What competences does the business world demand from new employees?

This is how Cphbusiness ensures relevant education with the artificial intelligence Watson from IBM.

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The team behind the project

Project Manager
Per Gunnar Bergfors
Associate Professor, Cphbusiness
pgb@cphbusiness.dk

Project Manager
Andreas Kiær Thomsen
Associate Professor, Cphbusiness
akth@cphbusiness.dk

Artificial intelligence at Cphbusiness

What skills do our students need...

to make a positive difference in the labour market? This is a question that education companies are constantly considering and analysing. This is also the case at Cphbusiness, where we offer higher education in close cooperation with the business community.

But how do we find the answer when the needs of the labour market are constantly evolving and changing?

Many rely on expectations, statements and forecasts. However, a group of teachers at Cphbusiness had an idea in 2016. They wanted to analyse the demand that shows up in the actions of the market – namely through job postings. This was the starting point for a methodology that is now an integral part of developing and qualifying our professions and programmes, ensuring that we always have evidence-based knowledge of current business demand.

Hundreds of thousands of job postings under the microscope

Between 20,000 and 25,000 new job postings come online every month. Each listing contains words describing the skills and personal attributes companies seek. And since September 2019, Cphbusiness has collected all the job postings in a database. The vast amount of text data is impossible to analyse using human intelligence or ordinary software. But the artificial intelligence Watson, which IBM has made available to Cphbusiness, makes this possible.

Watson is IBM's supercomputer that combines artificial intelligence and sophisticated software to analyse large amounts of unstructured data.

"Working with IBM on Watson gives us a tremendous and unique opportunity to keep up with what our customers are looking for. We can track demand in real time and react to developments right here and now. This means that we are always up to date and can qualify our education programmes on an up-to-date and evidence-based basis," says Frank A. Mathiasen, Development and Innovation Manager at Cphbusiness who has been involved in developing the Watson project.

It started as a pilot project in 2017...

where associate professors Per Gunnar Bergfors and Andreas Kiær Thomsen from Cphbusiness analysed 741 job postings within sales and marketing.

Special thanks for the collaboration to Henrik Toft, Chief Architect at IBM, who has made the project possible.

Artificial intelligence at Cphbusiness

The pilot showed such potential that we decided to carry on. And the database now contains hundreds of thousands of job advertisements, which show the demand for skills in the industries for which Cphbusiness provides education:

- Innovation and technology
- Laboratory and environment
- Management and communication
- Sales and marketing
- Service and experience
- Economy and finance

And every month new job postings are added.

Algorithms provide us with relevant knowledge
Our lecturers at Cphbusiness have experience in the business world and come with a large professional network. With their knowledge and input, we have developed algorithms that we use for the Watson analyses.

Among other things, the algorithms describe:
- Soft skills (personal qualities)
- Hard skills (skills, tools, methodologies)
- Industries
- Tasks, approaches and methods

When we combine the algorithms across the board, we can find what specific skills companies in particular industries or geographical areas are looking for with one click. The ability to combine the data is particularly valuable.

"Educational institutions may be inclined to look at one subject at a time. However, here we can actually see which topics are connected, so we can combine them and hit the target even better with our education," says Associate Professor Per Gunnar Bergfors from Cphbusiness, who is the project leader of the Watson project and helped develop the algorithms.

Research, education and knowledge sharing
The knowledge we gain from the Watson analyses is used primarily as evidence when we develop programmes – but it also benefits other parts of Cphbusiness' activities.

For example, the analyses provide evidence-based input to our research and development activities, which generate knowledge for use in business.

Our students get to try out Watson technology in the classroom. And we do Watson analysis for business stakeholders who want insight into skills demanded in their area.

You can learn more about how Cphbusiness uses artificial intelligence on the following pages.

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> When we make data-driven decisions, we can offer more relevant education and ensure a more skilled workforce for the business sector.

Line Louise Hansen,
Director of Programmes
at Cphbusiness

How we use Watson

The soft skills

It is important that Cphbusiness' students acquire the academic skills needed to solve concrete tasks in the business world. But students' personal qualities – also known as soft skills – can be just as key to succeeding and making a difference in a company.

But which soft skills are important? What personal qualities do companies need in their employees? Watson analytics can help understand this.

Both education and personal development
With Watson technology, we can track which personal qualities are valued in job postings.

At Cphbusiness, we work with both education and personal development – and the Watson analyses

help identify the soft skills we need to focus on in our teaching.
This can, for example, be about personal qualities such as responsibility, optimism or the ability to follow through on one's tasks.

Personal characteristics are put into system
To understand the soft skills, we have grouped them into six categories containing a number of words:

Curiosity e.g. curious, enterprising, passionate

Leadership e.g. responsible, committed, effective

Mindfulness e.g. balanced, present, empathic

Courageous e.g. energetic, courageous, optimistic

Ethics e.g. respectful, inclusive, honest

Resilience e.g. persistent, diligent, go-getter

In job postings within project management, the demand for the skills of presence, empathy and balance doubled in less than two years.

Result of Watson analysis

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When we saw that project management skills were in demand, project management became a regular part of our e-commerce education. It is a huge advantage that we can adapt our curriculum based on quantitative analysis.

Just Kjærgård Pedersen,
Associate Professor and Lecturer at the Top-up Bachelor's Degree in E-Commerce

Top-up Bachelor's Degree in E-Commerce

What does it take to create value in an e-commerce business? Which software programs are good to know, which analysis methods should employees use and which personal qualities do e-commerce companies value? The Top-up Bachelor's Degree in E-Commerce is an excellent example of how we are actively using Watson analytics to develop the content of our programmes.

For example, Watson analysis shows that the word...
'project' appears in many job postings in e-commerce and digital marketing. You must be able to be part of a project and also run projects.
Therefore, the Top-up Bachelor's Degree in E-Commerce includes:

- Project management as a compulsory subject
- Semester projects – rather than short subject-specific assignments
- Interdisciplinary exams – rather than single-subject exams

Soft skills like...
responsibility, commitment, energy and curiosity are highly sought after by e-commerce companies, according to Watson. As a result, we emphasise these skills in our teaching and when preparing students for job searches. And we're constantly monitoring developments, so we know if we need to change our focus.

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> Watson has made us more aware of the competences required to lead a company in the green transition – and this has a major impact on how we develop our management programmes today.

Mette Høy,
Head of Development Life long learning at Cphbusiness.

Sustainability subjects in management training

In management job postings, mentions of sustainability increased by more than 50% from 2019 in less than two years.
Cphbusiness has incorporated the significant increase, which became apparent through the Watson analysis, into our education in management. Especially in those subjects where sustainability is the focal point – such as sustainable development management and sustainable project management.

Present, empathetic and listening leaders are becoming more sought after...
according to the Watson analysis. And in job postings where sustainability is included, the demand for these skills has increased enormously.
That's why Cphbusiness includes them in its management programmes. For example, skills can be strengthened by practising questioning techniques and presence during one-to-one conversations.

Sustainability is a management task
It has become apparent through the Watson analysis that the business community sees sustainability as a management issue.
When sustainability is mentioned in a job posting, it is often in the context of management positions. In contrast, words like climate and ecology are more often associated with other parts of the organisation than management.

How we use Watson

In teaching

Students at Cphbusiness get to try their hand at Watson technology. For example, in the Top-up Bachelor's Degree programmes in e-commerce and international hospitality management, students have access to the database and have to analyse job advertisements in their sector.

Thereby, students get to acquaint themselves with artificial intelligence and machine learning, and how to deal with large amounts of data.

Equipping students for job searches

In several of Cphbusiness' full-time programmes, students are given extra preparation for applying for jobs. Here they get an insight into the Watson analytics' answers to what is in demand in the industry they want to apply for.

This gives future graduates precious knowledge about what to emphasise in their application.

How we use Watson

The Watson analysis showed that soft skills are essential when service companies are recruiting. It served as a benchmark and provided a good starting point for our further research.

Henrik Vejlgaard, Associate Professor at Cphbusiness and Project Manager at Soft Skills in Service Industries.

In research and development activities

Cphbusiness is an educational company. But we are also a research company, creating knowledge that is applied in private and public sectors.

We do this through practical research and development projects that promote the development of the business community and qualify our education.

Watson plays a role in several of our research and development projects. The Watson analyses provide quantitative and data-based input to the research and prove or disprove hypotheses.

An example is...
the research and development project Soft Skills in Service Industries.
The project investigates which character traits, skills, values and behaviour patterns are vital for employees in the hotel and restaurant industry. The aim is to gather knowledge to create a meaningful balance between soft and hard skills in Danish service companies.
In the project, Watson was used to gaining insight into the soft skills that companies in the hotel and restaurant industry require in job advertisements.

How we use Watson

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> Our research and development activities at Cphbusiness create knowledge for use in the business sector – and the Watson project is a great example of that. We look forward to the project creating value for even more companies and organisations in the future.

Frank A. Mathiasen,
Head of Development
and Innovation
at Cphbusiness

Knowledge sharing with Business Danmark, HK Privat, Djøf and the Danish Union of Journalists

Companies, trade unions and other business stakeholders benefit from Cphbusiness' Watson analytics. Both because the analyses help to ensure a qualified workforce through our education and because we share knowledge and results from the analyses. Our database contains job postings from all sectors. And we can draw out knowledge that tells us something about demand and trends in any industry, job title or geographic area.

Among other things, we have shared knowledge with the trade unions Business Denmark, HK Privat, Djøf and the Danish Union of Journalists about the competencies companies demand from their members.

Do you want something researched?

Our database contains job postings from all sectors. Do you want to know the skills demanded in your sector or field?

Then contact Associate Professor and Project Manager **Per Gunnar Bergfors** at **pgb@cphbusiness.dk.**

How we have helped

Business Denmark

Business Denmark has actively used Watson analytics to develop educational programmes and courses. By applying Cphbusiness' algorithms to job postings in sales and marketing, Business Denmark could see which skills were in demand, for example, among sales consultants, account managers and key account managers. And the union uses this knowledge when developing its training programmes.

HK Private

An analysis of 71,073 job postings in the professional areas of HK Privat members showed, among other things, that the demand for soft skills such as commitment and responsibility was increasing.

HK Privat shared the results of the Watson analysis with its members, along with a guide on how to bring the skills into play in your job application.

Djøf

Djøf asked which soft skills are in demand in job postings in their field, which covers, among other things, assistant lawyers, consultants, administrators, economists and project staff.

The analysis showed that competencies in courage and ethics were more in demand. And that you must be energetic, no matter what job you apply for within Djøf's area.

Danish Union of Journalists

The Danish Union of Journalists wanted to investigate what skills were in demand among journalists and communicators. And what differences and similarities appeared in the job ads.

For example, Watson showed that communicators need to be able to facilitate processes more than journalists. Journalists, on the other hand, need to be able to do more independent research and critical thinking than communicators.

The method behind it

Jobsearch, Denmark's largest job search engine, has developed a number of crawlers together with Cphbusiness. A crawler is a type of robot that collects knowledge from the Internet.

Our crawlers search job sites, job portals and the websites of companies and organisations for job postings, bringing between 20,000 and 25,000 new postings into our database every month. The Watson artificial intelligence helps analyse the huge amount of unstructured qualitative data when we add different extraction criteria such as company, region, job type and job title. Watson is an advanced text analysis tool developed by IBM.

Has developed algorithms

Our lecturers at Cphbusiness have business experience and an extensive professional network. Using their knowledge and input, we have developed algorithms that we employ in the Watson analyses and combine across needs and disciplines.
The algorithms contain words, phrases, phenomena and definitions that characterise a topic or skill set that is relevant to tracking demand for our education.

About Watson – IBM's supercomputer

Watson is the name of IBM's supercomputer, named after IBM's founder, Thomas J. Watson. The supercomputer combines artificial intelligence (AI) and sophisticated software to analyse large amounts of data when asked specific questions.

Watson helps businesses and organisations forecast, automate complex processes and optimise employee time. Watson has been used for more than 30,000 different projects globally.

Source: ibm.com

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> With Watson, we have a unique opportunity to analyse huge amounts of unstructured qualitative text data. And the possible combinations are only limited by imagination.

Associate Professor at Cphbusiness, **Per Gunnar Bergfors,** Project Manager at Competence Demand Analytics – **WATSON.**

The algorithms describe, e.g:

- Soft skills (personal qualities)
- Hard skills (skills, tools, methodologies)
- Industries
- Sustainability
- Management
- Tasks, approaches and methods

Combined data offers many possibilities

When we want to investigate a development or prove or disprove a theory, we can combine the extracts in many different ways. And it makes it possible to see what combination of skills and professions companies from a specific sector are looking for.

For example, sustainability, digital marketing and soft skills can be combined. This way, we will get a result that shows job offers from companies working in digital marketing and sustainability and in demand of soft skills.

Artificial intelligens at Cphbusiness

Between 20,000 and 25,000 new job postings come online every month. And since September 2019, we at Cphbusiness have gathered all the job postings in a database. In this booklet, you will learn more about how we analyse the job postings using the artificial intelligence Watson, which IBM has made available so that we keep up to date with the current demand of the business sector, develop our educations, qualify our research and create value for the business sector on an evidence-based basis.

About Cphbusiness

Cphbusiness is Denmark's largest business academy. We offer a wide range of Danish and international higher education programmes up to bachelor and diploma level and conduct research in the fields of sales and marketing, service and experience, economics and finance, innovation and technology, management and communication, and laboratory and environment.

Read more about Cphbusiness at cphbusiness.dk

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