, 81, 83–85, 167, 179, 218, 257, 258, 261
- Roberts, G.P., 99
- Ryan, G., 8
- Ryan, J.G., 149–160

S

- Scholarly publications, 69–75, 215
- Science literacy, 78
- Science, technology, engineering, and mathematics (STEM), 69, 70, 74, 75, 217, 277, 278, 283
- Scott, P., 62
- SEG. *See* Society of Exploration Geophysicists (SEG)
- Seilacher, A., 78
- Self-directed learning, 130, 133, 136
- Semantic web, 8, 171–176, 185, 186
- Sense of place, 111, 114, 134, 136
- Shadbolt, N., 172
- Social networking, 96, 172, 176
- Social web, 172
- Society of Exploration Geophysicists (SEG), 104
- Spronken-Smith, R., 37
- STEM. *See* Science, technology, engineering, and mathematics (STEM)
- Stott, T., 8, 163–185
- Strategies, 55–67, 107, 113, 115, 120, 129, 150, 151, 153, 155, 160
- Strauch, B., 98
- Student-centered learning, 114
- Student conceptions, 281, 283
- Students' final project, 237–251
- Student's perspective, 29–41, 46

- Sustainability, 78, 87, 89, 111, 195, 223, 224, 233, 253, 264, 267, 268, 269, 285
- Synergy, 3, 6, 9, 17, 199, 211

T

- Taxonomies, 87, 172, 174, 177–181, 183
- Teacher application projects, 119
- Teaching-enhanced research, 3–9, 211
- Teaching-led, 4, 9
- Teaching loads, 22
- Teaching-only, 14, 17, 24
- Teaching profile, 39
- Teaching-research symbiosis, 4
- Teaching responsibilities, 26
- Team-oriented research, 223–235
- Technology and Research-enhanced Education (TREE), 199–211
- Technology-enhanced learning, 5
- Telepresence, 49
- Thematic, 179, 200, 283
- Thomas, N., 58
- Tong, V.C.H., 3–9, 199–211
- Training, 4, 16, 23, 26, 27, 29, 34, 36, 50, 63, 66, 151–154, 158, 160, 190, 226, 240, 242, 247, 254, 256, 260, 262, 267, 272, 292
- Treagust, D.F., 284
- TREE. *See* Technology and Research-enhanced Education (TREE)
- Trochim, W., 283
- Troll, R., 111, 112, 117, 119, 134, 137, 142

U

- Undergraduate, 3, 17, 23, 30, 43, 55, 87, 95, 149, 165, 189, 202, 215, 223, 237
- Undergraduate learning, 66, 184
- Undergraduate research, 8, 58, 60, 64, 65, 156, 158, 159, 160, 189–195, 215–219
- Undergraduate research projects, 8, 156, 158, 160, 216, 218, 219
- University rankings, 13, 17
- UNIX terminal emulation software, 151
- US Geological Survey (USGS), 173, 174, 176

V

- van Der Hoeven Kraft, K. J., 283
- Virtual Alps, 165, 168–176, 178–186
- Virtual environments, 164
- Virtual field guides, 8, 163–186
- Virtual learning platforms, 9, 199, 201, 203

Visibility, 77, 79, 89, 92
von Humboldt, W., 12, 13

W

Walkington, H., 8, 189–195
Wandersee, J.H., 7, 111–145

Web 2.0, 172, 178
Writing skills, 64, 180,
191, 193

X

Xeriscape, 80, 81, 85