

# Education Zones – Bridging the Gap Between Candidate Education and Employer Requirements in Online Job Matching

Version: 01 / October 2020

Authors: Timothy Sperisen, Ontology Maintenance and Support &  
Jennifer Jayne Jakob, Technical Writer and Solution Documentalist

## Introduction

AI-based matching is on the rise and here to stay. But anyone using online job-matching services will undoubtedly encounter mismatches and sometimes even ridiculous job or candidate suggestions. One of the reasons for this is that most matching algorithms do not process information relating to education adequately. But what exactly is the challenge? Why do matching algorithms produce these strange results? As it turns out, it is not just a software issue. But it is an issue that can be addressed – through **Education Zones**.

Employers tend to use generic phrases such as “educational background in...”. But as for which education is part of this “background”, or how “necessary experience” is defined is often entirely unclear. What is the meaning of terms like “educated in a craft profession” or “educated in a ... field”? These questions have no easy answer, and many algorithms are thus designed to disregard this information altogether, relying on just the level of education instead. For instance, in job-matching apps, a travel agent may

be suggested a job as an IT specialist. Of course, the hiring firm will then also find this travel agent on their list of proposed candidates. Amongst other skills, a travel agent may have experience in databases, good communication skills... and a degree. But these skills were acquired in a different context, which is not taken into account when the matching algorithm only considers the **level** of education. To prevent such clear mismatches, the algorithm needs to work with additional information.

## The Pitfalls of an “Educational Background”

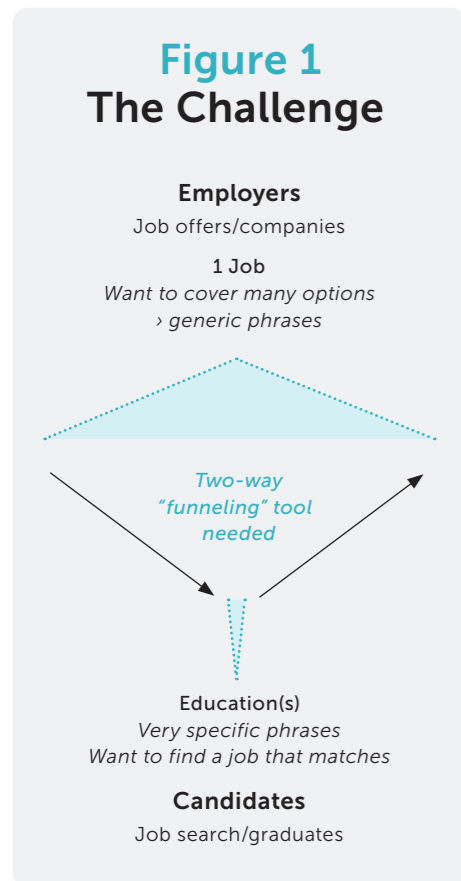
Not just online, but offline too, companies and job candidates encounter difficulties in finding the right job match. Companies want suitable candidates. Candidates want suitable opportunities. And graduates want suitable career paths. But many are not clear on how educations relate to professions. This issue is very much entangled with the fact that the titles of degrees or certificates rarely coincide with the phrasing of education requirements used by recruiters – or any part of the job description for that matter.

## Contents

- 01 The Pitfalls of an “Educational Background”
- 02 Fields of Education and Their Limitations
- 05 From Fields to Zones
- 06 Difference in Zone Compositions
- 09 Utilizing Education Zones
- 10 Education Zones in the Fast-Changing Educational Landscape
- 10 Conclusion
- 11 Education as a Skill Set

On the one hand, we have employers who want to find the right candidate. But maybe the ideal candidate cannot be traced down to one specific education. The way to a job in tourism, for example, does not necessarily lead over a degree in tourism. Hence the generic phrases. On the other hand, we have jobseekers with their completed education. They know exactly what they studied but, as recent graduates for instance, are not yet sure where work opportunities lie. They find that the specific title of their degree has very little to do with job descriptions, as professional fields are often very different from fields of study.

Another challenge in the context of education is that the highest level of education becomes less relevant as work experience increases. By contrast, with the growing popularity of lifelong learning, recently completed lower-level courses or certificates become more significant as they complement work experience. Matching algorithms that focus merely on levels of education fall short of that fact. And thus, jobseekers with 20 years of work experience are still matched primarily based on their university degree dating back 20 years.



The task is therefore to find a method which takes all the “upskilling”, the useful post-degree online courses, trainings and other programs into account. JANZZ.technology wants to ensure that an algorithm proposes suitable candidates for an open position, i.e. a candidate pool with a variety of educations which is not too broad, but also not too narrow. JANZZ also wants to make sure that job seekers are presented with suitable opportunities. In a nutshell, the mission is to bridge the gap between completed and required education.

### Fields of Education and Their Limitations

The first task on this mission is to create a classification (or categorization) that does justice to the wide variety of educations. Managing such a vast collection of educations, trying to bring them all together and classify them perfectly, is a mammoth task, and the desire for order and perfection can cause a lot of frustration. Opinions may differ. Educations are not constant and rigid. On the contrary, they are dynamic and flexible. Names of educations change. New subjects and fields are added to curricula, others become outdated and are removed. Education is an area of everchanging adaption and development.

Several different classification systems already exist, offering diverse views on how to organize educations, such as the OECD Fields of Science<sup>1</sup>, ISCED Fields of Education<sup>2</sup> or lists on career guidance websites<sup>3</sup>. In addition, there are regional classification systems like CIP (Classification of Instructional Programs) for North America or CMPE (Centro Mexicano de Promoción Educativa) for Mexico. They all offer points of orientation in their efforts to organize the numerous different educations.

Other parties have created maps of the various fields of science<sup>4</sup> such as maps of Computer Science or Biology. But each time such a classification is created, it generates at least as many questions as answers: is the field of **natural sciences** a good filter? Physicists and biologists both graduate in natural sciences but they are not necessarily suited to the same jobs.

If **natural sciences** is not a good filter, we need to somehow determine an alternate filter that can encompass the similarities of the fields while simultaneously meeting a need for differentiation. Moreover, in addition to the classical academic/scientific sector, vocational training also needs to be incorporated to categorize training for painters or street construction workers.

Fields of education are a starting point, but they cannot serve as a definitive classification. They cannot deal with the complexity of the world of educations. Such classifications represent only the theoretical perspective of this issue, which may differ strongly from practice. The professional fields a graduate could consider rarely fit into a single field of academic education. So, to avoid missing out on a good candidate or job opportunity, we need to cover vocational and non-classical educations as well.

<sup>1</sup> <https://www.oecd.org/science/innoc/38235147.pdf>

<sup>2</sup> <http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-fields-of-education-and-training-2013-detailed-field-descriptions-2015-en.pdf>

<sup>3</sup> <https://study.com/>; <https://www.bachelorstudies.com/>

<sup>4</sup> <https://nces.ed.gov/ipeds/cipcode/default.aspx?y=56>

<sup>5</sup> <https://cmpe.mx/>

<sup>6</sup> <https://www.youtube.com/channel/UCxqAWLtk1CmBvZFPzeZMd9A>

**Figure 2:**  
**OECD Fields of Science**

	FOS in FM 2002	Revised FOS
<b>1. Natural Sciences</b>	1.1 Mathematics and computer sciences 1.2 Physical sciences 1.3 Chemical sciences 1.4 Earth and related environmental sciences 1.5 Biological sciences	1.1 Mathematics 1.2 Computer and information sciences 1.3 Physical sciences 1.4 Chemical sciences 1.5 Earth and related environmental sciences 1.6 Biological sciences 1.7 Other natural sciences
<b>2. Engineering and Technology</b>	2.1 Civil engineering 2.2 Electrical engineering, electronics 2.3 Other engineering sciences	2.1 Civil engineering 2.2 Electrical engineering, electronic engineering, information engineering 2.3 Mechanical engineering 2.4 Chemical engineering 2.5 Materials engineering 2.6 Medical engineering 2.7 Environmental engineering 2.8 Environmental biotechnology 2.9 Industrial Biotechnology 2.10 Nano-technology 2.11 Other engineering and technologies
<b>3. Medical and Health Sciences</b>	3.1 Basic medicine 3.2 Clinical medicine 3.3 Health sciences	3.1 Basic medicine 3.2 Clinical medicine 3.3 Health sciences 3.4 Health biotechnology 3.5 Other medical sciences
<b>4. Agricultural Sciences</b>	4.1 Agriculture, forestry, fisheries and allied sciences 4.2 Veterinary medicine	4.1 Agriculture, forestry, and fisheries 4.2 Animal and dairy science 4.3 Veterinary science 4.4 Agricultural biotechnology 4.5 Other agricultural sciences
<b>5. Social Sciences</b>	5.1 Psychology 5.2 Economics 5.3 Educational sciences 5.4 Other social sciences	5.1 Psychology 5.2 Economics and business 5.3 Educational sciences 5.3 Sociology 5.5 Law 5.6 Political Science 5.7 Social and economic geography 5.8 Media and communications 5.7 Other social sciences
<b>6. Humanities</b>	6.1 History 6.2 Languages and literature 6.3 Other humanities	6.1 History and archaeology 6.2 Languages and literature 6.3 Philosophy, ethics and religion 6.4 Art (arts, history of arts, performing arts, music) 6.5 Other humanities

**Figure 3:**  
**ISCED Fields of Education**

<b>00</b>	<b>Generic programmes and qualifications</b>	001 Basic programmes and qualifications 002 Literacy and numeracy 003 Personal skills	0011 Basic programmes and qualifications 0021 Literacy and numeracy 0031 Personal skills
<b>01</b>	<b>Education</b>	011 Education	0111 Education science 0112 Training for pre-school teachers 0113 Teacher training without subject specialisation 0114 Teacher training with subject specialisation
<b>02</b>	<b>Arts and Humanities</b>	021  022 Humanities (except languages) 023 Languages	0211 Audio-visual techniques and media production 0212 Fashion, interior and industrial design 0213 Fine arts 0214 Handicrafts 0215 Music and performing arts 0221 Religion and theology 0222 History and archaeology 0231 Language acquisition 0232 Literature and linguistics
<b>03</b>	<b>Social Sciences, Journalism and Information</b>	031 Social and behavioural sciences  032 Journalism and information	0311 Economics 0312 Political sciences and civics 0313 Psychology 0314 Sociology and cultural studies 0321 Journalism and reporting 0322 Library, information and archival studies
<b>04</b>	<b>Business, Administration and Law</b>	041 Business and administration  042 Law	0411 Accounting and taxation 0412 Finance, banking and insurance 0413 Management and administration 0414 Marketing and advertising 0415 Secretarial and office work 0416 Wholesale and retail sales 0417 Work skills 0421 Law
<b>05</b>	<b>Natural Sciences, Mathematics and Statistics</b>	051 Biological and related sciences 052 Environment 053 Physical sciences 054 Mathematics and statistics	0511 Biology 0512 Biochemistry 0521 Environmental sciences 0522 Natural environments and wildlife 0531 Chemistry 0532 Earth sciences 0533 Physics 0541 Mathematics 0542 Statistics
<b>06</b>	<b>Information and Communication Technologies</b>	061 Information and Communication Technologies	0611 Computer use 0612 Database and network design and administration 0613 Software and applications development and analysis 0619 Information and Communication Technologies not elsewhere classified
<b>07</b>	<b>Engineering, Manufacturing and Construction</b>	071 Engineering and engineering trades  072 Manufacturing and processing  073 Architecture and construction	0711 Chemical engineering and processes 0712 Environmental protection technology 0713 Electricity and energy 0714 Electronics and automation 0715 Mechanics and metal trades 0716 Motor vehicles, ships and aircraft 0719 Engineering and engineering trades not elsewhere classified 0721 Food processing 0722 Materials (glass, paper, plastic and wood) 0723 Textiles (clothes, footwear and leather) 0724 Mining and extraction 0731 Architecture and town planning 0732 Building and civil engineering
<b>08</b>	<b>Agriculture, Forestry, Fisheries and Veterinary</b>	081 Agriculture 082 Forestry 083 Fisheries 084 Veterinary	0811 Crop and livestock production 0812 Horticulture 0821 Forestry 0831 Fisheries 0841 Veterinary
<b>09</b>	<b>Health and Welfare</b>	091 Health  092 Welfare	0911 Dental studies 0912 Medicine 0913 Nursing and midwifery 0914 Medical diagnostic and treatment technology 0915 Therapy and rehabilitation 0916 Pharmacy 0917 Traditional and complementary medicine and therapy 0921 Care of elderly and of disabled adults 0922 Child care and youth services 0923 Social work and counselling
<b>10</b>	<b>Services</b>	101 Personal service  102 Hygiene and occupational health services 103 Security services 104 Transport services	1011 Domestic services 1012 Hair and beauty services 1013 Hotel, restaurants and catering 1014 Sports 1015 Travel, tourism and leisure 1021 Community sanitation 1022 Occupational health and safety 1031 Military and defence 1032 Protection of persons and property 1041 Transport services

**From Fields to Zones**

As an example, let us discuss how to locate an education or an educational experience in the tourism sector by considering two generally opposing perspectives: theory and practice.

**The tourism sector from a theoretical perspective:**  
where to place tourism within educations

The OECD Fields of Science classification (Figure 2) cannot locate tourism at all because the field is not (yet) considered a science. None of the listed six fields suitably encompass tourism. The closest option would be 5.7, **other social sciences**, which is still unsatisfactory. By comparison, the ISCED Fields of Education (Figure 3) does include tourism: field 1015 **Travel, tourism and leisure**.

It appears that tourism has found its place on an educational map over the years. However, unlike other educations listed in the ISCED classification, a specific “Bachelor/Master/Certificate of Tourism” is rare. Instead, a degree almost always is connected to some other field of education, e.g. tourism management, which could also be classified under 041 **Business and administration**. This is not surprising if one considers the wide variety of subjects pertaining to tourism in practice.

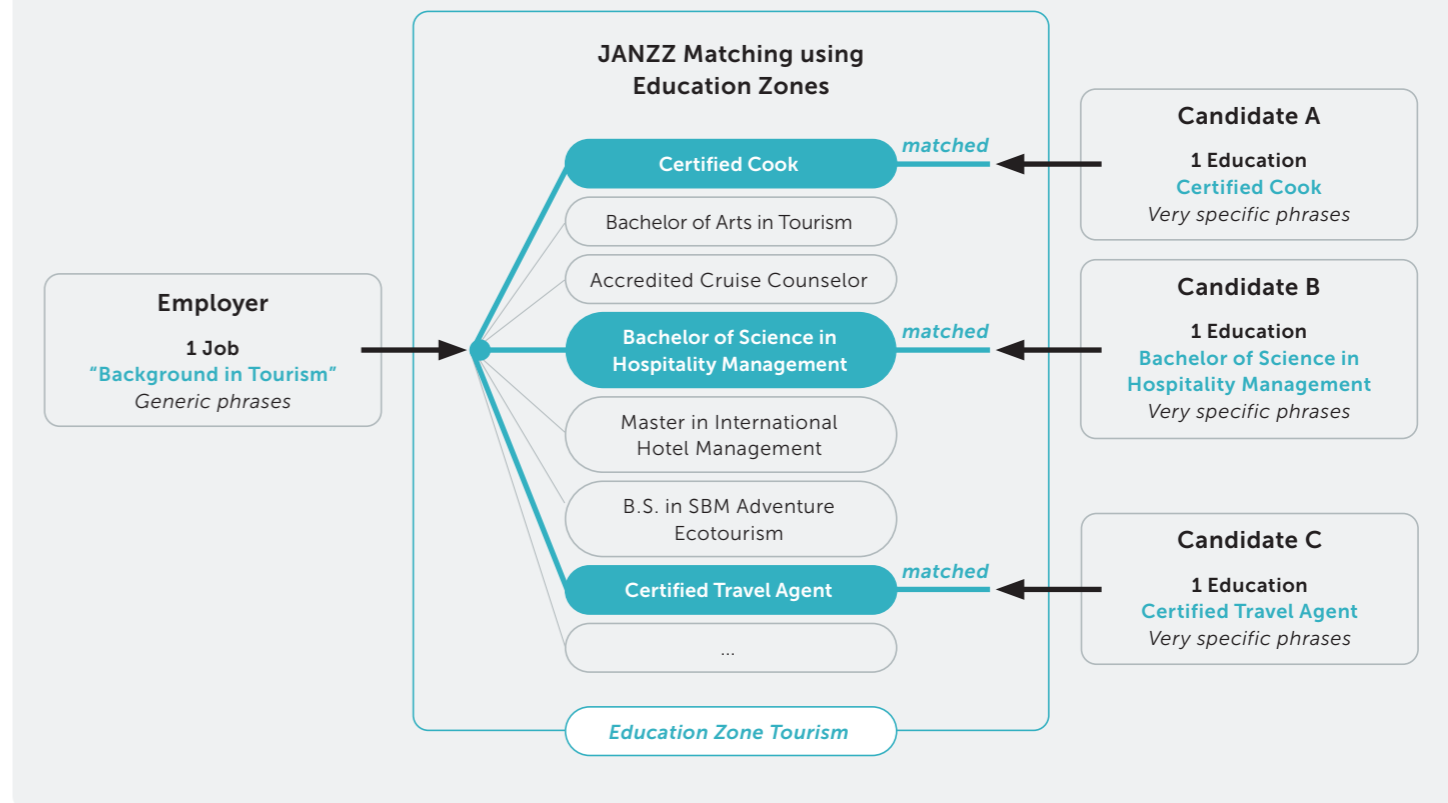
**Fact 1**  
There is no satisfying theoretical concept that defines educations in tourism

**The tourism sector from a practical perspective:**  
who works in tourism

The ISCED classification has categorized the field of tourism from a theoretical perspective. But when a company needs someone with experience in the tourism sector, who will they look for? Companies that operate in this sector do not only employ people with a degree in tourism. Many of the jobs in the tourism sector require education which is not specific to tourism.

In practice, tourism consists of 1) lodging, 2) food and beverage, 3) recreation/entertainment, 4) transportation and 5) travel services. This encompasses a wide variety of activities and related educations: cooks, tour guides, pilots, massage therapists and travel agents can all be

**Figure 4**  
**Using Education Zones to Match Jobs and Candidates in the Tourism Sector**



associated with the tourism sector, to name just a few. A hotel, for example, is a collective pool for a variety of educational backgrounds. Simply filtering by the field of education is not enough. Tourism degrees exist but only a small minority of people working in tourism do in fact hold such a degree. Going back to the ISCED classification, we see that just the few examples mentioned here already cover at least six different education fields

**Fact 2**  
Tourism is a multifaceted zone that unites many different educational backgrounds

Taking these two facts into consideration it becomes clear that a change is required. There is no need to invent another classification rivalling the existing fields of education. Instead, we can restructure the fields of education to create a tool that more accurately reflects which educations belong to a certain sector.

This restructuring combines degrees, training and other education into new clusters, which JANZZ calls **Education Zones**. These clusters provide a much more realistic representation of the demands of the labor market.

The traditional classifications of education fields are quite rigid. Any given education can only be assigned one location in the classification. By contrast, Education Zones provide the option to combine elements from several different fields of education into the same cluster, and each education can be part of several clusters.

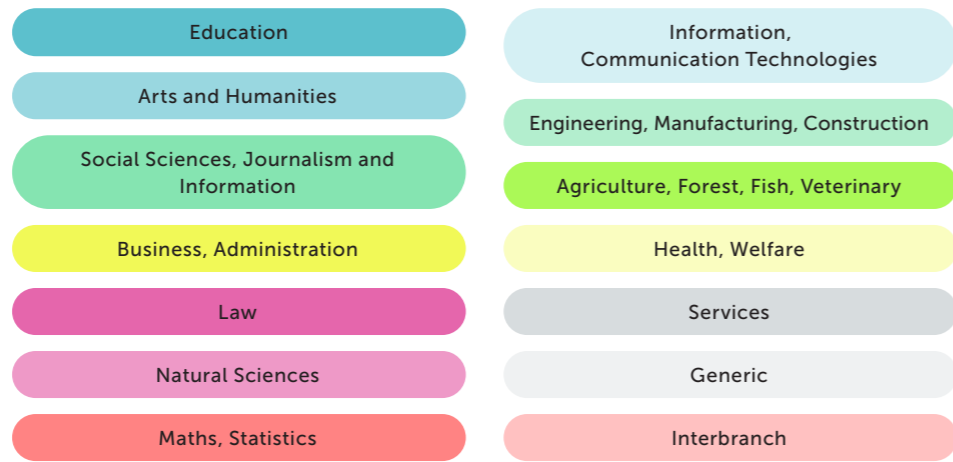
**Difference in Zone Compositions**  
Each Education Zone is composed of an inner and an outer zone; some also have an intermediate zone. The inner zone comprises the core elements and activities, giving insight into how the zone is composed and the origin of its designation. The outer zone represents the more indirect opportunities to apply the knowledge and skills acquired in educations featured in the inner zone. In **Figure 6**, showing the Education Zone for tourism, the activities and educations are marked with colors corresponding to the various fields of education. The code is defined in **Figure 5**.

**Figure 6** demonstrates just how multifaceted tourism is from an educational perspective. The inner tourism zone consists of Services (**grey**), Business (**yellow**), Humanities (**medium blue**) and Agriculture (**bright green**). Moving to the outer zone, tourism also includes Health (**light yellow**), Education (**darker blue**) and Social Sciences (**green**). Note that this zone composition is still sufficiently focused. For instance, the education field of law is absent even though there are legal aspects and activities in tourism. This is because in terms of education (as currently known), the connection is too weak.

A legal question connected to tourism is still a legal question<sup>7</sup> (e.g. cancellation regulations) and dealing with it more likely requires a legal background than a tourism background.

This last point can be also be illustrated using another example: Some tourists travel to a specific place because of a famous restaurant located there. So the restaurant contributes to tourism at that location. But the activity of owning and managing a restaurant is not a touristic activity per se. It thus makes sense to link the chef of that restaurant to tourism but not to the inner zone of educations related to tourism. From an individual perspective, when someone starts training as a cook, they will not necessarily have tourism in mind. Nevertheless, the cook may contribute to local/regional or even international tourism later in their career.

### Figure 5: Adjusted ISCED Fields of Education in a Color Code



**Figure 6: Tourism Education Zone With Color Code**

Education Zone Tourism <b>Inner Zone</b>	Restaurant, Culinary, and Catering Management	Parks, Recreation, and Leisure Facilities Management, Other
	Food Service, Waiter/Waitress, and Dining Room Management	Outdoor Education
	Culinary Arts/Chef Training	Truck and Bus Driver/Commercial Vehicle Operator and Instructor
	Food Preparation/Professional Cooking/Kitchen Assistant	Aeronautics/Aviation/Aerospace Science and Technology
	Culinary Arts and Related Services, Other	Airline/Commercial/Professional Pilot and Flight Crew
	Culinary, Entertainment, and Personal Services, Other	Marine Transportation, Other
	Leisure and Recreational Activities	Parks, Recreation, and Leisure Facilities Management
	Travel and Exploration	
	Hospitality Administration/Management	Tourism and Travel Services Management
	Hotel, Motel, and Restaurant Management	Meeting and Event Planning
Hotel/Motel Administration	Tourism and Travel Services Marketing Operations	
Resort Management	Tourism Promotion Operations	
Restaurant/Food Services Management	Hospitality and Recreation Marketing Operations	
Foodservice Systems Administration/Management		
Environmental/Natural Resource Recreation and Tourism	Ecotourism	
Crafts/Craft Design, Folk Art and Artisanry	Souvenir Manufacturing and Promotion	
Education Zone Tourism <b>Intermediate Zone</b>	Sales, Distribution, and Marketing Operations	Retailing and Retail Operations
	Merchandising and Buying Operations	Selling Skills and Sales Operations
Education Zone Tourism <b>Outer Zone</b>	Baking and Pastry Arts/Baker/Pastry Chef	Diver, Professional and Instructor
	Bartending	Handicrafts and Model-Making
	Culinary Science/Culinology	Casino Dealing
	Institutional Food Workers	Casino Operations and Services
	Meat Cutting/Meat Cutter	Golf Course Operation and Grounds Management
	Wine Steward/Sommelier	Cosmetology and Related Personal Grooming Arts, Other
	Commercial Fishing	Physical Fitness Technician
	Environmental Education	
	Public Relations/Image Management	
	Arts, Entertainment, and Media Management	Folklore Studies
	Dance	Commercial Photography
	Ballet	
	Brewing Science	
	Meditation/Mind-Body Wellness	Allied Health and Medical Assisting Services, Other
	Health and Wellness	
Brewery/Brewpub Operations/Management	Casino Management	
Museology/Museum Studies		

<sup>7</sup> See, for example: <https://www.besthospitalitydegrees.com/faq/what-is-tourism-law/>



**Figure 7:**  
**Computer Science Education Zone With Color Code**

Education Zone Computer Science <b>Inner Zone</b>	Computer and Information Sciences	Knowledge Representation and Reasoning
	Information Science	Virtual/Augmented Reality
	Computer Science	Pattern Recognition
	Applied Computer Science	Evolutionary Computation
	Web Page, Digital/Multimedia and Information Resources Design	Natural Language Processing
	Web/Multimedia Management and Webmastering	Information Technology
	Web Development (Front-/Back End)	Informatics; Business Information Technology
	Computer Programming	Human-Centered Technology Design
	Computer Game Programming	Application programming
	Data Processing and Data Processing Technology	Vendor/Product Certification Programming
	Network and System Administration	Platform programming
	System, Networking, and LAN/WAN Management	Computer Systems Analysis
	Computer and Information Systems Security/ Auditing/Information Assurance	Data Entry/Microcomputer Applications
	Computer Security and Cryptography	Word Processing
	Artificial Intelligence	Data Modeling/Warehousing and Database Administration
	Computer Graphics/Graphics Design	Computer Systems Networking and Telecommunications
	Modeling, Virtual Environments and Simulation; Computer Simulation	Cloud Computing
	Machine Learning / Deep Learning	Information Technology Project Management
	Computer Vision	Computer Support
	Image Processing	Computer/Information Technology Services Administration and Management
Big Data	Data Mining	
	Data Structures and Algorithms	
Education Zone Computer Science <b>Outer Zone</b>	Computer Engineering	Computer Engineering Technology
	Computer Architecture and Computer Engineering	Aircraft Armament Systems Technology
	Electrical and Computer Engineering.	Computer Installation and Repair
	Computer Software Engineering	Scientific Computing and Simulation/Computational Science
	Systems Engineering	CAD Systems
	Mechatronics, Robotics, and Automation Engineering	
	Management Information Systems	
	Applied Mathematics	
	Library and Information Science	
	Bioinformatics	Cheminformatics/Chemistry Informatics
	Mathematics and Computer Science.	Linguistics and Computer Science
	Accounting and Computer Science	Digital Humanities and Textual Studies
	Computational Science	Data Analytics
	Human Computer Interaction	
	Game and Interactive Media Design	
Cyber/Computer Forensics and Counterterrorism		
Health Information/Medical Records Administration	Medical Office Computer Support	
Health Information/Medical Records Technology	Medical Informatics	
Education Zone Computer Science <b>Remote Zone</b>	Technology Teaching/Industrial Arts Teaching	Computer Teaching
	History and Philosophy of Science and Technology	
Education Zone Computer Science <b>Very remote Zone</b>	Project Management	
	Engineering	

Not all Education Zones have as multi-colored or heterogeneous inner zones as tourism. One example of an almost monochrome inner zone is that of the Computer Science Education Zone shown in *Figure 7*, where a single color, *light blue*, clearly dominates. This demonstrates that the educational background is much more homogeneous in this area. Moving towards the outer zone for Computer Science, the variation starts to increase. Computer Science mixes with Business, Law, Natural Sciences, Education, Engineering and Social Sciences. This reflects well what we see in practice. Applications of Computer Science pervade almost every aspect of modern society. Note that tourism does not appear in the outer zone of Computer Science. These fields are not related closely enough. If a hotel needs an IT expert, a "background in tourism" is simply not necessary; and since, from an educational perspective, this search is well-defined, it does not require the instrument of Education Zones.

JANZZ.technology's Education Zones bring together educations from all the various fields relevant to the specific zone. Someone from the healthcare sector may have the potential to work in tourism, just as someone with an education in business or in cooking. Recently, the expression **same but different** has become increasingly popular. In its essence, the concept of Education Zones turns this around: **different but same**. The remaining task is to integrate Education Zones into the matching algorithm and carefully calibrate it to obtain better matching results between a candidate's education and a job's requirements.

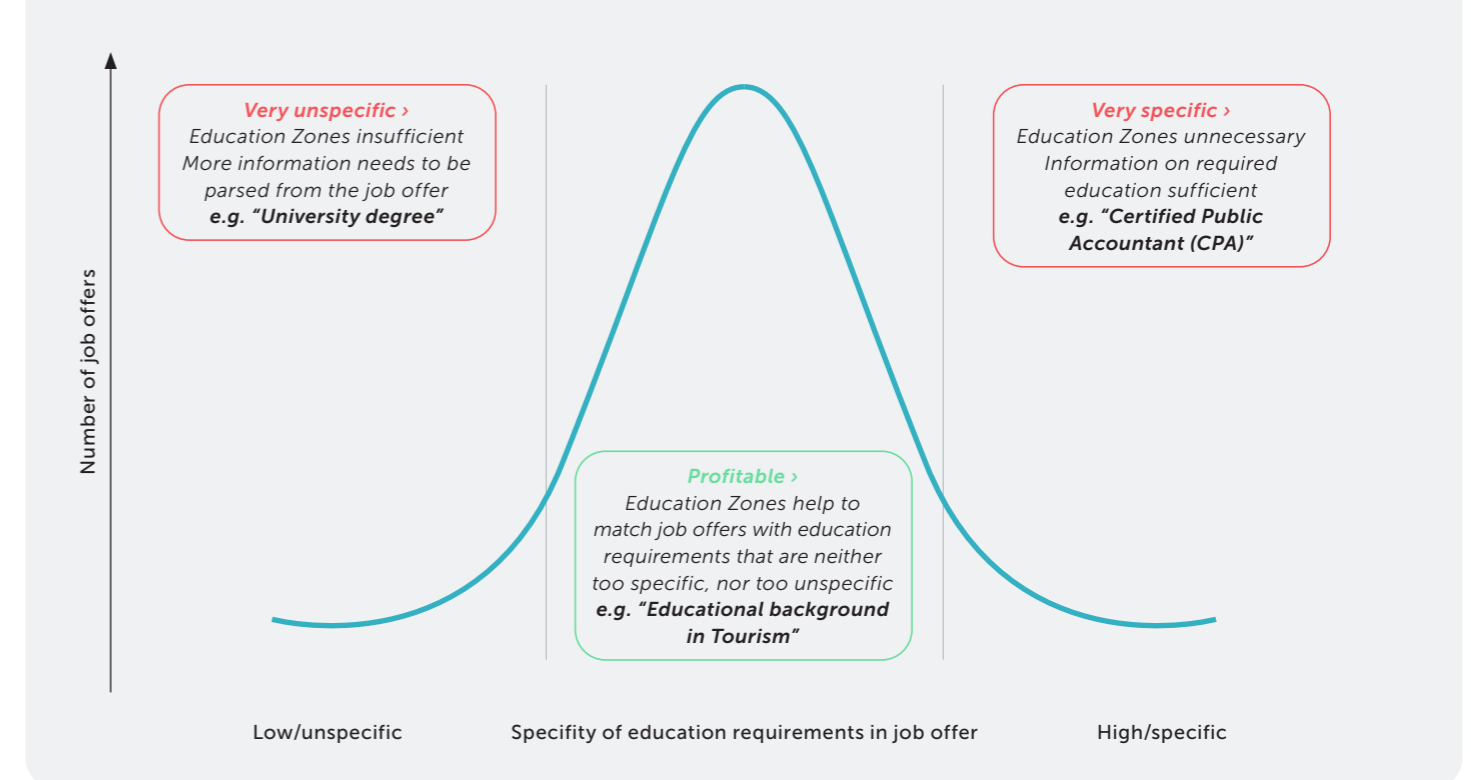
#### Utilizing Education Zones

The **Master of [your favorite subject]** belongs into a single field of education. But this field can be part of several Education Zones. This knowledge is valuable both for the jobseeker and the recruiter. And this is, of course, not limited to master's degrees. Any diploma or certificate can be integrated in the Education Zones, whether from a university or some other

education provider. They also cover courses, training and other education attained after graduation. This is important because over time, a candidate's initial education or degree loses significance as they gain experience. Twenty years after graduation, candidates may have more significant training and qualifications than their highest education. This additional, relevant information is captured by Education Zones and appropriately integrated into the matching process.

Education Zones can be extremely helpful, but they do not constitute a universal solution in the chaos of job searches and job offers. The main purpose of this concept is to harmonize the phrasing on both sides. Applying Education Zones is most profitable when the phrasing in a job offer is **medium specific**, e.g., "has an educational background in..." (see *Figure 8*). If a job announcement has very unspecific education requirements like "university degree", this is still a challenge.

**Figure 8**  
**Benefit of Education Zones Depending on Specificity of Phrasing in Job Offers**



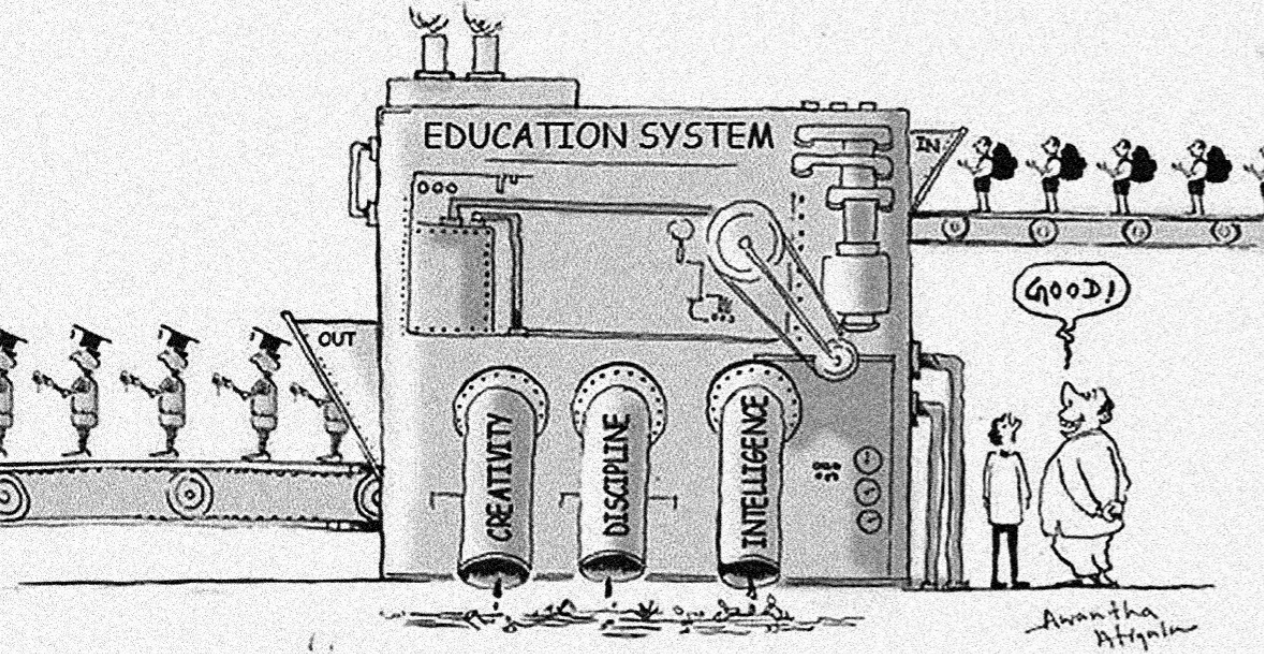


Image source: <https://propelsteps.wordpress.com/about/our-story/critiques-on-indian-educational-system/education-system-in-out-cartoon/>

Even the cleverest Education Zone mapping could struggle to provide a simple resolution to that phrasing. In this case, a well-designed matching algorithm should disregard this criterion and rely solely on other information from the job offer.

### Education Zones in the Fast-Changing Educational Landscape

Until very recently, education was widely perceived as a unified, closed system. Curricula were – and for the most part still are – based on traditional disciplines such as math, natural sciences, language and literature. The focus is on standardization and rote-learning methods, where students begin learning from the basics and teachers help them work their way up. For a long time, education was institutional and ended with graduation. But as the implications of disruptive technologies and rapid change in education, industry, and society are becoming clearer, so is the fact that this form of education produces uniform graduates with few employable skills.

In recent years, a growing body of research has shown that the current systems of learning are not addressing the fast-changing skill demands adequately. As studies reveal an ever-increasing need

for continual skills development to keep up with the immense shifts in workforce requirements, there has been a growing demand for a paradigm shift towards lifelong learning. In practice, this has already begun and is reflected in the vast number of available courses and training aimed at working professionals. This creates a much more permeable, but also fragmented system<sup>8</sup>, which is increasingly difficult to categorize. The possible combinations are endless, and matching algorithms need to keep up with this development. Education Zones can be a decisive element in that mission. By clustering related courses, training and other diplomas or certificates completed after graduation, Education Zones create a map of the various professional fields a person has engaged in over time. Combined with information provided by JANZZ.technology's extensive ontology about the skills developed in the various educations, this generates a more precise profile, providing better insight into the specific knowledge, competences and skills a candidate has acquired, which can then be exploited in the matching process.

<sup>8</sup> <https://www.holoniq.com/notes/online-higher-ed.-hyper-fragmentation-and-the-us-post-secondary-market/>

### Conclusion

Education Zones designed by JANZZ.technology provide a more pragmatic categorization of professional fields in a way that education fields cannot. They more accurately capture the fact that some professional fields are very heterogeneous and others much less so. This may be an obvious thought, but it is one which is very difficult to transfer into a matching algorithm. But with the help of Education Zones, a tourism graduate will not be found in a candidate pool for an IT position because these two areas are not part of the same Education Zone. A civil engineer who spent the last 25 years in marketing and sales with the corresponding further training will not be suggested a job as a bridge inspector. Matches are much sounder, the results much more satisfactory.

And this tool not only improves the job-candidate matching process, it can also be utilized in other areas: in-depth analyses of the education landscape, career counseling for graduates, and many more.

### Education as a Skill Set

Let us take a step back and consider what exactly education is. In brief, education is the acquisition of a particular set of knowledge and skills. When we think of trained painters, we immediately have a set of skills in mind. They can paint walls, handle paintbrushes and other painting tools, know how to mix paint, etc. We also know that a painter is more likely to have these skills than a trained carpenter. It is **common knowledge**. And precisely because of this common knowledge, neither painters nor carpenters typically list their standard skills in a professional profile. Similarly, businesses looking for someone trained in a specific craft will not list these standard skills in a job posting – even though it is precisely those skills that the hiring firm is implicitly looking for.

That said, painters and carpenters do have skills in common: in an apprenticeship in Switzerland, for instance, both will learn how to treat surfaces, remove old coating, as well as write reports, estimates and quotes. In addition, they will have or acquire skills typically found in most workers with manual training: physical fitness, good manual skills, work well in teams, ability to plan and prepare their work, awareness of environmental protection, occupational safety and accident prevention.

However, an algorithm will not know any of this unless it has been given the information explicitly, it does not have access to common knowledge. It can also rarely make reliable connections between different types of information the way humans do naturally, in this case education and skills. This is one of the reasons why most algorithms only compare information of the same type, i.e., occupations with occupations, education (levels) with education (levels), skills with skills, and so on.

If, instead, we explicitly represent educations as skill sets and feed this information to an algorithm, we are giving the algorithm access to this common knowledge. Using JANZZ's ontology, which can represent this kind of interconnected knowledge, the matching process includes comparisons across different types of information. For instance, occupations with work experience, or educations with skills.

Representing educations as skill sets does, however, have come with its own challenges. Just as there is no standard skill profile for a given profession<sup>9</sup>, there is no standard skill set for a given education. The skill set acquired in vocational training for carpenters will depend on the duration of the training (e.g. 1.5 years in Nicaragua compared to four years in Switzerland), or the choice of specialty, and many more factors. Moreover, if a hirer just asks for someone with "manual training", common sense dictates that they are not interested in skills specific to a given trade or training. What we can infer from this criterion is that they are looking for a candidate trained in a craft as opposed to, say, in healthcare or as a chef. In this case, representing education as skill sets is not such a relevant tool. Education Zones on the other hand can help by narrowing the search down and excluding candidates with training not related to a craft.

Another example is STEM degrees. Apart from expert knowledge in their area of study, STEM students typically also acquire the following skills:

- programming skills
- critical thinking
- problem solving
- analytical thinking
- quantitative reasoning
- creativity and resilience
- communication and presentation skills
- time management
- teamwork and independence

These skills are very sought after in professional fields such as (quantitative) finance, insurance or consulting, which is why employers often ask for a "degree in natural sciences or similar" in related job postings. Again, these employers are not interested in the graduates' expert knowledge, but in the transferrable skills they have acquired. And again, the skills they are primarily interested in are not listed explicitly in a job posting.

<sup>9</sup> See, for example, the JANZZ.technology white paper "Standard Skill Profiles – Chasing White Rabbits and Other Myths".

On the other hand, STEM graduates may not have work experience in this area, or even realize that they have this skill set. Based on a STEM-focused profile, there is thus a good chance that a standard matching algorithm would weed these candidates out. Education Zones can cluster STEM-related educations for these quantitative fields, while differentiating them for professional fields where expert knowledge is more likely relevant, e.g. aircraft engineering. Education Zones thus provide a more effective categorization of educations according to professional fields, creating the basis for better, more accurate matches.

## For Further Information Please Contact

**Timothy Sperisen**

Ontology Maintenance and Support

[t.sperisen@janzz.technology](mailto:t.sperisen@janzz.technology)

**Jennifer Jayne Jakob**

Technical Writer and  
Solution Documentalist

[j.j.jakob@janzz.technology](mailto:j.j.jakob@janzz.technology)

**JANZZ Ltd**

Nidelbadstrasse 6  
8038 Zurich | Switzerland  
T: +41 43 499 71 04  
F: +41 44 487 40 88  
[info@janzz.technology](mailto:info@janzz.technology)  
[www.janzz.technology](http://www.janzz.technology)





**Let's Build Tomorrow's Workforce.**  
With Labor Market Solutions That Are  
Powered by Cognitive Computing.

More than 140,000 occupations and 2,000,000 skills in up to 40 languages are stored in the world's largest knowledge database for the labor market. They form a vast and searchable semantic network: a constantly learning repository of knowledge that supports AI-driven labor market solutions and data analytics.

We help organizations like the Norwegian Labor and Welfare Administration, MTESS/Paraguay, USAID and the Inter-American Development Bank and global leaders in HR software and services capitalize on the extensive intelligence of our unique database, creating entirely new possibilities.

**Discover more at [janzz.technology](https://janzz.technology)**



**JANZZ.technology**