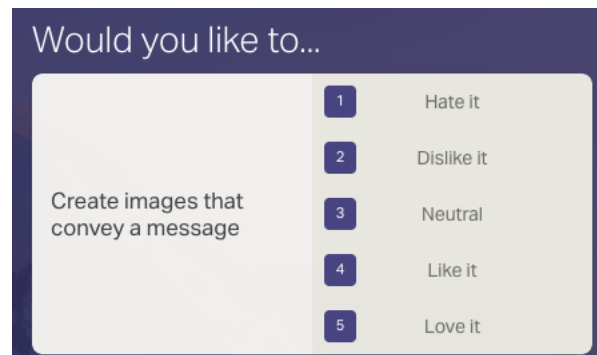


# Technical Manual

## Introduction

The Sokanu assessment is an online assessment designed to help users identify potential career options as well as enable insights into their own personality. To perform this, Sokanu presents its users a series of stimuli prompting for a response in order to infer personality traits and career matches. Mapping the connection between responses and careers are detailed in the sections below.



The figure above shows an example stimuli presented to a user.

Although there are many career assessment tools available to users, the Sokanu Career Assessment differs from other assessments in the following ways:

- The Sokanu Career Assessment provides granular career matching, meaning it uses individual assessment items to provide both career matches on a per-career basis, rather than for families of careers. In other words, Sokanu can match a user to careers such as 'Electrical Engineer' or 'Mechanical Engineer', rather than just 'Engineer'.
- Matches are powered by machine-learning driven models, which provide state-of-the-art accuracy and relevancy in the careers presented to users.
- The career pool and models are always evolving in order to stay up-to-date to incorporate modern careers and users.

Along with the career assessment, a personality assessment also provides users with unique, in-depth insights into what their strengths are and what makes them different from everyone else.

The sections below cover the subjects of assessment development, validity, and technical detail on how the career matching algorithm works.

## Career Assessment Development

This section details how stimuli were selected as well as how responses from users result in a set of recommended careers. Each of the potential careers that a person can be matched with is represented with a mathematical model. On its simplest level, these mathematical models assign an *importance weight* to each of the stimuli within the assessment. By combining the response that a user provides with the importance weight placed on each stimulus, a prediction is made based on a five point scale of how well they match with a career.

## Model Creation

Throughout the assessment, users provide answers to questions that are used to infer their psychometric attributes as well as contextual variables including items such as expected salary and willingness to pursue further education. By answering a large assortment of questions, Sokanu is able to capture the complexity and nuance involved with career matching. The answers that users provide serve as variables, also referred to as "features". The purpose of these features are two-fold. First, features are used in order to formulate and continuously improve mathematical career prediction models. Secondly, features are used as inputs when performing career match predictions.

In addition to providing Sokanu with features by answering questions, users are asked to provide two additional pieces of information:

1. Ratings of their interest levels of a random set of careers
2. Ratings of their overall satisfaction in careers that they have had in the past

These ratings, referred to as “labels”, are used as ground truth when creating the models mentioned above. By collecting both features and labels, models can be made and used to predict “unobserved labels”. Unobserved labels correspond to new users that have not explicitly provided information on any career interest or past career satisfaction ratings.

Further details on how career models are trained can be found in the “Technical Details” section below.

## Item Selection

An initial pool of 162 items was used for career matching, comprised of question related to user interests, dislikes, and behaviors. The items in this collection were drawn from a variety of sources:

- **Holland Codes**

The items in this collection correspond to six scales that are meant to measure people along six facets of their personality — Realistic, Investigative, Artistic, Social, Enterprising, and Conventional.

- **Basic Interests**

The items in this collection are based on a personality model developed by Day and Round that is grounded in how user interests determine career preferences [1].

- **Internally Developed Items**

Some items were created internally for the purpose of predicting career interest.

As more users completed the assessment, sufficient data was gathered so that items could be pruned to those that are most predictive of career interest. A multi-faceted strategy was used for this filtering:

1. **Elimination via correlation**

Correlation measure statistical association between two random variables. The magnitude of the correlation can vary between -1 and 1, with a larger value signifying a stronger association, and can be either positive or negative, signifying a positive or negative correlation. If the magnitude of correlation is high with an item already measured, it is a good sign that it should not be used in the models. For example, it is intuitive that “enjoying mathematics” and “a desire to avoid using mathematics” in your job would have a large, negative correlation. Therefore, having both items in the model would most likely be redundant. As the psychometric items are ordinal variables, Spearman's rank correlation was used.

2. **Elimination via Variance Inflation Factor (VIF)**

Although correlation is helpful in finding redundant pairs of items, multicollinearity is also an issue. Multicollinearity refers to the phenomenon where the response to an item can reliably be determined as a weighted sum of other features already measured. If not taken into account, it can cause instability in model weights, affecting the model's interpretability. This is especially an issue for the linear ordinal regression model employed by Sokanu.

VIF is calculated on a per item basis and can theoretically take on any value, but it is generally positive, with a larger value signifying greater issues with multicollinearity. A value of 5 or 10 is commonly chosen as a benchmark for when a feature is a cause for concern.

3. **Elimination via Stepwise Selection**

As discussed in a section below on validity, model performance is generally measured at Sokanu using an F1 score. Stepwise selection involves the removal of items one at a time that minimally affect the model performance, as determined by the F1 score. Items that do not help in prediction of career interest are excluded, as they offer no benefit to the user and only serve to lengthen the assessment.

## Data Quality

Data quality assurance is an additional concern when using collected data from users to create mathematical models. In order to ensure that data quality remains acceptable, Sokanu has developed a proprietary system to identify careless or fraudulent users. This identification process is based on the following strategies:

**1. Average Response Time**

Sokanu considers the average time it takes for a user to respond to the items on the assessment. An abnormally fast time signifies that the user may not be spending a sufficient amount of time reading the question and considering the possible responses.

**2. Repeated Responses**

The number of identical repeated responses that a user provides is used to help identify any users providing potentially careless responses. A long series of responses of "Strongly Agree", for example, might indicate that the user isn't being sufficiently discerning in their responses.

**3. Context Corroboration**

As a user completes the assessment and provides more data, Sokanu can begin to compare answers between different questions to find potential inconsistencies. A career such as pediatrician requires a great deal of education as well as a background in the sciences. For example, a user who reports being a pediatrician but also claims to be 20 years old or to have only a prior degree in Economics is flagged as someone who is possibly providing misleading information.

Once a user has been identified as careless or fraudulent, they are removed from the set of data that powers the career models. Even after removing such users, Sokanu still has a large collection of data to use for model training. The table below shows number of data points collected for each career.

Career name	Number of Data Points
Molding and Casting Worker	49397
Photographer	44874
Machine Feeder	44339
Nursery Worker	44146
Mine Shuttle Car Operator	41548
Architect	41298
Agricultural Worker	40700
Author	39762
Film and Video Editor	39670
Journalist	38921
Pastry Chef	38581
Psychologist	37907
Model	36316
Audio Engineer	36033
Dyeing Machine Operator	35523
Stone Cutter	32934
Animal Caretaker	32899
Telemarketer	32893
Graphic Designer	32851
Singer	32822
Farm Manager	32738
Actor	32551
Craft Artist	32462
Potter	32374
Hairdresser	32355
Money Manager	32190
Animal Trainer	32097
Wellhead Pumper	32016
Sheet Metal Worker	32013
Detective	31534
Lawyer	31236
Anthropologist	31177
Mathematician	31027
Commercial Fisherman	31023
Construction Worker	30968
Sewing Machine Operator	30818
Logging Worker	30812
Games Tester	30808
Mining Machine Operator	30522
Grain Elevator Worker	30351
Shoemaker	30348
Chief Executive	30303
Interior Designer	30236
Sports Scout	30074

Glazier	29997
Clergy	29981
Upholsterer	29962
Athlete	29922
Video Game Designer	29916
Fork Lift Operator	29763
Machine Assembler	29652
Janitor	29420
Composer	29384
Sports Writer	29233
Fashion Designer	28935
Metal Worker	28931
Machinist	28886
News Anchor	28882
Conductor	28774
Entrepreneur	28677
Film Director	28639
Welder	28566
Firefighter	28555
Cabinetmaker	28495
Culinary Chef	28334
Veterinarian	28332
Make-Up Artist	28322
Dancer	28271
Sheriff	28246
Orderly	28150
Special Agent	28070
Tool and Die Maker	28062
Drill Press Operator	28015
Bill and Account Collector	27991
Personal Care Aide	27954
Nail Technician	27949
Database Architect	27906
Web Developer	27821
Plasterer	27807
Computer Hardware Engineer	27762
Metal Caster	27638
Garbage Collector	27586
Air Crew Officer	27566
Doctor	27528
Construction Painter	27525
Security Guard	27265
Commercial Diver	27205
Boilermaker	27183
Electronic Equipment Assembler	27121
Building and Construction Inspector	26939
Computer Programmer	26877
Faller	26804
Pilot	26732
Zoologist	26701
Announcer	26691
Segmental Paver	26664
Robotics Engineer	26613
Truck Driver	26602
Quarry Rock Splitter	26594
Plumber	26571
Forensic Science Technician	26519
Vehicle Cleaner	26476
Library Assistant	26407
Trapper	26389
Housekeeping Cleaner	26330
Furniture Finisher	26270
Roofer	26260
Hand Sewer	26200
Marine Biologist	26154
Aviation Inspector	26134
Illustrator	26055
Pipelayer	26031
Professor	25981
Editor	25944
Intelligence Analyst	25939
Construction Manager	25913
Switchboard Operator	25875
Circus Performer	25872
Power Plant Operator	25760
Dentist	25749
Highway Maintenance Worker	25741
Sociologist	25718
Delivery Service Driver	25633
Administrative Assistant	25584
Drywall and Ceiling Tile Installer	25490

High School Teacher	25487
Petroleum Pump System Operator	25431
Molecular Biologist	25328
Mail Superintendent	25311
Choreographer	25302
Hand Polishing Worker	25290
Food Preparation Worker	25257
Music Teacher	25219
Producer	25195
Fitness Trainer	25167
Aircraft Mechanic	25167
Sports Medicine Physician	25140
Teller	25129
Stonemason	25125
Immunologist	25118
Operations Manager	25081
Filmmaker	24894
Industrial Machinery Mechanic	24816
Freight and Cargo Inspector	24749
Sports Referee	24717
Derrick Operator	24633
Sailor	24592
Preschool Teacher	24571
Music Therapist	24566
Landscaper	24546
Shipmate	24533
Juggler	24478
Biologist	24438
Biomass Power Plant Manager	24431
Ship Loader	24409
Meter Reader	24368
Receptionist	24362
Archaeologist	24329
Bus Driver	24323
Animal Breeder	24307
Political Scientist	24307
Kindergarten Teacher	24306
Carpenter	24287
Histotechnologist	24273
Printing Worker	24266
Computer & Information Research Scientist	24255
Historian	24247
Computer Systems Engineer	24243
Precious Metal Worker	24236
Special Education Teacher	24230
Software Quality Assurance Engineer	24192
Data Scientist	24175
Astronomer	24174
Leather and Shoe Worker	24128
Nanny	24066
Horse Trainer	24015
Climate Change Analyst	24015
Motion Picture Projectionist	23956
Stock Trader	23948
Counseling Psychologist	23914
Software Engineer	23851
Petroleum Engineer	23834
Radio Mechanic	23833
Mechanical Engineer	23832
Financial Clerk	23826
Multimedia Animator	23802
Auto Body Repairer	23797
Postal Service Worker	23767
Childcare Worker	23765
HVAC Technician	23765
Radiologist	23757
Music Artist	23721
Motorcycle Mechanic	23683
Infantry Soldier	23643
Insurance Appraiser	23643
Exterminator	23591
Judge	23556
Farm Equipment Mechanic	23503
Pump Operator	23483
Animal Behavioural Specialist	23455
Crane Operator	23443
Pediatrician	23407
Plastic Surgeon	23402
Decorating Worker	23396
Model Maker	23392
Food Batchmaker	23387

Correctional Officer	23377
Skincare Specialist	23336
Private Detective	23311
Aerospace Engineer	23295
Elementary School Teacher	23229
Postal Service Clerk	23213
Tightrope Walker	23183
Advertising Manager	23166
Choir Director	23156
Chiropractor	23155
Nurse	23128
Pipefitter	23114
Elevator Mechanic	23100
Explosives Worker	23094
Geneticist	23082
Animal Control Worker	23078
Log Grader	23075
Merchandiser	23056
Registered Nurse	23048
Tax Preparer	23030
Chemical Engineer	23020
Taxi Driver	23014
Butcher	22934
Computer Systems Administrator	22926
Restaurant Manager	22924
Drug & Alcohol Counselor	22923
Anesthesiologist	22922
Racehorse Trainer	22918
Computer Systems Analyst	22904
Bookkeeper	22837
Tile and Marble Setter	22837
Cement Mason	22829
Art Director	22824
Proofreader	22760
Orthodontist	22758
Cargo and Freight Agent	22756
Baker	22726
Lawn Care Specialist	22711
Brickmason	22702
Naval Architect	22699
Woodworker	22679
Ethical Hacker	22675
Gynecologist	22662
Loan Officer	22640
Park Naturalist	22638
Ironworker	22633
Clown	22591
Avionics Technician	22588
Neurologist	22569
Veterinary Assistant	22568
Photojournalist	22558
Music Arranger	22557
Rigger	22549
Police Officer	22547
Equestrian	22543
Courier	22530
Green Product Marketer	22527
Accountant	22525
Biochemist	22522
Home Health Aide	22495
Millwright	22493
Electrician	22489
Weatherization Technician	22467
Music Copyist	22460
Chemist	22457
Armored Assault Vehicle Crew Member	22450
Stock Clerk	22447
Session Musician	22422
Air Traffic Controller	22417
Cashier	22414
Dairy Farmer	22402
Teacher Assistant	22390
Neuropsychologist	22376
Animal Scientist	22363
Ventriloquist	22359
Automotive Service Technician	22347
Lyricist	22341
Cake Designer	22341
Physical Education Teacher	22333
Online Merchant	22307
Artillery Crew Member	22300

Industrial Engineering Technician		22291	
Exercise Physiologist		22256	
Sustainability Officer		22246	
Oil and Gas Rotary Drill Operator		22242	
Librarian		22232	
Podiatrist		22226	
Biofuels Production Manager		22199	
Advertising Sales Agent		22198	
Psychiatrist		22189	
Family Social Worker		22160	
Engraver		22142	
Search Marketing Strategist		22141	
Acrobat		22135	
Locksmith		22119	
Athletic Trainer		22116	
Remote Sensing Technician		22109	
Guide Dog Trainer		22104	
Ship Engineer		22099	
Agricultural and Food Science Technician		22081	
Jeweler		22073	
Dairy Herdsperson		22040	
Glass Blower		22034	
Dermatologist		22011	
Locomotive Engineer		21996	
Prosthodontist		21982	
Marine Mammal Trainer		21938	
Ship Captain		21936	
Farmer		21926	
Marine Electrician		21925	
Neurosurgeon		21920	
Mental Health Counselor		21913	
Humanitarian		21903	
Recreational Vehicle Service Technician		21894	
Atmospheric Scientist		21884	
Tattoo Artist		21866	
Lifeguard		21803	
Dog Trainer		21797	
Golf Pro		21795	
Maintenance Worker		21779	
Technical Support Specialist		21748	
Blogger		21745	
Clinical Nurse Specialist		21728	
Orchestrator		21720	
Sales Representative		21716	
Television Talk Show Host		21684	
Street Vendor		21683	
Sales Engineer		21673	
Industrial Engineer		21630	
Investment Banker		21618	
Art Therapist		21609	
Public Relations Specialist		21584	
School Counselor		21576	
Wedding Planner		21575	
Curator		21574	
Costume Designer		21569	
Aesthetician		21555	
Marriage Therapist		21549	
Librettist		21549	
Wind Turbine Services Technician		21540	
Legislator		21536	
Medical and Clinical Laboratory Technologist		21519	
Television Writer		21500	
Power Engineer		21496	
Ambassador		21481	
Jingle Writer		21469	
Medical Assistant		21462	
Florist		21441	
Biochemical Engineer		21440	
Traffic Technician		21430	
DJ		21392	
School Psychologist		21379	
Electrical Engineer		21338	
Seamstress		21332	
Piano Tuner		21315	
Video Game Creative Director		21310	
Funeral Director		21307	
Car Salesman		21303	
Animal Trainer For Film And Television		21303	
Social Fundraiser		21299	
Piano Accompanist		21285	
Extraction Worker		21278	

Particle Physicist	21273
Special Forces Officer	21264
Office Clerk	21261
Water Transport Worker	21236
Alligator Farmer	21231
Tailor	21222
Product Safety Engineer	21203
Greenhouse Technician	21188
Fish And Game Warden	21184
Oncologist	21179
Urologist	21175
Insurance Sales Agent	21160
Animal Assisted Therapist	21158
Commercial Pilot	21144
Biostatistician	21142
App Developer	21141
Nuclear Engineer	21127
Spa Manager	21093
Social Worker	21087
Veterinary Technologist	21074
Revenue Agent	21058
Licensed Practical Nurse	21050
Music Librarian	21045
Irrigation Technician	21040
Endoscopy Technician	21038
Customer Service Representative	21027
Colorectal Surgeon	21025
Credit Counselor	21016
Real Estate Agent	21007
Technical Writer	21005
Senator	20988
Geospatial Information Scientist	20981
Periodontist	20979
Nurse Practitioner	20972
Physical Therapist	20968
Acute Care Nurse Practitioner	20964
Bioinformatics Scientist	20961
Certified Crop Advisor	20960
Mechatronics Engineer	20954
Arborist	20940
Water Treatment Plant Operator	20938
Financial Analyst	20935
Physician Assistant	20925
Investment Fund Manager	20924
Principal	20917
Human Resources Manager	20894
Court Reporter	20892
Speech Language Pathologist	20888
Military Tactical Operations Leader	20868
Music Historian	20865
Massage Therapist	20863
Industrial Production Manager	20859
Rail Transportation Worker	20838
Financial Advisor	20832
Diagnostic Medical Sonographer	20822
Amusement Attendant	20816
Cartographer	20809
Hospitalist	20801
Mining and Geological Engineer	20797
Office Manager	20797
Surgeon	20796
Diplomat	20788
Pulmonologist	20786
Credit Analyst	20785
Restaurant Cook	20770
Marketing Manager	20767
Midwife	20758
Bailiff	20757
Aquacultural Manager	20755
Cytotechnologist	20755
Cardiothoracic Surgeon	20749
Pathologist	20740
Microbiologist	20732
Brewmaster	20728
Treasurer	20724
Retail Salesperson	20712
Solar Thermal Installer	20707
Otolaryngologist	20685
Rehabilitation Counselor	20659
Personal Chef	20655
Geologist	20645



Hydroelectric Plant Technician	20639
Retail Manager	20633
Marine Engineer	20612
Childcare Program Administrator	20603
Comedian	20596
Mayor	20592
Music Promoter	20583
Photonics Engineer	20581
Sales Manager	20580
UX Designer	20576
Customs Inspector	20568
Auditor	20567
Luthier	20561
Biomass Plant Technician	20559
Civil Engineer	20528
Commercial Artist	20521
Lobbyist	20510
Geotechnical Engineer	20504
Personal Trainer	20501
Legal Secretary	20496
Copywriter	20483
Family Practitioner	20466
Web Designer	20445
Substance Abuse Social Worker	20433
Music Studio Owner	20408
Agricultural Engineer	20401
Oral and Maxillofacial Surgeon	20399
Veterinary Acupuncturist	20396
Talent Director	20395
Music Manager	20395
Business Analyst	20394
Event Planner	20383
Acupuncturist	20378
Horticulturist	20369
Psychiatric Aide	20360
Financial Manager	20360
Transit Police Officer	20350
Paramedic	20336
Aircraft Launch and Recovery Specialist	20336
Computer Repair Technician	20332
Landscape Architect	20330
Broadcast and Sound Engineering Technician	20315
Back-End Developer	20307
Product Manager	20307
Hazardous Materials Removal Worker	20305
Occupational Therapist	20304
Hostess	20302
Energy Auditor	20296
Chemical Technician	20281
Nurse Anesthetist	20272
Financial Quantitative Analyst	20268
Front-End Developer	20259
Air Weapons Specialist	20258
Arbitrator	20239
Coroner	20237
Optician	20237
Food Processing Production Supervisor	20222
Judicial Law Clerk	20217
Statistician	20202
Javascript Developer	20201
Geothermal Technician	20198
Actuary	20194
Risk Management Specialist	20190
Orthopaedic Surgeon	20181
Dental Hygienist	20172
Urban Planner	20171
Paralegal	20162
Nanotechnology Engineer	20160
Music Editor	20128
Physiotherapist	20114
Conservation Scientist	20110
Forest and Conservation Worker	20107
Certified Professional Organizer	20104
Data Analyst	20088
Flight Engineer	20079
Internist	20058
Sports Broadcaster	20057
Wildlife Enforcement Officer	20054
Securities and Commodities Broker	20048
Forester	20042
Radio Frequency Specialist	20024

Clinical Psychologist	20022
Video Game Producer	20017
Radiation Therapist	20017
Food Regulatory Consultant	20015
Nanosystems Engineer	20014
Animal Lawyer	20014
Recreation Worker	20005
Music Contractor	19995
Surgical Assistant	19993
Cost Estimator	19980
Ambulance Dispatcher	19963
News Reporter	19959
Purchasing Manager	19955
Wind Energy Engineer	19951
Biomedical Engineer	19945
Cardiovascular Technologist and Technician	19944
Music Critic	19935
Translator	19929
Grounds Maintenance Worker	19921
Live Sound Engineer	19903
Management Consultant	19902
Agricultural Inspector	19881
Anesthesiologist Assistant	19877
Flight Attendant	19871
Career Counselor	19861
Soil and Plant Scientist	19859
Property Manager	19853
Registered Dietitian Nutritionist	19851
Bank Branch Manager	19842
Music Publicist	19839
Nurse Educator	19827
Costume Attendant	19816
Occupational Physician	19814
Hydrologist	19784
Account Manager	19764
Dental Assistant	19763
Artist & Repertoire Coordinator	19734
Audio and Video Equipment Technician	19733
Medical Secretary	19722
Quality Control Inspector	19718
Customs Broker	19716
Medical and Clinical Laboratory Technician	19714
Ophthalmic Medical Technician	19713
Kinesiologist	19709
Sign Language Interpreter	19705
Psychiatric Technician	19698
Search Engine Marketing Specialist	19697
Orthotist and Prosthetist	19693
Nutritionist	19692
Entomusicologist	19688
Camera Operator	19670
Ophthalmologist	19669
Cytogenetic Technologist	19656
Music Publisher	19654
Respiratory Therapist	19648
Cryptographer	19638
Non-Destructive Testing Specialist	19610
Barista	19609
Radiologic Technologist	19605
Medical Transcriptionist	19601
Coach	19595
CIO	19592
Soil and Water Conservationist	19574
Phlebotomist	19565
Water Engineer	19549
Full Stack Developer	19542
Surveyor	19530
Economist	19529
Gastroenterologist	19523
Underwriter	19519
Natural Sciences Manager	19511
Correspondent	19510
Hypnotherapist	19507
Concierge	19504
Food Science Technologist	19496
Community Health Worker	19493
Talent Agent	19493
Occupational Therapist Assistant	19473
Compensation and Benefits Manager	19471
Social Media Manager	19461
Surgical Technologist	19455

Health Services Manager	19452
Fitness and Wellness Coordinator	19440
Sommelier	19433
Video Game Level Editor	19429
Caterer	19420
Naturopathic Physician	19419
Compliance Manager	19415
Materials Scientist	19404
Medical Records Technician	19396
Endocrinologist	19387
Music Supervisor	19386
Tour Guide	19364
Supply Chain Manager	19360
Veterinary Pathologist	19341
Pharmacy Technician	19337
Fishery Officer	19335
Park Ranger	19325
Fundraising Manager	19325
Neurodiagnostic Technologist	19300
Healthcare Social Worker	19287
Transportation Planner	19283
Probation Officer	19275
Real Estate Appraiser	19274
Air Crew Member	19273
Genetic Counselor	19265
Energy Broker	19259
Exhibit Designer	19255
Pharmaceutical Sales Representative	19246
Road Manager	19244
Physical Therapist Assistant	19237
Archivist	19232
Music Executive	19224
Digital Marketing Specialist	19224
Museum Conservator	19223
Games Artist	19215
Environmental Restoration Planner	19202
CEO	19201
Artist & Repertoire Administrator	19195
Environmental Engineer	19191
Clinical Ethicist	19190
IT Manager	19181
Perfusionist	19164
Health Educator	19153
Volcanologist	19146
Embalmer	19142
Hearing Aid Specialist	19129
Music Business Manager	19110
Food Safety And Quality Technician	19109
Database Administrator	19100
Pharmacist	19053
Audiologist	19048
Environmental Consultant	19025
Geographer	19004
Operations Research Analyst	19004
Zoo Educator	18991
Medical Appliance Technician	18979
Industrial Designer	18961
Food Product Development Technician	18947
Industrial Organizational Psychologist	18943
Digital Remastering Engineer	18901
Informatics Nurse Specialist	18897
Fire Inspector	18882
Bartender	18858
Epidemiologist	18846
Information Security Analyst	18834
Range Manager	18816
Travel Agent	18806
Lodging Manager	18786
Recreational Therapist	18776
Hand Therapist	18774
Education Administrator	18772
Food Market Analyst	18770
Drafter	18744
Occupational Health Specialist	18721
Market Research Analyst	18720
Gem Worker	18714
Control Center Specialist	18699
Search Engine Optimization Specialist	18658
Recruiter	18635
Technical Artist	18605
Technical Product Manager	18602

Executive Assistant	18587
Distance Learning Coordinator	18584
Booking Agent	18564
Content Manager	18544
Hearing Officer	18515
Graduate Teaching Assistant	18498
Optometrist	18467
Logistician	18465
Dietetic Technician	18434
Digital Colourist	18410
Ophthalmic Medical Technologist	18345
Clinical Research Coordinator	18343
Industrial Ecologist	18313
Desktop Publisher	18275
Fraud Analyst	18251
Meteorologist	18239
Magnetic Resonance Imaging Technologist	17997
Musician	15865
Physicist	9841
Engineer	9775
Wildlife Rehabilitator	9149
COO	8932
Scientist	6958
Teacher	6607
Forensic Psychologist	6561
Forensic Pathologist	6177
Performer	5864
Mammalogist	5436
Music Producer	5046
Astronaut	4958
Counselor	4668
Motivational Speaker	4250
Cartoonist	4197
Rancher	4179
Project Manager	4159
Cinematographer	4152
Computer Crime Investigator	3822
Cardiologist	3770
Pet Adoption Counselor	3721
Dog Breeder	3395
Aquarist	3259
Bodyguard	3248
Set Designer	3222
Art Teacher	3186
Food Stylist	3184
Food Server	3143
Zoo Endocrinologist	3063
Videographer	3037
Security Engineer	3020
Dog Walker	3016
Beekeeper	3011
Organic Farmer	2950
Paleontologist	2889
Dog Groomer	2857
Shipping/Receiving Clerk	2842
Recording Engineer	2789
Pet Detective	2753
Radio Talk Show Host	2735
Food Critic	2723
Sculptor	2700
Executive Producer	2663
Curator Of Zoo Exhibits	2650
Consultant	2643
Jockey	2642
Stuntman	2634
Calligrapher	2595
Kennel Technician	2590
Animal Nutritionist	2586
Chicken Sexer	2542
Falconer	2530
Agronomist	2508
Franchise Owner	2505
Life Coach	2490
Farrier	2478
Golf Course Superintendent	2463
Livestock Feed Sales Representative	2455
Entomologist	2441
Tree Service Technician	2435
Poultry Farmer	2430
Magician	2429
Crocodile Wrangler	2414

Ski Patroller	2377
Vermiculturist	2374
CFO	2367
Grain & Forage Crop Farmer	2359
Publicist	2320
Controller	2303
Biofuel Manufacturing Research Engineer	2277
Customer Success Manager	2249
Snake Milker	2241
Agrologist	2212
Recipe Developer	2112
Biotechnician	2104
Solution Architect	2100
Nuclear Medicine Technologist	2080
CISO	2035
Gemologist	2028
Geothermal Engineer	2008
IT Security Consultant	2005
Systems Architect	1977
Cryptanalyst	1974
Security Architect	1966
Quality Assurance Analyst	1961
Network Administrator	1960
Computer Network Architect	1947
Gunsmith	1946
Budget Analyst	1940
Environmental Technician	1927
Information Security Auditor	1923
Endodontist	1893
Information Security Manager	1893
Enterprise Architect	1886
Chiropractic Neurologist	1875
Security Systems Administrator	1863
Genomics Technician	1854
Information Security Director	1847
Security Software Developer	1845
Research Chef	1835
Geodesist	1791
Server Administrator	1753
Gaffer	1743
Disaster Recovery Specialist	1727

## Reliability

Psychometric scales are used to power the insights provided to users once they have completed the assessment. These insights come in the form of personality and trait reports. Thus, reliability and internal consistency of the scales is essential. Internal consistency, generally measured using Cronbach's alpha, assesses if the items within the scale are measuring the same thing. Cronbach's alpha measures if the items in the scale tend to vary together. Cronbach's alpha values vary between 0 and 1, where a value of 0 means that the items are completely independent, and 1 means that they're identical in terms of the responses that they generate. An internally consistent scale will generally have a value greater than 0.7.

The Cronbach's alpha values in the below table were calculated from a sample of 18504 users that completed the Sokanu assessment.

Scale	Cronbach's Alpha
:-----:	-----:
Big 5 Agreeableness	0.779223
Big 5 Conscientiousness	0.911138
Big 5 Emotional Stability	0.860514
Big 5 Extraversion	0.877067
Big 5 Openness to Experience	0.774514
Big 5 Social Responsibility	0.643087
Interest in Artistic Jobs	0.856785
Interest in Conventional Jobs	0.757772
Interest in Enterprising Jobs	0.850712
Interest in Investigative Jobs	0.803528
Interest in Realistic Jobs	0.826165
Interest in Social Jobs	0.836996
Work Style of Acceptance of Criticism	0.530219
Work Style of Achievement/Effort	0.848568
Work Style of Adaptability/Flexibility	0.793724

Work Style of Analytical Thinking		0.849611	
Work Style of Attention to Detail		0.857183	
Work Style of Concern for Others		0.858407	
Work Style of Cooperation		0.85035	
Work Style of Dependability		0.811034	
Work Style of Impression Management		0.809467	
Work Style of Independence		0.778485	
Work Style of Initiative		0.803447	
Work Style of Innovation		0.885449	
Work Style of Integrity		0.827372	
Work Style of Leadership		0.870873	
Work Style of Persistence		0.809092	
Work Style of Self Control		0.868853	
Work Style of Social Orientation		0.850492	
Work Style of Stress Tolerance		0.859463	

## Validity

A valid test is supported by many types of evidence that tell users if the assessment measures what it is meant to measure for a wide variety of groups. Within the context of career matching, validity implies how accurately we match users with careers. Validity can be demonstrated using an F1 score as well as root mean squared error (RMSE). Both of these metrics are discussed below.

### F1 Score

F1 score, in this context, measures how accurately we are able to classify careers an individual would be a good match with in respect to either interest or satisfaction. Sometimes the line between a career a user likes a lot (e.g. a rating of 4) and a career that a user loves (e.g. a rating of 5) isn't clear, so we consider accurately predicting a 4 or 5 for a career that a user would actually rate *either* a 4 or 5 to be a success. F1 score combines the concepts of **precision** and **recall** into a single metric. In this context, precision helps answer the question: "Of all the times that we *predict* a match as "good", what proportion of them are *truly* good?". Alternatively, recall helps answer the question: "Of all the matches that are *truly* "good", what proportion of them are we able to *predict* as good?". These concepts are demonstrated in the equations below,

$$\text{Precision} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Positives}}$$

$$\text{Recall} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Negatives}}$$

Precision and recall are combined into one metric, the F1 score, by taking their harmonic mean. This allows one to balance the two metrics in order to easily compare performance,

$$\text{F1} = \frac{2 \cdot \text{Precision} \cdot \text{Recall}}{\text{Precision} + \text{Recall}}$$

It should be noted that F1 score values range from 0 - 1. A perfect score of 1 should not be expected within this context.

### Root Mean Squared Error (RMSE)

RMSE is a measurement of how *close* a predicted career match is from the ground truth.

$$\text{RMSE} = \sqrt{\frac{1}{n} \sum_{i=1}^n (\text{Prediction}_i - \text{Ground Truth}_i)^2}$$

In the equation above, "Ground Truth" represents data from the user in which they would tell us how satisfied they were in a past career. "Prediction" represents the output from the relevant career model.

Although root mean squared error is commonly used and understood performance metric, it is not representative of the problem under the context of career matching. The typical Sokanu user is not particularly concerned with how *closely* Sokanu is able to predict their career matches. Instead, users tend to concentrate on Sokanu's ability to determine high

quality careers. By using F1 score as a metric instead of RMSE when trying to optimize models, Sokanu's predictions are more in line with user intentions.

## Face Validity

A valid assessment should be able to provide accurate results for a wide variety of users. Below show the F1 scores for various demographic groups.

Ethnicity	F1 Score Average	N	F1 Score Standard Deviation
Aboriginal	0.558232	91	0.266197
Arab	0.524361	91	0.263779
Black or African American	0.529569	91	0.287164
East Asian	0.518911	91	0.281489
Hispanic, Latino, or Spanish	0.567059	91	0.29404
Other	0.512185	91	0.281697
South Asian	0.520001	91	0.300191
White	0.505968	91	0.283138

The remaining comparisons can be found in the Appendix.

Additionally, one would expect there to be intuitive correlations between certain items and careers that people claim to be a "good" match with. For example, one would expect there to be a high correlation between the interest in "Finding support resources for families in need" and users who had reported a high level of interest in working as a Family Social Worker. This is demonstrated in the tables below.

Career Name	Average Item Response Value
Family Social Worker	4.10149
Substance Abuse Social Worker	3.98118
Special Education Teacher	3.97419
Rehabilitation Counselor	3.96422
Healthcare Social Worker	3.919
Community Health Worker	3.90452
Social Worker	3.90118
School Counselor	3.86138
Drug & Alcohol Counselor	3.835
Counselor	3.7997
Childcare Program Administrator	3.78566
Occupational Therapist	3.78559
Mental Health Counselor	3.77933
Childcare Worker	3.7767
Personal Care Aide	3.75716
Home Health Aide	3.74623
Orderly	3.74096
Marriage Therapist	3.74007
School Psychologist	3.73301
Counseling Psychologist	3.68914

The table above shows the top 20 careers ordered by average item response values for "Finding support for families in need". This provides further evidence of item validity through correlation with intuitive careers. Additional demonstrations of this analysis can be found in the Appendix.

## Norm Groups

Assessments are tools for detecting differences. Sokanu's assessment detects differences in fit with careers. This information is helpful when choosing a career or the right person for a job.

Sometimes a lack of difference is desirable. To promote equal employment goals, it is helpful when protected groups score similarly to other groups. The tables below showcase differences between item responses for different demographic groups on four grounds: ethnicity, gender, age, and education level.

Group differences are measured using Cohen's *d* (Cohen, 1988), which takes into account both the size and consistency of the difference between groups. When interpreting Cohen's *d*, .2 is considered a small effect, .5 is a medium effect, and .8 is a large effect.

Item Text	Gender	Response Value Mean	Response Value Std	N	C
Computer programming	f	2.26	1.12	34679	
Computer programming	m	2.84	1.21	34679	
Helping people	f	3.95	1.01	34679	
Helping people	m	3.59	1.05	34679	
Driving a car or truck many hours a day	f	6.09	3.55	34679	
Driving a car or truck many hours a day	m	4.83	3.53	34679	
Installing equipment or programs	f	2.17	1.04	34679	
Installing equipment or programs	m	2.9	1.14	34679	
Learning new things	f	4.26	0.8	34679	
Learning new things	m	4.23	0.8	34679	
Write a play for a theater	f	2.53	1.34	34679	
Write a play for a theater	m	2.35	1.27	34679	
Science	f	3.1	1.29	34679	
Science	m	3.38	1.2	34679	
Critical thinking	f	3.98	0.95	34679	
Critical thinking	m	4.11	0.89	34679	
Process transactions at a bank	f	2.06	1.08	34679	
Process transactions at a bank	m	2.3	1.11	34679	
Investigate causes of climate change	f	2.65	1.26	34679	
Investigate causes of climate change	m	2.81	1.24	34679	
Find support resources for families in need	f	3.06	1.22	34679	
Find support resources for families in need	m	2.66	1.19	34679	
Direct the making of a movie	f	2.9	1.34	34679	
Direct the making of a movie	m	3	1.33	34679	
Sell a house	f	2.44	1.19	34679	
Sell a house	m	2.72	1.2	34679	
Help a client make business decisions	f	2.7	1.22	34679	
Help a client make business decisions	m	3.06	1.22	34679	
Create art for sale and exhibition	f	2.77	1.38	34679	
Create art for sale and exhibition	m	2.48	1.29	34679	
Write marketing material for a client's products	f	2.48	1.19	34679	
Write marketing material for a client's products	m	2.63	1.17	34679	
Keep records of payments received	f	2.4	1.18	34679	
Keep records of payments received	m	2.5	1.16	34679	
Sort mail in a post office	f	1.91	1.08	34679	
Sort mail in a post office	m	1.83	0.99	34679	
Verify quality of parts before shipment	f	1.97	1.04	34679	
Verify quality of parts before shipment	m	2.45	1.14	34679	
Make customized kitchen cabinets	f	2.07	1.15	34679	
Make customized kitchen cabinets	m	2.34	1.18	34679	
Interpret results of medical tests	f	2.94	1.28	34679	
Interpret results of medical tests	m	2.76	1.2	34679	
Help someone with a disability get dressed	f	2.3	1.18	34679	
Help someone with a disability get dressed	m	1.97	1.06	34679	
Advise organizations on how to meet their business goals	f	2.66	1.23	34679	
Advise organizations on how to meet their business goals	m	2.97	1.24	34679	
Oversee the hiring of new employees	f	2.9	1.2	34679	
Oversee the hiring of new employees	m	3.04	1.17	34679	
Study sea creatures	f	3	1.32	34679	
Study sea creatures	m	2.96	1.28	34679	
Estimate the value of items for an insurance policy	f	1.95	1.01	34679	
Estimate the value of items for an insurance policy	m	2.34	1.1	34679	
Help elderly people complete their daily activities	f	2.48	1.21	34679	
Help elderly people complete their daily activities	m	2.17	1.11	34679	
Perform scientific analyses on evidence from a crime scene	f	3.22	1.31	34679	
Perform scientific analyses on evidence from a crime scene	m	3.17	1.24	34679	
Teach kids how to play well with other children	f	2.87	1.3	34679	
Teach kids how to play well with other children	m	2.49	1.23	34679	
Entertain an audience	f	2.72	1.35	34679	
Entertain an audience	m	2.94	1.35	34679	
Repair damaged farm equipment	f	1.68	0.93	34679	
Repair damaged farm equipment	m	2.26	1.19	34679	
Write lyrics for songs	f	2.62	1.34	34679	
Write lyrics for songs	m	2.63	1.34	34679	
Install drywall in houses	f	1.65	0.91	34679	
Install drywall in houses	m	2.05	1.06	34679	
Operate a crane at a building site	f	1.62	0.89	34679	
Operate a crane at a building site	m	2.19	1.15	34679	
Counsel people with drug or alcohol addiction	f	2.66	1.26	34679	
Counsel people with drug or alcohol addiction	m	2.39	1.21	34679	
Analyze data using statistics	f	2.63	1.24	34679	
Analyze data using statistics	m	3.08	1.22	34679	
Examine artifacts left behind by previous civilizations	f	2.91	1.34	34679	
Examine artifacts left behind by previous civilizations	m	3.06	1.3	34679	
Oversee all aspects of a business	f	2.76	1.28	34679	
Oversee all aspects of a business	m	3.19	1.27	34679	
Research how genes function	f	2.87	1.32	34679	



Research how genes function	m		2.86		1.27	34679	
Take part in a musical performance	f		2.73		1.43	34679	
Take part in a musical performance	m		2.57		1.39	34679	
Finance	f		2.28		1.14	34679	
Finance	m		2.73		1.19	34679	
Athletics	f		2.61		1.32	34679	
Athletics	m		3.21		1.34	34679	
Flying	f		2.29		1.22	34679	
Flying	m		2.91		1.29	34679	
Law	f		2.64		1.25	34679	
Law	m		2.67		1.2	34679	
Healthcare service	f		3.01		1.33	34679	
Healthcare service	m		2.67		1.21	34679	
Physical science	f		2.66		1.23	34679	
Physical science	m		3.01		1.2	34679	
Nature and agriculture	f		2.97		1.34	34679	
Nature and agriculture	m		2.98		1.26	34679	
Professional advising	f		2.9		1.19	34679	
Professional advising	m		2.95		1.16	34679	
Creative arts	f		3.42		1.34	34679	
Creative arts	m		3.06		1.35	34679	
Culinary arts	f		2.84		1.26	34679	
Culinary arts	m		2.71		1.21	34679	
Social sciences	f		3.36		1.23	34679	
Social sciences	m		3.06		1.2	34679	
Beauty & style	f		3.21		1.31	34679	
Beauty & style	m		2.35		1.2	34679	
Working with animals	f		3.27		1.37	34679	
Working with animals	m		2.95		1.26	34679	
Creative writing & journalism	f		3.13		1.33	34679	
Creative writing & journalism	m		2.78		1.29	34679	
Green industry	f		3.01		1.29	34679	
Green industry	m		3.08		1.21	34679	
Politics	f		2.26		1.23	34679	
Politics	m		2.58		1.29	34679	
Engineering	f		2.34		1.19	34679	
Engineering	m		3.24		1.25	34679	
Sales	f		2.29		1.15	34679	
Sales	m		2.65		1.2	34679	
Protective services	f		2.42		1.17	34679	
Protective services	m		2.66		1.18	34679	
Skilled trades	f		2.2		1.1	34679	
Skilled trades	m		2.88		1.21	34679	
Office clerical work	f		2.38		1.19	34679	
Office clerical work	m		2.1		1.04	34679	
Mathematics	f		2.44		1.29	34679	
Mathematics	m		2.92		1.31	34679	
Military	f		1.9		1.09	34679	
Military	m		2.47		1.29	34679	
Information technology	f		2.28		1.13	34679	
Information technology	m		3.02		1.22	34679	
Music	f		3.5		1.33	34679	
Music	m		3.44		1.34	34679	
Teaching	f		3.14		1.21	34679	
Teaching	m		2.98		1.2	34679	

The remaining comparisons can be found in the Appendix.

## Comparison with Other Assessments

Sokanu's assessment is a modern take on traditional career assessments. It differs from, and improves upon, other assessment products in a few important ways.

### More Granular Career Matching

Nearly all other career matching assessments focus on interpreting scales rather than items. For most of the scales used by other assessment products, it is well-founded in the literature that the items that make up the scale measure the same underlying factor. Yet by coarsening the measure of a user's personality by combining items into a scale, these assessments lose some of the information that makes each person unique. At Sokanu, we've tested how well we can predict career matches using both scales and items, and have empirically found that using items allows for significantly better career matches.

The traditional barrier to using items for career matching instead of scales is that responses to items are noisier, and so scales are used to reduce the noise. However, the modern machine learning methods used at Sokanu are designed to sort through this noise to find the signal, allowing for state-of-the-art performance at career matching.

### **Optimal Weights**

Not only does Sokanu refine how a person is considered by looking at items instead of scales, but each item is weighted differently depending on which career is being considered. Most other assessments have an ad hoc association between a certain subset of their scales and the pool of careers that they match to. Instead of having an all-or-nothing relationship between items and careers, Sokanu uses machine learning methods to find optimal weights for each item and each career. When combined with the enormous amount of data provided by our diverse user-base, this means that the models we employ for career matching are the best possible that could be developed from the data.

### **Continually Evolving**

One of the major strengths of the Sokanu assessment is the ability to rapidly update the underlying models to reflect the changing user-base and career pool. Consider that many traditional assessments were developed years ago, potentially based on theory or practices from the mid-to-late 20th century, and they've only had minimal updates since. Careers change rapidly, with new technologies and practices supplanting old methods, and this means that older tests no longer reflect the new realities of these careers. Moreover, new careers are defined and come into existence, and existing tests have no rigorous way of connecting their assessments with them.

In contrast, Sokanu has a stream of up-to-date user data coming in every day. As new careers are defined or other careers change, we update our career pool and can get near instantaneous feedback from users. This means that new models are quickly made and old models are rapidly updated.

### **Satisfaction Matches**

Other career assessments focus on providing matches that a user might be interested in. Although Sokanu also does this using rigorous, modern methods, we also know that users ultimately want a career that they will be satisfied with. Since we have such a large user-base, we are able to crowd-source satisfaction ratings for a variety of careers, allowing for separate models from the interest-based models to be developed. These satisfaction models provide a separate level of insights for users, helping them to separate the idea of a career from the reality of it.

### **Assessment Flexibility**

A final key strength for Sokanu is the fact that the models used to provide career matches are very flexible. This means that they can be tweaked and adapted to solve issues related to, for example, flat or elevated profiles without worsening the overall performance of the models. We describe such a situation below in the *Existing Challenges* section.

Other career assessments are rooted in very traditional psychometric theory and practices, which means that they have very little flexibility. Any changes aren't done in a data-driven way, unlike at Sokanu, and can have unintended side-effects.

## **Existing Challenges**

The quality of career matches is always being improved, and there are two key areas where efforts at improvement are being directed.

### **Flat or Elevated Profiles**

Flat or elevated profiles refer to users that generally skew towards giving lower than, or higher than, average responses. For example, a user with a flat profile might provide responses that are rarely higher than 3. As such, they report feeling negative or neutral for nearly every item. For such users who tend not to express strong positive feelings about any particular interest or activity, it can be difficult to find a career match. A similar problem is encountered with users who have elevated profiles, who tend to give strongly positive responses to most items. The issue here is that it can be challenging to filter down to those careers that such a user would truly enjoy when there are seemingly so many valid matches for them.

Fortunately, there are relatively simple ways that this issue can be addressed. The flexibility of the machine learning models being employed at Sokanu allows for individual "bias terms" to be included in the model. This allows the model to be calibrated to the rating tendencies of specific users. Instead of comparing a user's responses on an absolute scale from 1 to 5, where 1 represents "Dislike" and 5 represents "Love", the scale is either shifted up or down to be relative to the

range that a user gives responses in. This method works for both flat and elevated profiles and will soon be included in all the models at Sokanu.

### **Self-Deception**

In order to give the best possible career matches, a user taking Sokanu's assessment must try to be honest and self-reflective when responding to items. Self-deception refers to the situation where a user gives responses that are potentially insufficiently critical. Such deception could be intentional in order to receive certain results, or it could be a genuine lack of self-reflection. Either way, it is important to flag these users so that their responses don't influence the behavior of the models for other users.

One integral method of doing this is by adding items that exist only for detecting self-deception. For example, items such as "I have never told a lie." or "I have never done something that I later regretted." should almost universally have answers of "Strongly Disagree" or "Disagree". Responses outside of the range mean that the user taking the assessment might not be being sufficiently thoughtful. Such items will be included in Sokanu's assessment in the near-future.

## **Further Technical Detail**

Sokanu is focused on providing users two types of career matches, which involves making models to give two kinds of predictions:

### **1. Predicting interest**

In this case, models are optimized for predicting which careers people would be *most interested* in. This optimization is done using answers to career interest questions. More concretely, we use answers to questions such as "*How interested are you in being an Accountant?*" as the ground truth. From this, we are able to predict which careers users are most interested/intrigued by.

### **2. Predicting satisfaction**

In this case, models are optimized for predicting which careers people would be *most satisfied* working as. Optimization is conducted by using real career history satisfaction ratings as labels in the error equation above. Put simply, we are able to predict which careers people would actually enjoy working as.

Each one of Sokanu's careers contains its own set of models capable of predicting a 1-5 rating for both interest and career satisfaction. We see each career as unique, and customizing a model for each allows for flexibility and higher quality recommendations.

## **Problem Formulation**

Sokanu uses feature-weighted linear stacking (FWLS) [4] to combine multiple models into a single model that is used for career matching. FWLS works by blending other models based on "meta-features". For example, Sokanu uses the number of career ratings a user has provided, to maximize the predictive performance of the final model. The result is a blended model that performs better than a single model would.

For example, as is mentioned below, one of these constituent models is a matrix factorization model. The predictions from matrix factorization become better as a user rates more careers. FWLS then allows Sokanu to emphasize the predictions from this model as more user ratings are provided to give users the best possible career matches using the information at hand.

In order to create models using the features and labels mentioned above, the problem of career matching must be translated into a mathematical optimization problem. Below is a summary of how this is done and which models are used.

### **Ordinal Regression**

The ordinal regression [3] component of the algorithm focuses on using the features learned about the user when answering our questions. The core idea is that the model learns a set of *weights*, labelled  $w$ , and a set of  $T$  thresholds. A user's responses to the assessment, denoted  $x$ , are each multiplied by one of the weights to give a raw output  $z$ . As  $z$  grows (or shrinks), it passes the thresholds in  $T$ . Depending on how many thresholds it's bigger than, a rating is predicted. In a nutshell, we optimize the following loss function across all training samples (i.e. users who have given us data). Note that in what follows,  $y$  always represents the true label.

$$loss(z, y) = \sum_{i=1}^{T-1} f(s(i, y)(\theta_i - z))$$

where,

$$s(i, y) = \begin{cases} -1 & \text{if } i < y \\ 1 & \text{if } i \geq y \end{cases}$$

and,

$$z = w^T x$$

For this model, we use the logistic loss function,

$$f(x) = \log(1 + \exp(-x))$$

Through optimization methods such as stochastic gradient descent, we minimize the loss function with respect to the weights and thresholds. In this way, for each career, we learn the right emphasis to place on each of the psychometric scales that we measure users on.

Once parameters have been optimized, predictions of how much someone would be interested/satisfied in a career can be made via:

$$\hat{y} = \begin{cases} \text{Hate It} & \text{if } z < \theta_1 \\ \text{Dislike It} & \text{if } \theta_1 \leq z < \theta_2 \\ \text{Neutral} & \text{if } \theta_2 \leq z < \theta_3 \\ \text{Like It} & \text{if } \theta_3 \leq z < \theta_4 \\ \text{Love It} & \text{if } \theta_4 \leq z \end{cases}$$

It should also be noted that synthetic minority over sampling (SMOTE) was used at different with different ratios in order to address class imbalances in the data.

### Matrix Factorization

Matrix factorization [2], a collaborative filtering method, is popular within product recommendation systems. This technique uses the career ratings that users provide in order to predict the career ratings for careers where a rating is unknown. For example, suppose that a user who has not provided a rating for the Author career is found to generally have similar ratings as another specific set of users. If that set of other users generally rates the Author career highly (either in interest or satisfaction), it is intuitive that we should also be predicting a high rating for the Author career for our original user. In order to accomplish this, we optimize the following loss function

$$loss(y_{ij}, u_i, v_j) = \frac{1}{2} (u_i^T v_j - y_{ij})^2$$

In the above,  $u$  denotes the embedding learned for user  $i$ ,  $v$  denotes the embedding learned for career  $j$ , and  $y$  is the rating provided by the user for the career. The lengths of the embeddings was chosen to be 20 based on empirical evidence.

### Feature Weighted Linear Stacking (FWLS)

Lastly, in order to produce a final prediction, we combine the results from all ordinal regression models and matrix factorization using FWLS. In order to do this, we set up another optimization problem where we tune the weights placed on meta-features within our model. In what follows,  $x$  denotes a user's responses and  $y$  denotes the rating (either interest or satisfaction) the user gave a career.

$$loss(y, x) = \frac{1}{2} (b(x) - y)^2$$

where,

$$b(x) = \sum_{i=0}^L w_i(x)g_i(x)$$

and,

$$w_i(x) = \sum_{j=0}^M v_{ij} f_j(x)$$

In the above,  $b$  denotes the prediction of the FWLS model,  $g$  denotes the output from either the ordinal regression or matrix factorization model,  $f$  denotes a meta-feature, and  $v$  denotes the learned weight the model places on that meta-feature.

## Appendix

### Average Item Responses

Help a client make a business decision:

Career Name	Average Item Response Value
Business Analyst	4.11066
Investment Banker	4.05044
Sales Manager	4.0486
Financial Advisor	4.01643
Financial Analyst	4.009
Marketing Manager	3.99455
Investment Fund Manager	3.98198
Management Consultant	3.97151
Money Manager	3.94432
COO	3.9441
Financial Manager	3.94179
Account Manager	3.93167
Consultant	3.92584
Sales Representative	3.89234
Advertising Manager	3.88585
Purchasing Manager	3.88218
Chief Executive	3.87666
Project Manager	3.87564
Market Research Analyst	3.85263
Supply Chain Manager	3.84295

Interest in Social Sciences:

Career Name	Average Item Response Value
Sociologist	4.4435
Anthropologist	4.18681
Industrial Organizational Psychologist	4.18126
Psychologist	4.16338
Political Scientist	4.13549
Counseling Psychologist	4.10392
School Psychologist	4.07272
Psychiatrist	4.06706
Substance Abuse Social Worker	4.06557
Marriage Therapist	4.04267
Neuropsychologist	4.02586
Mental Health Counselor	4.02031
Forensic Psychologist	4.02013
Humanitarian	3.98652
Clinical Psychologist	3.98299
Rehabilitation Counselor	3.96833
Historian	3.94435
Drug & Alcohol Counselor	3.93852
Family Social Worker	3.92932
Diplomat	3.92209

## Norm Groups:

### Ethnicity

Ethnicity	Item Text	Response Value Mean
Aboriginal	Advise organizations on how to meet their business goals	2.62
Arab	Advise organizations on how to meet their business goals	2.88
Black or African American	Advise organizations on how to meet their business goals	3.08
East Asian	Advise organizations on how to meet their business goals	3.04
Hispanic, Latino, or Spanish	Advise organizations on how to meet their business goals	2.59
Native Hawaiian or Other Pacific Islander	Advise organizations on how to meet their business goals	2.7
Other	Advise organizations on how to meet their business goals	2.93
South Asian	Advise organizations on how to meet their business goals	3.22
White	Advise organizations on how to meet their business goals	2.74
Aboriginal	Analyze data using statistics	2.76
Arab	Analyze data using statistics	2.87
Black or African American	Analyze data using statistics	2.72
East Asian	Analyze data using statistics	2.82
Hispanic, Latino, or Spanish	Analyze data using statistics	2.57
Native Hawaiian or Other Pacific Islander	Analyze data using statistics	2.86
Other	Analyze data using statistics	2.69
South Asian	Analyze data using statistics	3.18
White	Analyze data using statistics	2.94
Aboriginal	Athletics	2.76
Arab	Athletics	3.01
Black or African American	Athletics	2.62
East Asian	Athletics	2.5
Hispanic, Latino, or Spanish	Athletics	2.6
Native Hawaiian or Other Pacific Islander	Athletics	2.98
Other	Athletics	2.67
South Asian	Athletics	2.49
White	Athletics	2.97
Aboriginal	Beauty & style	3.06
Arab	Beauty & style	2.87
Black or African American	Beauty & style	2.88
East Asian	Beauty & style	3.22
Hispanic, Latino, or Spanish	Beauty & style	2.91
Native Hawaiian or Other Pacific Islander	Beauty & style	3.05
Other	Beauty & style	3.11
South Asian	Beauty & style	2.87
White	Beauty & style	2.78
Aboriginal	Computer programming	2.6
Arab	Computer programming	2.65
Black or African American	Computer programming	2.58
East Asian	Computer programming	2.55
Hispanic, Latino, or Spanish	Computer programming	2.17
Native Hawaiian or Other Pacific Islander	Computer programming	2.62
Other	Computer programming	2.39
South Asian	Computer programming	2.64
White	Computer programming	2.22
Aboriginal	Counsel people with drug or alcohol addiction	2.81
Arab	Counsel people with drug or alcohol addiction	2.65
Black or African American	Counsel people with drug or alcohol addiction	2.21
East Asian	Counsel people with drug or alcohol addiction	2.49
Hispanic, Latino, or Spanish	Counsel people with drug or alcohol addiction	2.43
Native Hawaiian or Other Pacific Islander	Counsel people with drug or alcohol addiction	2.47
Other	Counsel people with drug or alcohol addiction	2.64
South Asian	Counsel people with drug or alcohol addiction	2.52
White	Counsel people with drug or alcohol addiction	2.56
Aboriginal	Create art for sale and exhibition	2.97
Arab	Create art for sale and exhibition	2.81
Black or African American	Create art for sale and exhibition	2.6
East Asian	Create art for sale and exhibition	3.05
Hispanic, Latino, or Spanish	Create art for sale and exhibition	2.55
Native Hawaiian or Other Pacific Islander	Create art for sale and exhibition	2.73
Other	Create art for sale and exhibition	3.11
South Asian	Create art for sale and exhibition	2.79
White	Create art for sale and exhibition	2.54
Aboriginal	Creative arts	3.39
Arab	Creative arts	3.17
Black or African American	Creative arts	3.3
East Asian	Creative arts	3.56
Hispanic, Latino, or Spanish	Creative arts	3.25
Native Hawaiian or Other Pacific Islander	Creative arts	3.37
Other	Creative arts	3.53
South Asian	Creative arts	3.35

White	Creative arts	3.22
Aboriginal	Creative writing & journalism	3.16
Arab	Creative writing & journalism	2.94
Black or African American	Creative writing & journalism	2.87
East Asian	Creative writing & journalism	3.01
Hispanic, Latino, or Spanish	Creative writing & journalism	2.76
Native Hawaiian or Other Pacific Islander	Creative writing & journalism	2.89
Other	Creative writing & journalism	3.07
South Asian	Creative writing & journalism	3.01
White	Creative writing & journalism	2.89
Aboriginal	Critical thinking	3.99
Arab	Critical thinking	4.02
Black or African American	Critical thinking	4.07
East Asian	Critical thinking	4.07
Hispanic, Latino, or Spanish	Critical thinking	4.01
Native Hawaiian or Other Pacific Islander	Critical thinking	4.06
Other	Critical thinking	4.04
South Asian	Critical thinking	4.22
White	Critical thinking	4.17
Aboriginal	Culinary arts	2.88
Arab	Culinary arts	2.59
Black or African American	Culinary arts	2.62
East Asian	Culinary arts	3.04
Hispanic, Latino, or Spanish	Culinary arts	2.59
Native Hawaiian or Other Pacific Islander	Culinary arts	2.91
Other	Culinary arts	2.82
South Asian	Culinary arts	2.76
White	Culinary arts	2.82
Aboriginal	Direct the making of a movie	2.95
Arab	Direct the making of a movie	2.99
Black or African American	Direct the making of a movie	3.1
East Asian	Direct the making of a movie	3.13
Hispanic, Latino, or Spanish	Direct the making of a movie	2.81
Native Hawaiian or Other Pacific Islander	Direct the making of a movie	2.87
Other	Direct the making of a movie	3.11
South Asian	Direct the making of a movie	3.01
White	Direct the making of a movie	2.78
Aboriginal	Driving a car or truck many hours a day	4.6
Arab	Driving a car or truck many hours a day	5.53
Black or African American	Driving a car or truck many hours a day	6.26
East Asian	Driving a car or truck many hours a day	6.78
Hispanic, Latino, or Spanish	Driving a car or truck many hours a day	6.01
Native Hawaiian or Other Pacific Islander	Driving a car or truck many hours a day	6.07
Other	Driving a car or truck many hours a day	6.39
South Asian	Driving a car or truck many hours a day	6.92
White	Driving a car or truck many hours a day	5.91
Aboriginal	Engineering	2.73
Arab	Engineering	2.76
Black or African American	Engineering	2.63
East Asian	Engineering	2.69
Hispanic, Latino, or Spanish	Engineering	2.48
Native Hawaiian or Other Pacific Islander	Engineering	2.83
Other	Engineering	2.82
South Asian	Engineering	2.84
White	Engineering	2.67
Aboriginal	Entertain an audience	2.74
Arab	Entertain an audience	2.87
Black or African American	Entertain an audience	2.93
East Asian	Entertain an audience	2.82
Hispanic, Latino, or Spanish	Entertain an audience	2.59
Native Hawaiian or Other Pacific Islander	Entertain an audience	2.82
Other	Entertain an audience	2.63
South Asian	Entertain an audience	2.78
White	Entertain an audience	2.82
Aboriginal	Estimate the value of items for an insurance policy	2.25
Arab	Estimate the value of items for an insurance policy	2.17
Black or African American	Estimate the value of items for an insurance policy	2.11
East Asian	Estimate the value of items for an insurance policy	2.15
Hispanic, Latino, or Spanish	Estimate the value of items for an insurance policy	2.03
Native Hawaiian or Other Pacific Islander	Estimate the value of items for an insurance policy	2.1
Other	Estimate the value of items for an insurance policy	2.12
South Asian	Estimate the value of items for an insurance policy	2.23
White	Estimate the value of items for an insurance policy	2.01
Aboriginal	Examine artifacts left behind by previous civilizations	3.18
Arab	Examine artifacts left behind by previous civilizations	2.73
Black or African American	Examine artifacts left behind by previous civilizations	2.74
East Asian	Examine artifacts left behind by previous civilizations	3.08
Hispanic, Latino, or Spanish	Examine artifacts left behind by previous civilizations	2.8
Native Hawaiian or Other Pacific Islander	Examine artifacts left behind by previous civilizations	2.88
Other	Examine artifacts left behind by previous civilizations	3.06
South Asian	Examine artifacts left behind by previous civilizations	2.93

White	Examine artifacts left behind by previous civilizations	3.15
Aboriginal	Finance	2.39
Arab	Finance	2.47
Black or African American	Finance	2.53
East Asian	Finance	2.41
Hispanic, Latino, or Spanish	Finance	2.16
Native Hawaiian or Other Pacific Islander	Finance	2.51
Other	Finance	2.37
South Asian	Finance	2.75
White	Finance	2.37
Aboriginal	Find support resources for families in need	3.12
Arab	Find support resources for families in need	3.05
Black or African American	Find support resources for families in need	2.82
East Asian	Find support resources for families in need	2.87
Hispanic, Latino, or Spanish	Find support resources for families in need	2.79
Native Hawaiian or Other Pacific Islander	Find support resources for families in need	2.98
Other	Find support resources for families in need	2.95
South Asian	Find support resources for families in need	2.97
White	Find support resources for families in need	3.01
Aboriginal	Flying	2.54
Arab	Flying	2.72
Black or African American	Flying	2.13
East Asian	Flying	2.56
Hispanic, Latino, or Spanish	Flying	2.19
Native Hawaiian or Other Pacific Islander	Flying	2.63
Other	Flying	2.68
South Asian	Flying	2.47
White	Flying	2.32
Aboriginal	Green industry	3.32
Arab	Green industry	2.83
Black or African American	Green industry	2.67
East Asian	Green industry	3.34
Hispanic, Latino, or Spanish	Green industry	2.76
Native Hawaiian or Other Pacific Islander	Green industry	3
Other	Green industry	3.17
South Asian	Green industry	3.12
White	Green industry	3.11
Aboriginal	Healthcare service	2.99
Arab	Healthcare service	2.93
Black or African American	Healthcare service	2.83
East Asian	Healthcare service	2.94
Hispanic, Latino, or Spanish	Healthcare service	2.89
Native Hawaiian or Other Pacific Islander	Healthcare service	3.02
Other	Healthcare service	2.91
South Asian	Healthcare service	2.92
White	Healthcare service	2.99
Aboriginal	Help a client make business decisions	2.74
Arab	Help a client make business decisions	2.99
Black or African American	Help a client make business decisions	2.98
East Asian	Help a client make business decisions	3.02
Hispanic, Latino, or Spanish	Help a client make business decisions	2.58
Native Hawaiian or Other Pacific Islander	Help a client make business decisions	2.62
Other	Help a client make business decisions	2.79
South Asian	Help a client make business decisions	3.09
White	Help a client make business decisions	2.88
Aboriginal	Help elderly people complete their daily activities	2.62
Arab	Help elderly people complete their daily activities	2.54
Black or African American	Help elderly people complete their daily activities	2.17
East Asian	Help elderly people complete their daily activities	2.42
Hispanic, Latino, or Spanish	Help elderly people complete their daily activities	2.12
Native Hawaiian or Other Pacific Islander	Help elderly people complete their daily activities	2.57
Other	Help elderly people complete their daily activities	2.46
South Asian	Help elderly people complete their daily activities	2.56
White	Help elderly people complete their daily activities	2.39
Aboriginal	Help someone with a disability get dressed	2.39
Arab	Help someone with a disability get dressed	2.58
Black or African American	Help someone with a disability get dressed	2.26
East Asian	Help someone with a disability get dressed	2.24
Hispanic, Latino, or Spanish	Help someone with a disability get dressed	2.12
Native Hawaiian or Other Pacific Islander	Help someone with a disability get dressed	2.25
Other	Help someone with a disability get dressed	2.41
South Asian	Help someone with a disability get dressed	2.36
White	Help someone with a disability get dressed	2.14
Aboriginal	Helping people	3.85
Arab	Helping people	3.88
Black or African American	Helping people	3.81
East Asian	Helping people	3.89
Hispanic, Latino, or Spanish	Helping people	3.76
Native Hawaiian or Other Pacific Islander	Helping people	3.83
Other	Helping people	3.87
South Asian	Helping people	3.71



White	Helping people	3.86
Aboriginal	Information technology	2.5
Arab	Information technology	2.77
Black or African American	Information technology	2.57
East Asian	Information technology	2.73
Hispanic, Latino, or Spanish	Information technology	2.19
Native Hawaiian or Other Pacific Islander	Information technology	2.72
Other	Information technology	2.53
South Asian	Information technology	2.76
White	Information technology	2.34
Aboriginal	Install drywall in houses	2.04
Arab	Install drywall in houses	1.89
Black or African American	Install drywall in houses	1.68
East Asian	Install drywall in houses	1.91
Hispanic, Latino, or Spanish	Install drywall in houses	1.58
Native Hawaiian or Other Pacific Islander	Install drywall in houses	1.86
Other	Install drywall in houses	1.85
South Asian	Install drywall in houses	1.87
White	Install drywall in houses	1.72
Aboriginal	Installing equipment or programs	2.55
Arab	Installing equipment or programs	2.73
Black or African American	Installing equipment or programs	2.47
East Asian	Installing equipment or programs	2.39
Hispanic, Latino, or Spanish	Installing equipment or programs	2.27
Native Hawaiian or Other Pacific Islander	Installing equipment or programs	2.68
Other	Installing equipment or programs	2.49
South Asian	Installing equipment or programs	2.42
White	Installing equipment or programs	2.37
Aboriginal	Interpret results of medical tests	2.97
Arab	Interpret results of medical tests	2.97
Black or African American	Interpret results of medical tests	2.89
East Asian	Interpret results of medical tests	2.95
Hispanic, Latino, or Spanish	Interpret results of medical tests	2.9
Native Hawaiian or Other Pacific Islander	Interpret results of medical tests	2.97
Other	Interpret results of medical tests	2.89
South Asian	Interpret results of medical tests	2.97
White	Interpret results of medical tests	3.09
Aboriginal	Investigate causes of climate change	2.93
Arab	Investigate causes of climate change	2.71
Black or African American	Investigate causes of climate change	2.46
East Asian	Investigate causes of climate change	2.94
Hispanic, Latino, or Spanish	Investigate causes of climate change	2.42
Native Hawaiian or Other Pacific Islander	Investigate causes of climate change	2.81
Other	Investigate causes of climate change	2.8
South Asian	Investigate causes of climate change	2.88
White	Investigate causes of climate change	2.8
Aboriginal	Keep records of payments received	2.62
Arab	Keep records of payments received	2.58
Black or African American	Keep records of payments received	2.67
East Asian	Keep records of payments received	2.52
Hispanic, Latino, or Spanish	Keep records of payments received	2.26
Native Hawaiian or Other Pacific Islander	Keep records of payments received	2.46
Other	Keep records of payments received	2.59
South Asian	Keep records of payments received	2.81
White	Keep records of payments received	2.35
Aboriginal	Law	2.83
Arab	Law	2.61
Black or African American	Law	2.87
East Asian	Law	2.48
Hispanic, Latino, or Spanish	Law	2.59
Native Hawaiian or Other Pacific Islander	Law	2.71
Other	Law	2.81
South Asian	Law	2.73
White	Law	2.56
Aboriginal	Learning new things	4.17
Arab	Learning new things	4.29
Black or African American	Learning new things	4.29
East Asian	Learning new things	4.4
Hispanic, Latino, or Spanish	Learning new things	4.19
Native Hawaiian or Other Pacific Islander	Learning new things	4.23
Other	Learning new things	4.26
South Asian	Learning new things	4.32
White	Learning new things	4.23
Aboriginal	Make customized kitchen cabinets	2.33
Arab	Make customized kitchen cabinets	2.27
Black or African American	Make customized kitchen cabinets	1.9
East Asian	Make customized kitchen cabinets	2.47
Hispanic, Latino, or Spanish	Make customized kitchen cabinets	1.96
Native Hawaiian or Other Pacific Islander	Make customized kitchen cabinets	2.26
Other	Make customized kitchen cabinets	2.4
South Asian	Make customized kitchen cabinets	2.3

White	Make customized kitchen cabinets	2.11
Aboriginal	Mathematics	2.64
Arab	Mathematics	2.74
Black or African American	Mathematics	2.48
East Asian	Mathematics	2.64
Hispanic, Latino, or Spanish	Mathematics	2.49
Native Hawaiian or Other Pacific Islander	Mathematics	2.64
Other	Mathematics	2.57
South Asian	Mathematics	2.84
White	Mathematics	2.75
Aboriginal	Military	2.24
Arab	Military	2.06
Black or African American	Military	1.82
East Asian	Military	1.84
Hispanic, Latino, or Spanish	Military	1.76
Native Hawaiian or Other Pacific Islander	Military	2.19
Other	Military	1.99
South Asian	Military	2.2
White	Military	2.06
Aboriginal	Music	3.71
Arab	Music	3.4
Black or African American	Music	3.53
East Asian	Music	3.75
Hispanic, Latino, or Spanish	Music	3.42
Native Hawaiian or Other Pacific Islander	Music	3.51
Other	Music	3.52
South Asian	Music	3.44
White	Music	3.56
Aboriginal	Nature and agriculture	3.2
Arab	Nature and agriculture	2.63
Black or African American	Nature and agriculture	2.38
East Asian	Nature and agriculture	2.89
Hispanic, Latino, or Spanish	Nature and agriculture	2.64
Native Hawaiian or Other Pacific Islander	Nature and agriculture	3.08
Other	Nature and agriculture	2.74
South Asian	Nature and agriculture	2.71
White	Nature and agriculture	3.15
Aboriginal	Office clerical work	2.42
Arab	Office clerical work	2.11
Black or African American	Office clerical work	2.39
East Asian	Office clerical work	2.24
Hispanic, Latino, or Spanish	Office clerical work	2.12
Native Hawaiian or Other Pacific Islander	Office clerical work	2.46
Other	Office clerical work	2.4
South Asian	Office clerical work	2.27
White	Office clerical work	2.2
Aboriginal	Operate a crane at a building site	2.02
Arab	Operate a crane at a building site	1.92
Black or African American	Operate a crane at a building site	1.73
East Asian	Operate a crane at a building site	1.84
Hispanic, Latino, or Spanish	Operate a crane at a building site	1.67
Native Hawaiian or Other Pacific Islander	Operate a crane at a building site	2.03
Other	Operate a crane at a building site	1.83
South Asian	Operate a crane at a building site	1.88
White	Operate a crane at a building site	1.79
Aboriginal	Oversee all aspects of a business	2.8
Arab	Oversee all aspects of a business	3.1
Black or African American	Oversee all aspects of a business	3.23
East Asian	Oversee all aspects of a business	3.08
Hispanic, Latino, or Spanish	Oversee all aspects of a business	2.57
Native Hawaiian or Other Pacific Islander	Oversee all aspects of a business	2.75
Other	Oversee all aspects of a business	2.94
South Asian	Oversee all aspects of a business	3.13
White	Oversee all aspects of a business	2.82
Aboriginal	Oversee the hiring of new employees	2.92
Arab	Oversee the hiring of new employees	2.87
Black or African American	Oversee the hiring of new employees	3.08
East Asian	Oversee the hiring of new employees	3.1
Hispanic, Latino, or Spanish	Oversee the hiring of new employees	2.84
Native Hawaiian or Other Pacific Islander	Oversee the hiring of new employees	2.91
Other	Oversee the hiring of new employees	3.01
South Asian	Oversee the hiring of new employees	3.07
White	Oversee the hiring of new employees	3.04
Aboriginal	Perform scientific analyses on evidence from a crime scene	3.3
Arab	Perform scientific analyses on evidence from a crime scene	3.36
Black or African American	Perform scientific analyses on evidence from a crime scene	3.05
East Asian	Perform scientific analyses on evidence from a crime scene	3.27
Hispanic, Latino, or Spanish	Perform scientific analyses on evidence from a crime scene	3.12
Native Hawaiian or Other Pacific Islander	Perform scientific analyses on evidence from a crime scene	3.18
Other	Perform scientific analyses on evidence from a crime scene	3.27
South Asian	Perform scientific analyses on evidence from a crime scene	3.26

White	Perform scientific analyses on evidence from a crime scene	3.29
Aboriginal	Physical science	2.8
Arab	Physical science	2.83
Black or African American	Physical science	2.51
East Asian	Physical science	2.6
Hispanic, Latino, or Spanish	Physical science	2.82
Native Hawaiian or Other Pacific Islander	Physical science	3.08
Other	Physical science	2.87
South Asian	Physical science	2.86
White	Physical science	2.97
Aboriginal	Politics	2.44
Arab	Politics	2.34
Black or African American	Politics	2.3
East Asian	Politics	2.15
Hispanic, Latino, or Spanish	Politics	2.16
Native Hawaiian or Other Pacific Islander	Politics	2.24
Other	Politics	2.29
South Asian	Politics	2.23
White	Politics	2.34
Aboriginal	Process transactions at a bank	2.32
Arab	Process transactions at a bank	2.23
Black or African American	Process transactions at a bank	2.25
East Asian	Process transactions at a bank	2.36
Hispanic, Latino, or Spanish	Process transactions at a bank	2.06
Native Hawaiian or Other Pacific Islander	Process transactions at a bank	2.25
Other	Process transactions at a bank	2.21
South Asian	Process transactions at a bank	2.46
White	Process transactions at a bank	2.06
Aboriginal	Professional advising	2.83
Arab	Professional advising	3.09
Black or African American	Professional advising	2.99
East Asian	Professional advising	3.13
Hispanic, Latino, or Spanish	Professional advising	2.76
Native Hawaiian or Other Pacific Islander	Professional advising	2.74
Other	Professional advising	3.1
South Asian	Professional advising	3.2
White	Professional advising	2.94
Aboriginal	Protective services	2.78
Arab	Protective services	2.43
Black or African American	Protective services	2.24
East Asian	Protective services	2.17
Hispanic, Latino, or Spanish	Protective services	2.36
Native Hawaiian or Other Pacific Islander	Protective services	2.66
Other	Protective services	2.53
South Asian	Protective services	2.48
White	Protective services	2.6
Aboriginal	Repair damaged farm equipment	1.99
Arab	Repair damaged farm equipment	2.05
Black or African American	Repair damaged farm equipment	1.54
East Asian	Repair damaged farm equipment	1.9
Hispanic, Latino, or Spanish	Repair damaged farm equipment	1.67
Native Hawaiian or Other Pacific Islander	Repair damaged farm equipment	1.98
Other	Repair damaged farm equipment	1.97
South Asian	Repair damaged farm equipment	2.05
White	Repair damaged farm equipment	1.86
Aboriginal	Research how genes function	2.97
Arab	Research how genes function	2.98
Black or African American	Research how genes function	2.79
East Asian	Research how genes function	2.8
Hispanic, Latino, or Spanish	Research how genes function	2.77
Native Hawaiian or Other Pacific Islander	Research how genes function	2.93
Other	Research how genes function	2.7
South Asian	Research how genes function	2.82
White	Research how genes function	2.9
Aboriginal	Sales	2.54
Arab	Sales	2.55
Black or African American	Sales	2.39
East Asian	Sales	2.51
Hispanic, Latino, or Spanish	Sales	2.26
Native Hawaiian or Other Pacific Islander	Sales	2.38
Other	Sales	2.39
South Asian	Sales	2.53
White	Sales	2.18
Aboriginal	Science	3.27
Arab	Science	3.45
Black or African American	Science	3.1
East Asian	Science	3.11
Hispanic, Latino, or Spanish	Science	3.07
Native Hawaiian or Other Pacific Islander	Science	3.24
Other	Science	3.08
South Asian	Science	3.36

White	Science	3.18
Aboriginal	Sell a house	2.55
Arab	Sell a house	2.58
Black or African American	Sell a house	2.74
East Asian	Sell a house	2.33
Hispanic, Latino, or Spanish	Sell a house	2.27
Native Hawaiian or Other Pacific Islander	Sell a house	2.46
Other	Sell a house	2.48
South Asian	Sell a house	2.28
White	Sell a house	2.66
Aboriginal	Skilled trades	2.69
Arab	Skilled trades	2.33
Black or African American	Skilled trades	2.16
East Asian	Skilled trades	2.58
Hispanic, Latino, or Spanish	Skilled trades	2.19
Native Hawaiian or Other Pacific Islander	Skilled trades	2.75
Other	Skilled trades	2.4
South Asian	Skilled trades	2.36
White	Skilled trades	2.49
Aboriginal	Social sciences	3.34
Arab	Social sciences	3.18
Black or African American	Social sciences	3.22
East Asian	Social sciences	3.42
Hispanic, Latino, or Spanish	Social sciences	3.21
Native Hawaiian or Other Pacific Islander	Social sciences	3.22
Other	Social sciences	3.26
South Asian	Social sciences	3.33
White	Social sciences	3.35
Aboriginal	Sort mail in a post office	2.26
Arab	Sort mail in a post office	1.94
Black or African American	Sort mail in a post office	1.72
East Asian	Sort mail in a post office	2.07
Hispanic, Latino, or Spanish	Sort mail in a post office	1.07
Native Hawaiian or Other Pacific Islander	Sort mail in a post office	1.99
Other	Sort mail in a post office	2.08
South Asian	Sort mail in a post office	2.1
White	Sort mail in a post office	1.89
Aboriginal	Study sea creatures	3.2
Arab	Study sea creatures	2.75
Black or African American	Study sea creatures	2.48
East Asian	Study sea creatures	3.04
Hispanic, Latino, or Spanish	Study sea creatures	2.7
Native Hawaiian or Other Pacific Islander	Study sea creatures	3.08
Other	Study sea creatures	2.88
South Asian	Study sea creatures	2.77
White	Study sea creatures	3.15
Aboriginal	Take part in a musical performance	2.82
Arab	Take part in a musical performance	2.75
Black or African American	Take part in a musical performance	2.67
East Asian	Take part in a musical performance	3.17
Hispanic, Latino, or Spanish	Take part in a musical performance	2.47
Native Hawaiian or Other Pacific Islander	Take part in a musical performance	2.74
Other	Take part in a musical performance	2.89
South Asian	Take part in a musical performance	2.81
White	Take part in a musical performance	2.51
Aboriginal	Teach kids how to play well with other children	2.83
Arab	Teach kids how to play well with other children	2.9
Black or African American	Teach kids how to play well with other children	2.58
East Asian	Teach kids how to play well with other children	2.89
Hispanic, Latino, or Spanish	Teach kids how to play well with other children	2.68
Native Hawaiian or Other Pacific Islander	Teach kids how to play well with other children	2.78
Other	Teach kids how to play well with other children	2.71
South Asian	Teach kids how to play well with other children	2.8
White	Teach kids how to play well with other children	2.88
Aboriginal	Teaching	3.28
Arab	Teaching	2.96
Black or African American	Teaching	2.86
East Asian	Teaching	3.16
Hispanic, Latino, or Spanish	Teaching	2.99
Native Hawaiian or Other Pacific Islander	Teaching	2.99
Other	Teaching	3.13
South Asian	Teaching	3.15
White	Teaching	3.24
Aboriginal	Verify quality of parts before shipment	2.38
Arab	Verify quality of parts before shipment	2.29
Black or African American	Verify quality of parts before shipment	2.17
East Asian	Verify quality of parts before shipment	2.18
Hispanic, Latino, or Spanish	Verify quality of parts before shipment	1.92
Native Hawaiian or Other Pacific Islander	Verify quality of parts before shipment	2.21
Other	Verify quality of parts before shipment	2.23
South Asian	Verify quality of parts before shipment	2.28

White	Verify quality of parts before shipment		1.93
Aboriginal	Working with animals		3.26
Arab	Working with animals		2.6
Black or African American	Working with animals		2.58
East Asian	Working with animals		3.18
Hispanic, Latino, or Spanish	Working with animals		3.19
Native Hawaiian or Other Pacific Islander	Working with animals		3.24
Other	Working with animals		3.13
South Asian	Working with animals		2.71
White	Working with animals		3.37
Aboriginal	Write a play for a theater		2.59
Arab	Write a play for a theater		2.54
Black or African American	Write a play for a theater		2.48
East Asian	Write a play for a theater		2.68
Hispanic, Latino, or Spanish	Write a play for a theater		2.22
Native Hawaiian or Other Pacific Islander	Write a play for a theater		2.28
Other	Write a play for a theater		2.53
South Asian	Write a play for a theater		2.56
White	Write a play for a theater		2.27
Aboriginal	Write lyrics for songs		2.92
Arab	Write lyrics for songs		2.63
Black or African American	Write lyrics for songs		2.72
East Asian	Write lyrics for songs		2.87
Hispanic, Latino, or Spanish	Write lyrics for songs		2.37
Native Hawaiian or Other Pacific Islander	Write lyrics for songs		2.52
Other	Write lyrics for songs		2.69
South Asian	Write lyrics for songs		2.7
White	Write lyrics for songs		2.45
Aboriginal	Write marketing material for a client's products		2.4
Arab	Write marketing material for a client's products		2.69
Black or African American	Write marketing material for a client's products		2.72
East Asian	Write marketing material for a client's products		2.81
Hispanic, Latino, or Spanish	Write marketing material for a client's products		2.29
Native Hawaiian or Other Pacific Islander	Write marketing material for a client's products		2.44
Other	Write marketing material for a client's products		2.63
South Asian	Write marketing material for a client's products		2.64
White	Write marketing material for a client's products		2.41

### Education Level:

Item Text	Highest education level	Response Value Mean	Response Value
Computer programming	associates_degree	2.44	1
Computer programming	bachelors_degree	2.33	1
Computer programming	doctoral_degree	2.51	1
Computer programming	ged	2.53	1
Computer programming	high_school	2.47	1
Computer programming	masters_degree	2.45	1
Computer programming	some_college	2.32	1
Computer programming	still_in_high_school	2.37	1
Helping people	associates_degree	3.88	0
Helping people	bachelors_degree	3.91	0
Helping people	doctoral_degree	3.91	1
Helping people	ged	3.65	1
Helping people	high_school	3.74	1
Helping people	masters_degree	3.98	0
Helping people	some_college	3.85	0
Helping people	still_in_high_school	3.73	1
Driving a car or truck many hours a day	associates_degree	5.27	3
Driving a car or truck many hours a day	bachelors_degree	5.72	3
Driving a car or truck many hours a day	doctoral_degree	5.95	3
Driving a car or truck many hours a day	ged	4.63	3
Driving a car or truck many hours a day	high_school	5.5	3
Driving a car or truck many hours a day	masters_degree	5.93	3
Driving a car or truck many hours a day	some_college	5.33	3
Driving a car or truck many hours a day	still_in_high_school	6	3
Installing equipment or programs	associates_degree	2.54	1
Installing equipment or programs	bachelors_degree	2.37	1
Installing equipment or programs	doctoral_degree	2.39	1
Installing equipment or programs	ged	2.61	1
Installing equipment or programs	high_school	2.54	1
Installing equipment or programs	masters_degree	2.41	1
Installing equipment or programs	some_college	2.47	1
Installing equipment or programs	still_in_high_school	2.44	1
Learning new things	associates_degree	4.24	0
Learning new things	bachelors_degree	4.33	0
Learning new things	doctoral_degree	4.39	0
Learning new things	ged	4.14	0

Learning new things	high_school	4.2	0
Learning new things	masters_degree	4.46	0
Learning new things	some_college	4.19	0
Learning new things	still_in_high_school	4.09	0
Write a play for a theater	associates_degree	2.31	1
Write a play for a theater	bachelors_degree	2.63	1
Write a play for a theater	doctoral_degree	2.76	1
Write a play for a theater	ged	2.19	1
Write a play for a theater	high_school	2.37	1
Write a play for a theater	masters_degree	2.77	1
Write a play for a theater	some_college	2.4	1
Write a play for a theater	still_in_high_school	2.4	1
Science	associates_degree	3.2	1
Science	bachelors_degree	3.04	1
Science	doctoral_degree	3.66	1
Science	ged	3.12	1
Science	high_school	3.13	1
Science	masters_degree	3.21	1
Science	some_college	3.08	1
Science	still_in_high_school	3.2	1
Critical thinking	associates_degree	4.02	0
Critical thinking	bachelors_degree	4.18	0
Critical thinking	doctoral_degree	4.38	0
Critical thinking	ged	3.86	0
Critical thinking	high_school	3.97	0
Critical thinking	masters_degree	4.29	0
Critical thinking	some_college	3.99	0
Critical thinking	still_in_high_school	3.93	0
Process transactions at a bank	associates_degree	2.2	1
Process transactions at a bank	bachelors_degree	2.18	1
Process transactions at a bank	doctoral_degree	2.07	1
Process transactions at a bank	ged	2.19	1
Process transactions at a bank	high_school	2.25	1
Process transactions at a bank	masters_degree	2.13	1
Process transactions at a bank	some_college	2.26	1
Process transactions at a bank	still_in_high_school	2.06	1
Investigate causes of climate change	associates_degree	2.74	1
Investigate causes of climate change	bachelors_degree	2.83	1
Investigate causes of climate change	doctoral_degree	3.09	1
Investigate causes of climate change	ged	2.55	1
Investigate causes of climate change	high_school	2.68	1
Investigate causes of climate change	masters_degree	3	1
Investigate causes of climate change	some_college	2.74	1
Investigate causes of climate change	still_in_high_school	2.59	1
Find support resources for families in need	associates_degree	2.99	1
Find support resources for families in need	bachelors_degree	3	1
Find support resources for families in need	doctoral_degree	3	1
Find support resources for families in need	ged	2.87	1
Find support resources for families in need	high_school	2.89	1
Find support resources for families in need	masters_degree	3.11	1
Find support resources for families in need	some_college	2.91	1
Find support resources for families in need	still_in_high_school	2.84	1
Direct the making of a movie	associates_degree	2.82	1
Direct the making of a movie	bachelors_degree	3.12	1
Direct the making of a movie	doctoral_degree	3	1
Direct the making of a movie	ged	2.66	1
Direct the making of a movie	high_school	2.83	1
Direct the making of a movie	masters_degree	3.13	1
Direct the making of a movie	some_college	3.04	1
Direct the making of a movie	still_in_high_school	3.01	1
Sell a house	associates_degree	2.6	1
Sell a house	bachelors_degree	2.58	1
Sell a house	doctoral_degree	2.45	1
Sell a house	ged	2.64	1
Sell a house	high_school	2.49	1
Sell a house	masters_degree	2.61	1
Sell a house	some_college	2.63	1
Sell a house	still_in_high_school	2.48	1
Help a client make business decisions	associates_degree	2.9	1
Help a client make business decisions	bachelors_degree	3.19	1
Help a client make business decisions	doctoral_degree	3.11	1
Help a client make business decisions	ged	2.68	1
Help a client make business decisions	high_school	2.75	1
Help a client make business decisions	masters_degree	3.37	1
Help a client make business decisions	some_college	2.83	1
Help a client make business decisions	still_in_high_school	2.51	1
Create art for sale and exhibition	associates_degree	2.67	1
Create art for sale and exhibition	bachelors_degree	2.95	1
Create art for sale and exhibition	doctoral_degree	2.78	1
Create art for sale and exhibition	ged	2.57	1
Create art for sale and exhibition	high_school	2.5	1

Create art for sale and exhibition	masters_degree	2.89	1
Create art for sale and exhibition	some_college	2.72	1
Create art for sale and exhibition	still_in_high_school	2.71	1
Write marketing material for a client's products	associates_degree	2.53	1
Write marketing material for a client's products	bachelors_degree	2.94	1
Write marketing material for a client's products	doctoral_degree	2.74	1
Write marketing material for a client's products	ged	2.28	1
Write marketing material for a client's products	high_school	2.5	1
Write marketing material for a client's products	masters_degree	2.9	1
Write marketing material for a client's products	some_college	2.61	1
Write marketing material for a client's products	still_in_high_school	2.42	1
Keep records of payments received	associates_degree	2.58	1
Keep records of payments received	bachelors_degree	2.6	1
Keep records of payments received	doctoral_degree	2.38	1
Keep records of payments received	ged	2.55	1
Keep records of payments received	high_school	2.59	1
Keep records of payments received	masters_degree	2.51	1
Keep records of payments received	some_college	2.58	1
Keep records of payments received	still_in_high_school	2.18	1
Sort mail in a post office	associates_degree	2	1
Sort mail in a post office	bachelors_degree	1.95	1
Sort mail in a post office	doctoral_degree	1.91	1
Sort mail in a post office	ged	2.02	1
Sort mail in a post office	high_school	1.92	1
Sort mail in a post office	masters_degree	1.95	1
Sort mail in a post office	some_college	1.87	1
Sort mail in a post office	still_in_high_school	1.65	0
Verify quality of parts before shipment	associates_degree	2.21	1
Verify quality of parts before shipment	bachelors_degree	2.21	1
Verify quality of parts before shipment	doctoral_degree	2.15	1
Verify quality of parts before shipment	ged	2.24	1
Verify quality of parts before shipment	high_school	2.2	1
Verify quality of parts before shipment	masters_degree	2.22	1
Verify quality of parts before shipment	some_college	2.1	1
Verify quality of parts before shipment	still_in_high_school	1.87	1
Make customized kitchen cabinets	associates_degree	2.22	1
Make customized kitchen cabinets	bachelors_degree	2.44	1
Make customized kitchen cabinets	doctoral_degree	2.29	1
Make customized kitchen cabinets	ged	2.11	1
Make customized kitchen cabinets	high_school	2.29	1
Make customized kitchen cabinets	masters_degree	2.32	1
Make customized kitchen cabinets	some_college	2.18	1
Make customized kitchen cabinets	still_in_high_school	1.89	1
Interpret results of medical tests	associates_degree	2.91	1
Interpret results of medical tests	bachelors_degree	2.82	1
Interpret results of medical tests	doctoral_degree	3.47	1
Interpret results of medical tests	ged	2.76	1
Interpret results of medical tests	high_school	2.82	1
Interpret results of medical tests	masters_degree	2.84	1
Interpret results of medical tests	some_college	2.87	1
Interpret results of medical tests	still_in_high_school	2.93	1
Help someone with a disability get dressed	associates_degree	2.2	1
Help someone with a disability get dressed	bachelors_degree	2.17	1
Help someone with a disability get dressed	doctoral_degree	2.25	1
Help someone with a disability get dressed	ged	2.19	1
Help someone with a disability get dressed	high_school	2.32	1
Help someone with a disability get dressed	masters_degree	2.25	1
Help someone with a disability get dressed	some_college	2.19	1
Help someone with a disability get dressed	still_in_high_school	2.12	1
Advise organizations on how to meet their business goals	associates_degree	2.78	1
Advise organizations on how to meet their business goals	bachelors_degree	3.16	1
Advise organizations on how to meet their business goals	doctoral_degree	3.08	1
Advise organizations on how to meet their business goals	ged	2.49	1
Advise organizations on how to meet their business goals	high_school	2.65	1
Advise organizations on how to meet their business goals	masters_degree	3.33	1
Advise organizations on how to meet their business goals	some_college	2.74	1
Advise organizations on how to meet their business goals	still_in_high_school	2.59	1
Oversee the hiring of new employees	associates_degree	3.05	1
Oversee the hiring of new employees	bachelors_degree	3.19	1
Oversee the hiring of new employees	doctoral_degree	3.07	1
Oversee the hiring of new employees	ged	2.94	1
Oversee the hiring of new employees	high_school	2.91	1
Oversee the hiring of new employees	masters_degree	3.28	1
Oversee the hiring of new employees	some_college	3.02	1
Oversee the hiring of new employees	still_in_high_school	2.7	1
Study sea creatures	associates_degree	3.03	1
Study sea creatures	bachelors_degree	2.91	1
Study sea creatures	doctoral_degree	3.18	1
Study sea creatures	ged	3.02	1
Study sea creatures	high_school	2.88	1
Study sea creatures	masters_degree	2.86	1

Study sea creatures	some_college	2.99	1
Study sea creatures	still_in_high_school	2.94	1
Estimate the value of items for an insurance policy	associates_degree	2.17	1
Estimate the value of items for an insurance policy	bachelors_degree	2.21	1
Estimate the value of items for an insurance policy	doctoral_degree	2.18	1
Estimate the value of items for an insurance policy	ged	2.09	1
Estimate the value of items for an insurance policy	high_school	2.13	1
Estimate the value of items for an insurance policy	masters_degree	2.19	1
Estimate the value of items for an insurance policy	some_college	2.11	1
Estimate the value of items for an insurance policy	still_in_high_school	2.01	1
Help elderly people complete their daily activities	associates_degree	2.41	1
Help elderly people complete their daily activities	bachelors_degree	2.35	1
Help elderly people complete their daily activities	doctoral_degree	2.38	1
Help elderly people complete their daily activities	ged	2.34	1
Help elderly people complete their daily activities	high_school	2.38	1
Help elderly people complete their daily activities	masters_degree	2.45	1
Help elderly people complete their daily activities	some_college	2.29	1
Help elderly people complete their daily activities	still_in_high_school	2.19	1
Perform scientific analyses on evidence from a crime scene	associates_degree	3.2	1
Perform scientific analyses on evidence from a crime scene	bachelors_degree	3.1	1
Perform scientific analyses on evidence from a crime scene	doctoral_degree	3.43	1
Perform scientific analyses on evidence from a crime scene	ged	3.12	1
Perform scientific analyses on evidence from a crime scene	high_school	3.17	1
Perform scientific analyses on evidence from a crime scene	masters_degree	3.06	1
Perform scientific analyses on evidence from a crime scene	some_college	3.21	1
Perform scientific analyses on evidence from a crime scene	still_in_high_school	3.36	1
Teach kids how to play well with other children	associates_degree	2.75	1
Teach kids how to play well with other children	bachelors_degree	2.8	1
Teach kids how to play well with other children	doctoral_degree	2.72	1
Teach kids how to play well with other children	ged	2.61	1
Teach kids how to play well with other children	high_school	2.75	1
Teach kids how to play well with other children	masters_degree	2.97	1
Teach kids how to play well with other children	some_college	2.78	1
Teach kids how to play well with other children	still_in_high_school	2.59	1
Entertain an audience	associates_degree	2.62	1
Entertain an audience	bachelors_degree	2.87	1
Entertain an audience	doctoral_degree	2.79	1
Entertain an audience	ged	2.5	1
Entertain an audience	high_school	2.63	1
Entertain an audience	masters_degree	2.95	1
Entertain an audience	some_college	2.82	1
Entertain an audience	still_in_high_school	2.79	1
Repair damaged farm equipment	associates_degree	2	1
Repair damaged farm equipment	bachelors_degree	1.97	1
Repair damaged farm equipment	doctoral_degree	2.06	1
Repair damaged farm equipment	ged	1.96	1
Repair damaged farm equipment	high_school	1.99	1
Repair damaged farm equipment	masters_degree	2.01	1
Repair damaged farm equipment	some_college	1.95	1
Repair damaged farm equipment	still_in_high_school	1.75	0
Write lyrics for songs	associates_degree	2.56	1
Write lyrics for songs	bachelors_degree	2.74	1
Write lyrics for songs	doctoral_degree	2.76	1
Write lyrics for songs	ged	2.53	1
Write lyrics for songs	high_school	2.56	1
Write lyrics for songs	masters_degree	2.75	1
Write lyrics for songs	some_college	2.69	1
Write lyrics for songs	still_in_high_school	2.54	1
Install drywall in houses	associates_degree	1.9	1
Install drywall in houses	bachelors_degree	1.9	0
Install drywall in houses	doctoral_degree	1.91	1
Install drywall in houses	ged	1.89	1
Install drywall in houses	high_school	1.84	1
Install drywall in houses	masters_degree	1.89	0
Install drywall in houses	some_college	1.81	0
Install drywall in houses	still_in_high_school	1.67	0
Operate a crane at a building site	associates_degree	1.9	1
Operate a crane at a building site	bachelors_degree	1.84	0
Operate a crane at a building site	doctoral_degree	1.98	1
Operate a crane at a building site	ged	1.98	1
Operate a crane at a building site	high_school	1.88	1
Operate a crane at a building site	masters_degree	1.92	1
Operate a crane at a building site	some_college	1.87	1
Operate a crane at a building site	still_in_high_school	1.65	0
Counsel people with drug or alcohol addiction	associates_degree	2.6	1
Counsel people with drug or alcohol addiction	bachelors_degree	2.53	1
Counsel people with drug or alcohol addiction	doctoral_degree	2.59	1
Counsel people with drug or alcohol addiction	ged	2.63	1
Counsel people with drug or alcohol addiction	high_school	2.58	1
Counsel people with drug or alcohol addiction	masters_degree	2.68	1
Counsel people with drug or alcohol addiction	some_college	2.59	1



Counsel people with drug or alcohol addiction	still_in_high_school	2.44	1
Analyze data using statistics	associates_degree	2.74	1
Analyze data using statistics	bachelors_degree	2.91	1
Analyze data using statistics	doctoral_degree	3.2	1
Analyze data using statistics	ged	2.71	1
Analyze data using statistics	high_school	2.66	1
Analyze data using statistics	masters_degree	3.01	1
Analyze data using statistics	some_college	2.7	1
Analyze data using statistics	still_in_high_school	2.6	1
Examine artifacts left behind by previous civilizations	associates_degree	3.11	1
Examine artifacts left behind by previous civilizations	bachelors_degree	3.07	1
Examine artifacts left behind by previous civilizations	doctoral_degree	3.28	1
Examine artifacts left behind by previous civilizations	ged	3.08	1
Examine artifacts left behind by previous civilizations	high_school	2.98	1
Examine artifacts left behind by previous civilizations	masters_degree	3.11	1
Examine artifacts left behind by previous civilizations	some_college	3.04	1
Examine artifacts left behind by previous civilizations	still_in_high_school	2.73	1
Oversee all aspects of a business	associates_degree	2.96	1
Oversee all aspects of a business	bachelors_degree	3.25	1
Oversee all aspects of a business	doctoral_degree	3.07	1
Oversee all aspects of a business	ged	2.8	1
Oversee all aspects of a business	high_school	2.83	1
Oversee all aspects of a business	masters_degree	3.27	1
Oversee all aspects of a business	some_college	2.93	1
Oversee all aspects of a business	still_in_high_school	2.8	1
Research how genes function	associates_degree	2.92	1
Research how genes function	bachelors_degree	2.8	1
Research how genes function	doctoral_degree	3.35	1
Research how genes function	ged	2.86	1
Research how genes function	high_school	2.81	1
Research how genes function	masters_degree	2.87	1
Research how genes function	some_college	2.82	1
Research how genes function	still_in_high_school	2.79	1
Take part in a musical performance	associates_degree	2.6	1
Take part in a musical performance	bachelors_degree	2.77	1
Take part in a musical performance	doctoral_degree	2.8	1
Take part in a musical performance	ged	2.42	1
Take part in a musical performance	high_school	2.57	1
Take part in a musical performance	masters_degree	2.83	1
Take part in a musical performance	some_college	2.61	1
Take part in a musical performance	still_in_high_school	2.63	1
Finance	associates_degree	2.46	1
Finance	bachelors_degree	2.49	1
Finance	doctoral_degree	2.53	1
Finance	ged	2.39	1
Finance	high_school	2.4	1
Finance	masters_degree	2.59	1
Finance	some_college	2.41	1
Finance	still_in_high_school	2.31	1
Athletics	associates_degree	2.93	1
Athletics	bachelors_degree	2.98	1
Athletics	doctoral_degree	2.84	1
Athletics	ged	2.68	1
Athletics	high_school	2.91	1
Athletics	masters_degree	2.99	1
Athletics	some_college	2.86	1
Athletics	still_in_high_school	2.89	1
Flying	associates_degree	2.48	1
Flying	bachelors_degree	2.48	1
Flying	doctoral_degree	2.49	1
Flying	ged	2.45	1
Flying	high_school	2.61	1
Flying	masters_degree	2.51	1
Flying	some_college	2.45	1
Flying	still_in_high_school	2.4	1
Law	associates_degree	2.57	1
Law	bachelors_degree	2.7	1
Law	doctoral_degree	2.91	1
Law	ged	2.64	1
Law	high_school	2.52	1
Law	masters_degree	2.69	1
Law	some_college	2.67	1
Law	still_in_high_school	2.71	1
Healthcare service	associates_degree	2.96	1
Healthcare service	bachelors_degree	2.77	1
Healthcare service	doctoral_degree	3.29	1
Healthcare service	ged	2.8	1
Healthcare service	high_school	2.83	1
Healthcare service	masters_degree	2.75	1
Healthcare service	some_college	2.91	1
Healthcare service	still_in_high_school	2.92	1

Physical science	associates_degree	2.87	1
Physical science	bachelors_degree	2.59	1
Physical science	doctoral_degree	3.11	1
Physical science	ged	2.81	1
Physical science	high_school	2.71	1
Physical science	masters_degree	2.67	1
Physical science	some_college	2.73	1
Physical science	still_in_high_school	2.81	1
Nature and agriculture	associates_degree	3.08	1
Nature and agriculture	bachelors_degree	2.94	1
Nature and agriculture	doctoral_degree	3.05	1
Nature and agriculture	ged	3.16	1
Nature and agriculture	high_school	3.02	1
Nature and agriculture	masters_degree	2.96	1
Nature and agriculture	some_college	2.96	1
Nature and agriculture	still_in_high_school	2.77	1
Professional advising	associates_degree	2.94	1
Professional advising	bachelors_degree	3.21	1
Professional advising	doctoral_degree	3.36	1
Professional advising	ged	2.69	1
Professional advising	high_school	2.76	1
Professional advising	masters_degree	3.47	1
Professional advising	some_college	2.85	1
Professional advising	still_in_high_school	2.59	1
Creative arts	associates_degree	3.31	1
Creative arts	bachelors_degree	3.6	1
Creative arts	doctoral_degree	3.28	1
Creative arts	ged	3.13	1
Creative arts	high_school	3.22	1
Creative arts	masters_degree	3.5	1
Creative arts	some_college	3.41	1
Creative arts	still_in_high_school	3.45	1
Culinary arts	associates_degree	2.81	1
Culinary arts	bachelors_degree	2.87	1
Culinary arts	doctoral_degree	2.89	1
Culinary arts	ged	2.7	1
Culinary arts	high_school	2.7	1
Culinary arts	masters_degree	2.97	1
Culinary arts	some_college	2.75	1
Culinary arts	still_in_high_school	2.66	1
Social sciences	associates_degree	3.31	1
Social sciences	bachelors_degree	3.41	1
Social sciences	doctoral_degree	3.57	1
Social sciences	ged	3.05	1
Social sciences	high_school	3.09	1
Social sciences	masters_degree	3.61	1
Social sciences	some_college	3.3	1
Social sciences	still_in_high_school	3.14	1
Beauty & style	associates_degree	2.95	1
Beauty & style	bachelors_degree	2.99	1
Beauty & style	doctoral_degree	2.75	1
Beauty & style	ged	2.77	1
Beauty & style	high_school	2.77	1
Beauty & style	masters_degree	2.96	1
Beauty & style	some_college	2.97	1
Beauty & style	still_in_high_school	2.88	1
Working with animals	associates_degree	3.22	1
Working with animals	bachelors_degree	3.07	1
Working with animals	doctoral_degree	2.99	1
Working with animals	ged	3.33	1
Working with animals	high_school	3.22	1
Working with animals	masters_degree	2.94	1
Working with animals	some_college	3.31	1
Working with animals	still_in_high_school	3.19	1
Creative writing & journalism	associates_degree	2.95	1
Creative writing & journalism	bachelors_degree	3.24	1
Creative writing & journalism	doctoral_degree	3.25	1
Creative writing & journalism	ged	2.81	1
Creative writing & journalism	high_school	2.81	1
Creative writing & journalism	masters_degree	3.33	1
Creative writing & journalism	some_college	2.94	1
Creative writing & journalism	still_in_high_school	2.81	1
Green industry	associates_degree	3.14	1
Green industry	bachelors_degree	3.24	1
Green industry	doctoral_degree	3.27	1
Green industry	ged	2.92	1
Green industry	high_school	2.92	1
Green industry	masters_degree	3.37	1
Green industry	some_college	3.06	1
Green industry	still_in_high_school	2.81	1
Politics	associates_degree	2.21	1

Politics	bachelors_degree	2.53	1
Politics	doctoral_degree	2.68	1
Politics	ged	2.17	1
Politics	high_school	2.22	1
Politics	masters_degree	2.65	1
Politics	some_college	2.32	1
Politics	still_in_high_school	2.28	1
Engineering	associates_degree	2.64	1
Engineering	bachelors_degree	2.53	1
Engineering	doctoral_degree	2.83	1
Engineering	ged	2.7	1
Engineering	high_school	2.61	1
Engineering	masters_degree	2.65	1
Engineering	some_college	2.55	1
Engineering	still_in_high_school	2.61	1
Sales	associates_degree	2.35	1
Sales	bachelors_degree	2.48	1
Sales	doctoral_degree	2.24	1
Sales	ged	2.3	1
Sales	high_school	2.41	1
Sales	masters_degree	2.45	1
Sales	some_college	2.4	1
Sales	still_in_high_school	2.45	1
Protective services	associates_degree	2.5	1
Protective services	bachelors_degree	2.38	1
Protective services	doctoral_degree	2.38	1
Protective services	ged	2.7	1
Protective services	high_school	2.61	1
Protective services	masters_degree	2.34	1
Protective services	some_college	2.62	1
Protective services	still_in_high_school	2.68	1
Skilled trades	associates_degree	2.6	1
Skilled trades	bachelors_degree	2.45	1
Skilled trades	doctoral_degree	2.47	1
Skilled trades	ged	2.73	1
Skilled trades	high_school	2.48	1
Skilled trades	masters_degree	2.42	1
Skilled trades	some_college	2.49	1
Skilled trades	still_in_high_school	2.32	1
Office clerical work	associates_degree	2.51	1
Office clerical work	bachelors_degree	2.44	1
Office clerical work	doctoral_degree	2.16	1
Office clerical work	ged	2.45	1
Office clerical work	high_school	2.35	1
Office clerical work	masters_degree	2.38	1
Office clerical work	some_college	2.39	1
Office clerical work	still_in_high_school	2.11	1
Mathematics	associates_degree	2.45	1
Mathematics	bachelors_degree	2.47	1
Mathematics	doctoral_degree	2.88	1
Mathematics	ged	2.42	1
Mathematics	high_school	2.5	1
Mathematics	masters_degree	2.7	1
Mathematics	some_college	2.48	1
Mathematics	still_in_high_school	2.66	1
Military	associates_degree	2.04	1
Military	bachelors_degree	1.91	1
Military	doctoral_degree	2.1	1
Military	ged	2.08	1
Military	high_school	2.14	1
Military	masters_degree	2.01	1
Military	some_college	2.11	1
Military	still_in_high_school	2.09	1
Information technology	associates_degree	2.53	1
Information technology	bachelors_degree	2.56	1
Information technology	doctoral_degree	2.64	1
Information technology	ged	2.57	1
Information technology	high_school	2.56	1
Information technology	masters_degree	2.69	1
Information technology	some_college	2.51	1
Information technology	still_in_high_school	2.43	1
Music	associates_degree	3.53	1
Music	bachelors_degree	3.43	1
Music	doctoral_degree	3.38	1
Music	ged	3.52	1
Music	high_school	3.44	1
Music	masters_degree	3.5	1
Music	some_college	3.49	1
Music	still_in_high_school	3.47	1
Teaching	associates_degree	3.22	1
Teaching	bachelors_degree	3.38	1

Teaching	doctoral_degree	3.51	1
Teaching	ged	2.93	1
Teaching	high_school	3.04	1
Teaching	masters_degree	3.58	1
Teaching	some_college	3.19	1
Teaching	still_in_high_school	2.8	1

### Age Group:

Item Text	Age group	Response Value Mean	Response Value Std	N
Computer programming	16-20	2.4	1.22	4876
Computer programming	21-25	2.36	1.15	4876
Computer programming	26-30	2.45	1.15	4876
Computer programming	31-40	2.37	1.13	4876
Computer programming	41+	2.32	1.1	4876
Helping people	16-20	3.81	1.06	4876
Helping people	21-25	3.88	1.01	4876
Helping people	26-30	3.84	0.97	4876
Helping people	31-40	3.86	0.96	4876
Helping people	41+	3.91	0.95	4876
Driving a car or truck many hours a day	16-20	5.92	3.54	4876
Driving a car or truck many hours a day	21-25	5.68	3.61	4876
Driving a car or truck many hours a day	26-30	5.61	3.65	4876
Driving a car or truck many hours a day	31-40	5.39	3.65	4876
Driving a car or truck many hours a day	41+	5.02	3.63	4876
Installing equipment or programs	16-20	2.46	1.15	4876
Installing equipment or programs	21-25	2.45	1.12	4876
Installing equipment or programs	26-30	2.5	1.11	4876
Installing equipment or programs	31-40	2.45	1.11	4876
Installing equipment or programs	41+	2.41	1.11	4876
Learning new things	16-20	4.22	0.8	4876
Learning new things	21-25	4.34	0.74	4876
Learning new things	26-30	4.35	0.72	4876
Learning new things	31-40	4.28	0.76	4876
Learning new things	41+	4.24	0.78	4876
Write a play for a theater	16-20	2.31	1.28	4876
Write a play for a theater	21-25	2.4	1.28	4876
Write a play for a theater	26-30	2.48	1.3	4876
Write a play for a theater	31-40	2.5	1.28	4876
Write a play for a theater	41+	2.57	1.25	4876
Science	16-20	3.2	1.3	4876
Science	21-25	3.13	1.25	4876
Science	26-30	3.12	1.16	4876
Science	31-40	3.08	1.13	4876
Science	41+	3.02	1.14	4876
Critical thinking	16-20	3.99	0.93	4876
Critical thinking	21-25	4.11	0.9	4876
Critical thinking	26-30	4.15	0.85	4876
Critical thinking	31-40	4.12	0.88	4876
Critical thinking	41+	4.06	0.89	4876
Process transactions at a bank	16-20	2.15	1.1	4876
Process transactions at a bank	21-25	2.24	1.12	4876
Process transactions at a bank	26-30	2.2	1.1	4876
Process transactions at a bank	31-40	2.24	1.13	4876
Process transactions at a bank	41+	2.33	1.13	4876
Investigate causes of climate change	16-20	2.62	1.26	4876
Investigate causes of climate change	21-25	2.78	1.27	4876
Investigate causes of climate change	26-30	2.85	1.23	4876
Investigate causes of climate change	31-40	2.82	1.21	4876
Investigate causes of climate change	41+	2.76	1.19	4876
Find support resources for families in need	16-20	2.86	1.23	4876
Find support resources for families in need	21-25	2.98	1.23	4876
Find support resources for families in need	26-30	3.02	1.2	4876
Find support resources for families in need	31-40	3.08	1.2	4876
Find support resources for families in need	41+	3.18	1.16	4876
Direct the making of a movie	16-20	2.83	1.35	4876
Direct the making of a movie	21-25	2.84	1.33	4876
Direct the making of a movie	26-30	2.93	1.32	4876
Direct the making of a movie	31-40	2.85	1.29	4876
Direct the making of a movie	41+	2.89	1.26	4876
Sell a house	16-20	2.45	1.2	4876
Sell a house	21-25	2.51	1.21	4876
Sell a house	26-30	2.58	1.21	4876
Sell a house	31-40	2.65	1.21	4876
Sell a house	41+	2.76	1.2	4876
Help a client make business decisions	16-20	2.8	1.18	4876
Help a client make business decisions	21-25	2.94	1.23	4876

Help a client make business decisions	26-30		3.08		1.22	4876
Help a client make business decisions	31-40		3.13		1.22	4876
Help a client make business decisions	41+		3.16		1.2	4876
Create art for sale and exhibition	16-20		2.53		1.33	4876
Create art for sale and exhibition	21-25		2.71		1.36	4876
Create art for sale and exhibition	26-30		2.82		1.35	4876
Create art for sale and exhibition	31-40		2.85		1.36	4876
Create art for sale and exhibition	41+		2.86		1.31	4876
Write marketing material for a client's products	16-20		2.41		1.16	4876
Write marketing material for a client's products	21-25		2.64		1.22	4876
Write marketing material for a client's products	26-30		2.74		1.2	4876
Write marketing material for a client's products	31-40		2.7		1.19	4876
Write marketing material for a client's products	41+		2.74		1.17	4876
Keep records of payments received	16-20		2.48		1.17	4876
Keep records of payments received	21-25		2.56		1.2	4876
Keep records of payments received	26-30		2.56		1.2	4876
Keep records of payments received	31-40		2.61		1.21	4876
Keep records of payments received	41+		2.68		1.21	4876
Sort mail in a post office	16-20		1.79		1	4876
Sort mail in a post office	21-25		1.95		1.08	4876
Sort mail in a post office	26-30		2.02		1.11	4876
Sort mail in a post office	31-40		2.09		1.13	4876
Sort mail in a post office	41+		2.15		1.12	4876
Verify quality of parts before shipment	16-20		2.04		1.06	4876
Verify quality of parts before shipment	21-25		2.19		1.12	4876
Verify quality of parts before shipment	26-30		2.26		1.13	4876
Verify quality of parts before shipment	31-40		2.29		1.14	4876
Verify quality of parts before shipment	41+		2.35		1.12	4876
Make customized kitchen cabinets	16-20		2.05		1.14	4876
Make customized kitchen cabinets	21-25		2.23		1.19	4876
Make customized kitchen cabinets	26-30		2.34		1.21	4876
Make customized kitchen cabinets	31-40		2.29		1.19	4876
Make customized kitchen cabinets	41+		2.28		1.16	4876
Interpret results of medical tests	16-20		2.85		1.27	4876
Interpret results of medical tests	21-25		2.84		1.24	4876
Interpret results of medical tests	26-30		2.85		1.21	4876
Interpret results of medical tests	31-40		2.89		1.18	4876
Interpret results of medical tests	41+		2.98		1.17	4876
Help someone with a disability get dressed	16-20		2.18		1.16	4876
Help someone with a disability get dressed	21-25		2.21		1.16	4876
Help someone with a disability get dressed	26-30		2.14		1.12	4876
Help someone with a disability get dressed	31-40		2.21		1.12	4876
Help someone with a disability get dressed	41+		2.31		1.12	4876
Advise organizations on how to meet their business goals	16-20		2.65		1.22	4876
Advise organizations on how to meet their business goals	21-25		2.86		1.26	4876
Advise organizations on how to meet their business goals	26-30		2.99		1.27	4876
Advise organizations on how to meet their business goals	31-40		2.98		1.26	4876
Advise organizations on how to meet their business goals	41+		2.99		1.25	4876
Oversee the hiring of new employees	16-20		2.86		1.19	4876
Oversee the hiring of new employees	21-25		3.06		1.22	4876
Oversee the hiring of new employees	26-30		3.16		1.18	4876
Oversee the hiring of new employees	31-40		3.17		1.18	4876
Oversee the hiring of new employees	41+		3.22		1.16	4876
Study sea creatures	16-20		2.87		1.29	4876
Study sea creatures	21-25		2.93		1.3	4876
Study sea creatures	26-30		2.98		1.28	4876
Study sea creatures	31-40		2.91		1.27	4876
Study sea creatures	41+		2.92		1.24	4876
Estimate the value of items for an insurance policy	16-20		2.03		1.03	4876
Estimate the value of items for an insurance policy	21-25		2.1		1.08	4876
Estimate the value of items for an insurance policy	26-30		2.18		1.1	4876
Estimate the value of items for an insurance policy	31-40		2.23		1.1	4876
Estimate the value of items for an insurance policy	41+		2.37		1.12	4876
Help elderly people complete their daily activities	16-20		2.35		1.19	4876
Help elderly people complete their daily activities	21-25		2.34		1.17	4876
Help elderly people complete their daily activities	26-30		2.3		1.15	4876
Help elderly people complete their daily activities	31-40		2.43		1.14	4876
Help elderly people complete their daily activities	41+		2.57		1.15	4876
Perform scientific analyses on evidence from a crime scene	16-20		3.16		1.27	4876
Perform scientific analyses on evidence from a crime scene	21-25		3.13		1.27	4876
Perform scientific analyses on evidence from a crime scene	26-30		3.1		1.27	4876
Perform scientific analyses on evidence from a crime scene	31-40		3.1		1.26	4876
Perform scientific analyses on evidence from a crime scene	41+		3.2		1.24	4876
Teach kids how to play well with other children	16-20		2.67		1.32	4876
Teach kids how to play well with other children	21-25		2.75		1.3	4876
Teach kids how to play well with other children	26-30		2.76		1.27	4876
Teach kids how to play well with other children	31-40		2.79		1.24	4876
Teach kids how to play well with other children	41+		2.87		1.19	4876
Entertain an audience	16-20		2.8		1.36	4876
Entertain an audience	21-25		2.78		1.35	4876
Entertain an audience	26-30		2.74		1.34	4876

Entertain an audience	31-40	2.66	1.31	4876
Entertain an audience	41+	2.72	1.31	4876
Repair damaged farm equipment	16-20	1.83	1.06	4876
Repair damaged farm equipment	21-25	1.89	1.08	4876
Repair damaged farm equipment	26-30	1.96	1.1	4876
Repair damaged farm equipment	31-40	1.95	1.09	4876
Repair damaged farm equipment	41+	1.97	1.09	4876
Write lyrics for songs	16-20	2.51	1.32	4876
Write lyrics for songs	21-25	2.57	1.33	4876
Write lyrics for songs	26-30	2.63	1.31	4876
Write lyrics for songs	31-40	2.63	1.29	4876
Write lyrics for songs	41+	2.73	1.26	4876
Install drywall in houses	16-20	1.74	0.96	4876
Install drywall in houses	21-25	1.83	1	4876
Install drywall in houses	26-30	1.9	1.03	4876
Install drywall in houses	31-40	1.92	1.03	4876
Install drywall in houses	41+	1.92	1	4876
Operate a crane at a building site	16-20	1.72	0.98	4876
Operate a crane at a building site	21-25	1.82	1.03	4876
Operate a crane at a building site	26-30	1.9	1.06	4876
Operate a crane at a building site	31-40	1.95	1.11	4876
Operate a crane at a building site	41+	2.01	1.1	4876
Counsel people with drug or alcohol addiction	16-20	2.53	1.26	4876
Counsel people with drug or alcohol addiction	21-25	2.6	1.26	4876
Counsel people with drug or alcohol addiction	26-30	2.59	1.23	4876
Counsel people with drug or alcohol addiction	31-40	2.63	1.23	4876
Counsel people with drug or alcohol addiction	41+	2.65	1.2	4876
Analyze data using statistics	16-20	2.76	1.23	4876
Analyze data using statistics	21-25	2.85	1.28	4876
Analyze data using statistics	26-30	2.93	1.26	4876
Analyze data using statistics	31-40	2.89	1.26	4876
Analyze data using statistics	41+	2.86	1.25	4876
Examine artifacts left behind by previous civilizations	16-20	2.74	1.31	4876
Examine artifacts left behind by previous civilizations	21-25	3.01	1.33	4876
Examine artifacts left behind by previous civilizations	26-30	3.17	1.3	4876
Examine artifacts left behind by previous civilizations	31-40	3.18	1.29	4876
Examine artifacts left behind by previous civilizations	41+	3.21	1.27	4876
Oversee all aspects of a business	16-20	2.85	1.27	4876
Oversee all aspects of a business	21-25	3.04	1.29	4876
Oversee all aspects of a business	26-30	3.14	1.28	4876
Oversee all aspects of a business	31-40	3.09	1.28	4876
Oversee all aspects of a business	41+	3.13	1.24	4876
Research how genes function	16-20	2.8	1.31	4876
Research how genes function	21-25	2.81	1.28	4876
Research how genes function	26-30	2.86	1.25	4876
Research how genes function	31-40	2.86	1.22	4876
Research how genes function	41+	2.88	1.22	4876
Take part in a musical performance	16-20	2.64	1.43	4876
Take part in a musical performance	21-25	2.64	1.41	4876
Take part in a musical performance	26-30	2.69	1.38	4876
Take part in a musical performance	31-40	2.67	1.37	4876
Take part in a musical performance	41+	2.7	1.34	4876
Finance	16-20	2.36	1.16	4876
Finance	21-25	2.43	1.19	4876
Finance	26-30	2.5	1.17	4876
Finance	31-40	2.5	1.18	4876
Finance	41+	2.58	1.16	4876
Athletics	16-20	2.77	1.41	4876
Athletics	21-25	2.85	1.36	4876
Athletics	26-30	2.91	1.32	4876
Athletics	31-40	2.83	1.29	4876
Athletics	41+	2.74	1.27	4876
Flying	16-20	2.43	1.28	4876
Flying	21-25	2.51	1.3	4876
Flying	26-30	2.51	1.28	4876
Flying	31-40	2.44	1.26	4876
Flying	41+	2.39	1.25	4876
Law	16-20	2.65	1.23	4876
Law	21-25	2.57	1.2	4876
Law	26-30	2.59	1.19	4876
Law	31-40	2.66	1.2	4876
Law	41+	2.71	1.18	4876
Healthcare service	16-20	2.93	1.36	4876
Healthcare service	21-25	2.83	1.3	4876
Healthcare service	26-30	2.79	1.25	4876
Healthcare service	31-40	2.83	1.22	4876
Healthcare service	41+	2.9	1.21	4876
Physical science	16-20	2.71	1.24	4876
Physical science	21-25	2.71	1.21	4876
Physical science	26-30	2.76	1.15	4876
Physical science	31-40	2.74	1.15	4876

Physical science	41+	2.68	1.12	4876
Nature and agriculture	16-20	2.87	1.31	4876
Nature and agriculture	21-25	2.98	1.32	4876
Nature and agriculture	26-30	3.09	1.29	4876
Nature and agriculture	31-40	3.08	1.28	4876
Nature and agriculture	41+	3.05	1.23	4876
Professional advising	16-20	2.81	1.16	4876
Professional advising	21-25	3.03	1.19	4876
Professional advising	26-30	3.15	1.17	4876
Professional advising	31-40	3.2	1.18	4876
Professional advising	41+	3.27	1.14	4876
Creative arts	16-20	3.12	1.4	4876
Creative arts	21-25	3.29	1.37	4876
Creative arts	26-30	3.39	1.3	4876
Creative arts	31-40	3.36	1.31	4876
Creative arts	41+	3.31	1.25	4876
Culinary arts	16-20	2.67	1.24	4876
Culinary arts	21-25	2.78	1.23	4876
Culinary arts	26-30	2.91	1.25	4876
Culinary arts	31-40	2.89	1.24	4876
Culinary arts	41+	2.88	1.22	4876
Social sciences	16-20	3.19	1.23	4876
Social sciences	21-25	3.33	1.21	4876
Social sciences	26-30	3.4	1.17	4876
Social sciences	31-40	3.4	1.14	4876
Social sciences	41+	3.4	1.1	4876
Beauty & style	16-20	2.87	1.35	4876
Beauty & style	21-25	2.96	1.34	4876
Beauty & style	26-30	2.98	1.31	4876
Beauty & style	31-40	2.92	1.29	4876
Beauty & style	41+	2.93	1.26	4876
Working with animals	16-20	3.07	1.35	4876
Working with animals	21-25	3.14	1.33	4876
Working with animals	26-30	3.12	1.33	4876
Working with animals	31-40	3.01	1.33	4876
Working with animals	41+	3.04	1.27	4876
Creative writing & journalism	16-20	2.87	1.33	4876
Creative writing & journalism	21-25	3.04	1.31	4876
Creative writing & journalism	26-30	3.13	1.27	4876
Creative writing & journalism	31-40	3.1	1.28	4876
Creative writing & journalism	41+	3.14	1.24	4876
Green industry	16-20	2.92	1.26	4876
Green industry	21-25	3.22	1.26	4876
Green industry	26-30	3.32	1.22	4876
Green industry	31-40	3.26	1.22	4876
Green industry	41+	3.17	1.16	4876
Politics	16-20	2.3	1.26	4876
Politics	21-25	2.34	1.25	4876
Politics	26-30	2.34	1.25	4876
Politics	31-40	2.38	1.24	4876
Politics	41+	2.4	1.2	4876
Engineering	16-20	2.62	1.33	4876
Engineering	21-25	2.59	1.27	4876
Engineering	26-30	2.67	1.22	4876
Engineering	31-40	2.64	1.2	4876
Engineering	41+	2.56	1.16	4876
Sales	16-20	2.46	1.19	4876
Sales	21-25	2.34	1.17	4876
Sales	26-30	2.3	1.17	4876
Sales	31-40	2.27	1.15	4876
Sales	41+	2.36	1.16	4876
Protective services	16-20	2.51	1.18	4876
Protective services	21-25	2.45	1.19	4876
Protective services	26-30	2.41	1.14	4876
Protective services	31-40	2.42	1.17	4876
Protective services	41+	2.52	1.14	4876
Skilled trades	16-20	2.33	1.17	4876
Skilled trades	21-25	2.49	1.21	4876
Skilled trades	26-30	2.58	1.21	4876
Skilled trades	31-40	2.61	1.21	4876
Skilled trades	41+	2.56	1.18	4876
Office clerical work	16-20	2.18	1.12	4876
Office clerical work	21-25	2.42	1.19	4876
Office clerical work	26-30	2.48	1.21	4876
Office clerical work	31-40	2.52	1.2	4876
Office clerical work	41+	2.55	1.16	4876
Mathematics	16-20	2.66	1.35	4876
Mathematics	21-25	2.5	1.29	4876
Mathematics	26-30	2.49	1.22	4876
Mathematics	31-40	2.47	1.21	4876
Mathematics	41+	2.46	1.17	4876

Military	16-20	2.09	1.21	4876
Military	21-25	2	1.17	4876
Military	26-30	1.99	1.15	4876
Military	31-40	1.95	1.11	4876
Military	41+	2	1.12	4876
Information technology	16-20	2.47	1.23	4876
Information technology	21-25	2.49	1.21	4876
Information technology	26-30	2.61	1.21	4876
Information technology	31-40	2.59	1.2	4876
Information technology	41+	2.57	1.18	4876
Music	16-20	3.52	1.35	4876
Music	21-25	3.56	1.32	4876
Music	26-30	3.56	1.29	4876
Music	31-40	3.52	1.29	4876
Music	41+	3.39	1.24	4876
Teaching	16-20	2.95	1.22	4876
Teaching	21-25	3.22	1.17	4876
Teaching	26-30	3.28	1.15	4876
Teaching	31-40	3.36	1.14	4876
Teaching	41+	3.46	1.08	4876

## F1 Scores Comparisons:

### Gender:

gender				
Gender	F1 Score Average	N	F1 Score Standard Deviation	
F	0.513596	100	0.311057	
M	0.581826	100	0.259043	

### Education Level:

Highest education level				
Highest education level	F1 Score Average	N	F1 Score Standard Deviation	
Associates degree	0.532955	100	0.287925	
Bachelors degree	0.520747	100	0.291728	
Doctoral degree	0.514161	100	0.295595	
Ged	0.449398	100	0.283664	
High school	0.544166	100	0.296418	
Masters degree	0.47764	100	0.317931	
Some college	0.506682	100	0.279954	
Still in high school	0.503269	100	0.289926	

### Age Group:

age_group				
Age group	F1 Score Average	N	F1 Score Standard Deviation	
16-20	0.560383	100	0.263538	
21-25	0.507304	100	0.307508	
26-30	0.508364	100	0.272224	
31-40	0.500562	100	0.287099	
41+	0.476667	100	0.279343	

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