

Explorative study on verbalizing students' skills with NLP/AI-tool in Digital Living Lab at Laurea UAS, Finland

Asko Mononen

Laurea University of Applied Sciences, Finland
asko.mononen@laurea.fi

Abstract

This explorative study tested Laurea UAS students' (N=16) abilities to verbalize their skills, before and after the study unit "Digital Analytics and Consumer Insights". Before the study unit the students listed their skills unaided and afterwards with help of Careerbot AI -service. The findings indicate that the intervention increased both quantity and quality of the skills verbalized, relevant to the learning objectives and generic, 21st century skills.

1 Introduction

The purpose of this explorative study was to research if the students can verbalize their skills and competences better with the help of Careerbot AI -service than without it.

Laurea University of Applied Sciences in Helsinki region in Finland has a learning environment called Digital Living Lab (DLL), focusing on real-life project-based studies with partner organisations. The DLL aims to support the acquisition of "21st century skills", working life skills focusing on digital service development.

Trilling et al. (2009) defines 7C's of 21st century skills as:

- Critical thinking and problem solving
- Creativity and innovation
- Collaboration, teamwork, and leadership
- Cross-cultural understanding
- Communications, information, and media literacy
- Computing and ICT (information and communication technology) literacy
- Career and learning self-reliance

In August 2023, five day design sprint for study unit "Digital Analytics and Consumer insights" (DACI) was executed in English. This study unit is part of elective studies. The author was the responsible lecturer and the head facilitator during the whole hybrid event. Six other facilitators and subject-matter experts supported partially.

Learning objectives for this 5-credit point (ects) study unit were the following: "After the study unit, the student is able to:

- recognize the consumer behaviour offline and online (per main demographics)
- plan data collection points and methods online
- analyse data (e.g., aggregation, trends, comparison)
- visualize results (e.g., dashboards)
- plan consumer activation methods based on data" (Laurea, 2023)

2 Sample

The participating students (N=16) consisted of 15 bachelor and 1 master-level students.

9 of them participated face-to face, and 7 online.

Study fields were Business Management (n=11), Business Information Technology (n=3), Hospitality management (n=1) and Service Design (n=1).

The age groups were in the following categories: 25 or less (n=6), 25-34 (n=2), 35-44 (n=7) and 45-54 (n=1).

Their previous degree was vocational level (n=1), high school/matriculation exam (n=7),

bachelor level (n=7) and master's level of more (n=1).

The participants' native language was mixed, Finnish (n=8) and non-Finnish (n=8, several languages, not specified here for privacy reasons).

The participants' average work experience from knowledge intensive work was 6,36 years. Knowledge intensive work here was defined here as "creative work, requiring complex thinking and communication, vs. routine or manual work".

3 Related work

The use of artificial intelligence (AI) tools in helping higher education students to verbalize their skills and competences in a job market language (as defined in job ads) has not been researched much yet.

Mononen et al. (2023) conceptualized "forecasted self", future-oriented digital twin, where a student can explore several future selves equipped with new, acquired skills for projected future jobs with Careerbot AI -service.

Westman S., & Mononen A., et al. (2021) discussed the prospects for career coaching, with four AI maturity levels in career guidance: 1. AI-aware guidance, 2. AI-informed guidance, 3. AI-integrated guidance and 4. AI-transformed guidance.

Transversal and transferable skills and competences were defined in [Transval-EU project \(2021\)](#) as generic working life skills, soft skills, and employability skills.

Brown and Souto-Otero (2020) analyzed 21 million job ads in the UK and found that employers are most likely to focus applicants "job readiness", demonstrating both generic, soft skills and technical requirements.

Brown and Heskett (2004) talked about potential job candidates' fit with organization through "narrative of employability" boosted by non-work-related skills acquisition and qualifications.

Claro et al., (2012) defined ICT literacy above the mastery of ICT applications, to include "higher-order thinking processes", like problem solving of information, communication, and knowledge tasks in an ICT context, relevant to learning context in the knowledge society.

21st century skills were popularized by [Trilling & Fadel \(2009\)](#), rooting back to 1980's.

4 Technology and data

The tool used for students on verbalizing their skills is called "Careerbot". This webservice interface has been developed "for helping 34 000 students to pursue their dream careers with the help of AI" by 3AMK. 3AMK is a strategic alliance of Laurea, Haaga-Helia, and Metropolia universities of applied sciences in Helsinki region, Finland. ([3AMK.fi, 2023](#))

The AI behind this webservice is called "Graphmind" and built by Finnish tech company HeadAI Ltd. Graphmind is a Graph Machine Learning -based semantic computing framework accessible via REST-API for Careerbot -service. ([Mononen et al., 2023](#)).

In the first phase Graphmind has been taught with unstructured data (millions of news) and e.g., European Skills, Competences, Qualifications and Occupations (ESCO) classification, and in the second phase with reinforced learning. ([Headai Ltd., 2023](#))

The main data source for Careerbot is job market data in Finland (Työmarkkinatori, MOL and Duunitori/employment services) with over 400 000 job ads on a yearly basis since January 2018.

The other data sources are 3AMK course data, Theseus -theses data from Finland and global directory of open access journals (DOAJ) but they were not used for this study.

In the Careerbot AI -service the students can create their skills profile, a digital twin for skills, "forecasted self". The skills are defined pragmatically, as the words are stated in the job ads.

The user experience flow in Careerbot AI-service works in the following way: a) login to the system, b) create a new skills profile, c) start typing in the skills words individually (and get suggested related skills words), optionally d) copy-paste personal cv to text field from which the skills words are retrieved, e) select relevant skills word from suggested skills word list, f) look for jobs in Finland based on area, time and your skills profile (selected skills words), and g) further update your skills profile from selected job (Finnish job ads “soft- and hard skills” that were still missing from one’s skills profile).

There were some bugs encountered during the session with students. However, every student managed to perform the given assignment on verbalizing their own skills with the help of Careerbot AI -service.

5 Methods

During the sprint week, the students were assigned into five teams of 3-4 people randomly, 2 teams online and 3 face-to-face in the Digital Living Lab. Teams could choose their team assignments freely, along the learning objectives.

Strictly speaking this was a quasi-experiment, since 3 students were allowed to change their assigned study method (face-to-face or online) to another one for personal reasons, after ethical consideration.

This sub-study focused on students’ ability for skills verbalization, not on the skills development per se. The other sub-study will be reporting the findings for perceptions on the course.

The briefing for the students is stated below:

“...Please answer honestly to this questionnaire, how do you feel about the claims right now. These are your personal views, there are no right or wrong answers, and these answers will not affect your study unit grading...”

“YOUR DACI -RELATED SKILLS

List down YOUR CURRENT SKILLS after the "digital analytics & consumer insights" - study unit.

You can list as many as you can. Please list skills one per line in the open text field below.

(Addition in POST-questionnaire:) List down spontaneously and use also the 3AMK.FI/CAREERBOT AI-service for listing your skills.

(Open ended text -field for answers)”

In the PRE-questionnaire, the students were given only written instructions via email and online questionnaire with open text field for answer.

Before the POST-questionnaire, on the last day of study unit, the students were introduced to usage of Careerbot AI -service for 10 minutes. The students were instructed on how to create a new skills profile, look for jobs based on it, and further educate their skills profiles based on missing skills found on the job ads. The students used 30 minutes for the assignment and filled in their skills words to POST-questionnaire with open text field.

6 Results

The results of verbalizing student’s skills with the PRE vs. POST experiment setup indicate a clear increase of quantity and quality of the skills words for every participated student (N=16).

	PRE	POST	DIFF.
Average	3.56	13.94	10.38
Median	3.5	12.5	9
Std Dev	2.60	6.06	3.46

Table 1: DACI-study, quantity of skills

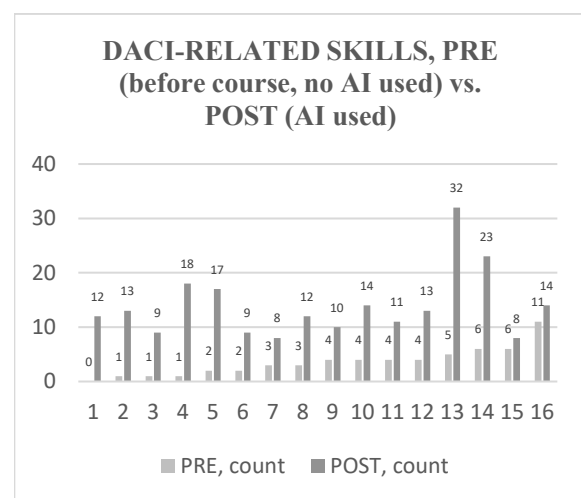


Figure 3: DACI-related skills count, PRE vs. POST (with AI used) per student 1-16.

The quality of the verbalized skills was evaluated based on the relevance to study unit learning objectives and 21st century skills by the author. From the students open text field -answers the skills words were manually extracted and copied as a list to <https://www.wordclouds.com/> from which the frequencies were extracted, synonyms combined and visualized.

Before the study unit the students listed their skills and their frequency as following (top 20):

#	skill	#	skill
6	research*	2	problem*
4	thinking*	2	market*
4	design*	2	making*
3	excel*	2	journey*
3	data*	2	customer*
3	consumer*	2	critical*
2	solving*	2	communication*
2	skills*	2	behavior*
2	segmentation*	2	analysis*
2	problem-solving*	1	visualisation*

Table 2: PRE-questionnaire skills list & freq.

*can be any character/word as continuation.

After the study unit, with the help of Careerbot AI - service, the students listed their skills and their frequency as following (top 20):

#	skill	#	skill
42	Data*	8	Research*
22	Marketing*	7	Communication*
19	Analysis*	7	Insight*
15	Customer*	7	Management*
13	Consumer*	7	Service*
11	Analytics*	7	Trends*
9	Business*	7	Visualization*
9	Digital*	6	Development*
8	Collection*	6	Product*
8	Excel*	5	Design*

Table 3: POST-questionnaire skills list & freq.

*can be any character/word as continuation.

7 Discussion

The purpose of this exploration was to research if the students can verbalize their skills better with help of Careerbot AI -service than without it.

As a conclusion, the quantity verbalized skills increased for all the participated students, on

average from 3,56 to 13,94 (median from 3,5 to 12,5). The students learned to elaborate more on the topic of the study unit.

The quality of the verbalized skills also increased. The mentioned skills can be seen relevant from employment point of view, since they all appear in job ads (=data source). Also, more students mentioned keywords relevant to the learning objectives and 21st century skills (generic, soft skills) after the sprint week.

Evaluating the extent to which the difference was due to teaching method vs. AI is not clear. The earlier sessions using Careerbot AI-service with the students have produced results of similar direction, but they have not been documented systematically.

Both face-to-face and online groups received the same introduction and guidance for the AI service use simultaneously. Face-to-face group improved slightly more during the week (3,89 →12,3 vs. online 3,14→15,2 skills). Sample size is too small for conclusions on the difference.

Based on the earlier feedback of industry partners of Laurea UAS in autumn 2022, the graduates have had sometimes difficulties in verbalizing and therefore “selling” their skills to the recruiters. For this, the use of AI in addition to teaching and coaching can be useful. This is in line with [Brown, et al. \(2004\)](#) who highlighted “narrative of employability” for job candidates.

This experiment was using AI as a personal tool, reaching at most the level 2/4 “AI-informed guidance” in maturity model, [Westman S., et al. \(2021\)](#). So, there is still a gap for reaching the higher levels in AI maturity in coaching.

However, to confirm these initial findings, more studies are needed with larger sample sizes. Also, more studies are needed with other tools in comparison, including traditional human guided career coaching and other tools, like latest versions of generative AI (ChatGPT, etc.).

Acknowledgments

Thank you for Laurea UAS for the research permission granted on June 15, 2023.

References

<https://doi.org/10.22492/ije.9.4.03>

Brown, P., Hesketh A. (2004). *The mismanagement of talent: Employability and jobs in the knowledge economy*. Oxford University Press.

Brown, P., Souto-Otero, M. (2020). The end of the credential society? An analysis of the relationship between education and the labour market using big data. *Journal of Education Policy* 35 (1), pp. 95-118.

<https://doi.org/10.1080/02680939.2018.1549752>

Claro, M., Preiss, D. D., San Martín, E., Jara, I., Hinojroza, J. E., Valenzuela, S., Cortes, F., & Nussbaum, M. (2012). Assessment of 21st century ICT skills in Chile: Test design and results from high school level students. *Computers & Education*, 59(3), 1042-1053.

<https://doi.org/10.1016/j.compedu.2012.04.004>

European State of the Art Report, VALIDATION OF TRANSVERSAL SKILLS ACROSS EUROPE (December, 2021).

https://www.transvalproject.eu/wp-content/uploads/2022/03/D2.1_State-of-the-Art-Report_EN_public.pdf

Headai Ltd. *No magic, just science*. Retrieved October 2, 2023 from

<https://headai.com/science/>

Laurea University of Applied Sciences. *Digital Analytics and Consumer Insights, study guide*. (October 2, 2023).

<https://ops.laurea.fi/212701/fi/68154/209690/2692/0/27172>

Mononen, A., Alamäki, A., Kauttonen, J., Klemetti, A., Passi-Rauste, A., & Ketamo, H. (2023). *Forecasted Self: AI-Based Careerbot-Service Helping Students with Job Market Dynamics*. The 9th International Conference on Time Series and Forecasting, 99.

<https://doi.org/10.3390/engproc2023039099>

3AMK, homepage. Retrieved November 11, 2023 from

<https://www.3amk.fi/en/welcome-to-3amk-fi/>

Trilling, B., & Fadel, C. (2009). *21st Century Skills: Learning for Life in Our Times*. Wiley.

Westman, S., Kauttonen, J., Klemetti, A., Korhonen, N., Manninen, M., Mononen, A., Niittymäki, S., & Paananen, H. (2021). *Artificial Intelligence for Career Guidance – Current Requirements and Prospects for the Future*, 9(4).