Artificial intelligence

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Introduction

This section describes some research studies into career interventions designed to increase exposure to either the workplace or professionals within it, which offer learning opportunities or the chances for using evidence and ideas in approaches

In doing so, in the Practices and Outcomes section, we have noted the potential contribution that the study could make to practice, by identifying the type of challenge it addresses.

As well as publications showing implementations for this type of career intervention, we have included several resources from other media, including talks, interviews and case studies. These may not be “academically" rigorous, but can provoke reflection and understanding of further approaches. These are included in the “Further illustrations and perspectives” section.

Finally, from either discussions we have had with the CDI, or through research agendas suggested in careers or related fields, we include a section on some potential future “Research questions”.

Headlines

AI has emerged widely across the counselling and therapeutic fields from the mid 2010s (e.g. Kretzschmar, 2019).

By 2019, there had already been a wide number of applications in career counselling (e.g. Mehraj et al, 2019)

Ideas were also emerging about the wider digital transition of career guidance (Cedefop, 2021)

Where AI has been applied, however, it is showing positive results e.g. Muhammed (2023) reported one study where it was used and achieved positive feedback from 93% of students.

A body of case studies has now been built. DIscussions ensue on how AI with integrate within the career development ecosystem (Nayak et al, 2024)

The applications of AI in the parallel field of psychotherapy and counselling appear to be ahead of career guidance, with innovations underway in areas like virtual reality counselling and avatar therapy (Jackson, 2023).

Practices and outcomes

Selected publications that describe practices and outcomes for different challenges are listed below, with links in the title column. We have mostly included open access sources, but where the sources requires payment, it is noted next to the link by "(Paid)".

Title	Themes	Brief description
Ansari, F., Saad, S., & Shareem, S. (2008). Career Counselling Chatbot. Computing, 242-246. (Link)	Early variants of career chatbots	This paper presents the design of an expert system for educational guidance for students available after SSC & HSC. Artificial intelligence involves two basic ideas. First, it involves studying the thought processes of human beings. Second, it deals with representing those processes via machines. Rather than using generative AI, earlier variations used the idea of expert machines i.e. rules based systems. This paper provides a benchmark to show the development of systems in subsequent years.
Kretzschmar, K., et al (2019). Can Your Phone Be Your Therapist? Young People's Ethical Perspectives on the Use of Fully Automated Conversational Agents (Chatbots) in Mental Health Support. Biomedical Informatics Insights, 11. (Link)(Paid)	Using mobile apps and considering ethical issues	In this article, an application of AI is explored from outside of careers, in the area of a mobile app. The paper takes a young person's perspective and reviews the strengths and limitations of using chatbots in mental health support. The authors also outline what are the minimum ethical standards for these platforms, including issues surrounding privacy and confidentiality, efficacy, and safety, and review three existing platforms (Woebot, Joy, and Wysa)
Mehraj, T., & Baba, A. M. (2019). Scrutinizing artificial intelligence based career guidance and counselling systems: an appraisal. International journal of interdisciplinary research and innovations, 7(1), 402-411. (Link)	Scrutinising AI systems	The paper reviews the numerous Artificial Intelligence (AI) based schemes that had already been published in career guidance by 2019. The different technological approaches are described and their implications, such as case based reasoning systems, or expert systems. Some of the technical drawbacks are outlined with some of the approaches, given the ambitions of such systems e.g. the lack of adaptiveness in some configurations. At the time, the systems reviewed showed generic capability but had

		weaknesses, leading to recommended research.
D'Silva, Godson, et al. "Career counselling chatbot using cognitive science and artificial intelligence." Advanced Computing Technologies and Applications: Proceedings of 2nd International Conference on Advanced Computing Technologies and Applications—ICACTA 2020. Singapore: Springer Singapore, 2020. (Link)(Paid)	Example of an AI chatbot and evaluation	This paper provides an example of a chatbot developed to minic career interactions: his paper reflects the methods through which personalized career counselling for students can be implemented. To achieve this, a chatbot is used which is a computer program that mimics human conversations using artificial intelligence and cognitive science. Users can start conversations with the bot on a different channel like Facebook Messenger, Skype, Slack and SMS. Initially, the chatbot will start by asking the user for the personal information. Next, the bot will conduct a series of psychometric tests specifically holland test for suggesting career options which are best suited and big 5 test for identifying a user's overall personality. According to the results, the bot will suggest a list of job opportunities well suited for the user.
Pordelan, N., & Hosseinian, S. (2020). Design and development of the online career counselling: a tool for better career decision-making. Behaviour & Information Technology, 41(1), 118–138. (Link)(Paid)	Steps involved with the design and evaluation of a career counselling tool	It was attempted to design an online career counselling tool for students in career fields. This study was conducted in three parts in 2019. 1) the career counselling website was designed. 2) using the opinions of the experts (20 career counselling experts and 20 software engineering specialists), the website efficiency was assessed. 3) To conduct the online career counselling, 45 students were assigned into the online counselling, the face-to-face groups, and the control groups to compare their career decision-makings at the pretest and the post-test. Results showed that the face-to-face and the online groups, compared with the control group, showed a significant and positive difference in decision-making
Terblanche, N., & Cilliers, D. (2020). Factors that influence users' adoption of being coached by an artificial intelligence coach. Philosophy of	Understanding acceptance of AI-based coaching and counselling	The paper reviews one of the first ever studies on the use of AI in organisational coaching. (Although not career coaching, the factors that were evaluated could prove instructive). Authors used the Unified Theory of Acceptance and Use of Technology

Coaching: An International Journal, 5(1), 61-70. (Link)		(UTAUT) as a theoretical framework to use an AI coach for goal attainment (called Vicci). n=226 users had a coaching conversation with Vicci. The analysis of the results showed that performance expectancy, social influences and attitude all played a role in the acceptance of the intervention.
Akkök, F., Hughes, D., & CareersNet, U. K. (2021). Career chat: the art of AI and the human interface in career development. The European Centre for the Development of Vocational Training (Cedefop), 91. (Link)	Crafting career conversations between humans and AI	The chapter reviews new forms of digital career guidance support and particularly focuses on AI. The benefits and risks of AI are discusses from a literature review. The second part of the paper discusses 'career chat' conversations that harness big data, artificial intelligence (AI), machine learning, labour market intelligence (LMI) and chatbots.
Westman, S., Kauttonen, J., Klemetti, A., Korhonen, N., Manninen, M., Mononen, A., ... & Paananen, H. (2021). Artificial Intelligence for Career Guidance--Current Requirements and Prospects for the Future. IAFOR Journal of Education, 9(4), 43-62. (Link)	Defining use cases for AI in Higher education	This paper reports on development on using artificial intelligence to support and further career guidance in higher education institutions. Results from focus groups, scenario work and practical trials are presented, mapping requirements and possibilities for using artificial intelligence in career guidance from the viewpoints of students, guidance staff and institutions.
Grosso, C., Sazen, N., & Boselli, R. (2022, September). AI-implemented toolkit to assist users with career" configuration" the case of create your own future. In Proceedings of the 26th ACM International Systems and Software Product Line Conference-Volume B (pp. 158-165). (Link)	Developing an AI toolkit to provide support for career planning	This conference paper presents a slightly different emphasis to other papers, that often represent information provision and/or decision-support tools, by offering support for users to develop a career pathway. The tool is called Create Your Own Future (CYOF), produced by a company called Saffron Interactive. It supports individuals in finding careers that are congruent with their "vocational personality" and selects a tailored roadmap to progress in their career or a pathway to a new one. The European migration crisis, and the need for career adaptability, is proposed as a motivation for looking

		more at digital and automated solutions that address “pathways”.
Ceric (2023.) Five tools for career exploration (Link)	Exploring capabilities of AI tools for career exploration	This review from Ceric, a Canadian charitable organisation dedicated to advancing careers education and research.
Chen, IC., Bradford, L., Schneider, B. (2023). Learning Career Knowledge: Can AI Simulation and Machine Learning Improve Career Plans and Educational Expectations?. In: Niemi, H., Pea, R.D., Lu, Y. (eds) AI in Learning: Designing the Future. Springer, Cham. (Link)	Applying AI to raise career awareness of disadvantaged pupils.	This particular experiment shows an AI used within a game for students whereby they are encouraged to seek alignment between career choices, educational choices and salary expectations. It is also a more general example of using AI in education while gaming career educating. The author argues that the results show AI as capable of reducing educational inequities by improving the decision making capabilities of disadvantaged groups.
Devanshu, D., Sandhu, G. G., Mittal, H., Prajapati, K., & Kumar, S. (2023). Artificial Intelligence Based Career Development Web Counseling: A Review. Kilby, 100, 7th. (Link)(Paid)	Reviewing research and development in online AI career tools	.This article critically examines twenty articles related to online web application career guidance following elementary and high school graduation, drawn from reputable sources such as the IEEE, IRJET, and other respected journals. The analysis aims to identify trends, challenges, and opportunities linked to online career services. This article evaluates the effectiveness of online career counselling and the use of online career counselling services to provide counselling and support to students. The study reveals that online career counselling is gaining popularity as an effective means of providing career guidance to students
Goyal, R., Chaudhary, N. and Singh, M. (2023). "Machine Learning based Intelligent Career Counselling Chatbot (ICCC)," 2023 International Conference on Computer Communication and	Understanding how AI chatbots are configured	A number of chatbots have been developed for careers, often from computer scientists and software engineers, and presented in journals or at conferences. This is one such example, where an AI chat bot is applied for helping students with choices in pursuing further courses in IT and technical subjects. The paper explains the components and functions of such a system.

Informatics (ICCCI), Coimbatore, India, 2023, pp. 1-8 (Link)		
José-García, A., Sneyd, A., Melro, A., Ollagnier, A., Tarling, G., Zhang, H., ... & Arthur, R. (2023). C3-IoC: A career guidance system for assessing student skills using machine learning and network visualisation. International Journal of Artificial Intelligence in Education, 33(4), 1092-1119. (Link)	Using AI to evaluate specific skills and propose career paths within a technical field	In this paper, the authors briefly review the growth of AI in education and careers and introduce an AI-based solution named C3-IoC (https://c3-ioc.co.uk), for helping students to explore career paths in IT according to their level of education, skills and prior experience. It provides a visualisation of the job-role network, showing students communities of related jobs.
Muhammad, R. (2023). Barriers and effectiveness to counselling careers with Artificial Intelligence: A systematic literature review. Ricerche di Pedagogia e Didattica. Journal of Theories and Research in Education, 18(3), 143-164. (Link)	Reviewing barriers and effectiveness for AI in career counselling	This report reviews empirical data on career counselling with AI in two areas: barriers and effectiveness. After applying a criteria to past research, ten studies were selected for analysis. The research includes reference to studies that show strong results for making forms of recommendations, eliciting positive responses from users (e.g. in one study, 92% of student users gave positive feedback). However it also involves various drawbacks.
Sorensen, S. (2023). The AI-Enhanced Coaching Triad. BPS Coaching Psychology Division, Annual Research and Practitioners Conference, London (Link)	Introducing AI into coaching sessions	In this conference publication, an accredited coach describes the integration of AI technology into the coaching process, focusing on the way conversations are created between the coach, coachee, and an AI coaching companion. The coach proposes that AI is useful for producing immediate insights that supplement the practice. This presentation examines the opportunities, risks, and ethical issues associated with this AI-enhanced coaching approach
Bandhu, K. C., Litoriya, R., Khatri, M., Kaul, M., & Soni, P. (2024). A Novel	Evaluation of different AI models / performance of	The paper describes the evaluation of different algorithms within a career guidance AI tool to derive the best

Approach for Better Career Counselling Utilizing Machine Learning Techniques. Wireless Personal Communications, 138(4), 2523-2560. (Link)(Paid)	different models	results. The best model produced an accuracy score of 86%.
Bankins, S., Jooss, S., Restubog, S. L. D., Marrone, M., Ocampo, A. C., & Shoss, M. (2024). Navigating career stages in the age of artificial intelligence: A systematic interdisciplinary review and agenda for future research. Journal of Vocational Behavior, 104011. (Link)	How AI is set to influence career stages	This paper provides a literature review of 104 papers and research agenda for the impact of AI on career stages. The paper finds themes in the literature and also highlights topics covered in school, university and work e.g. during job search. "Drawing upon career stage theory, we examine the implications of AI on careers, identify key barriers and enablers of AI use in this area, and reveal how the utilization of AI impacts individuals' career competencies." The authors advocate for AI systems that promote equitable careers.
Bridgeman, J., & Giraldez-Hayes, A. (2024). Using artificial intelligence-enhanced video feedback for reflective practice in coach development: benefits and potential drawbacks. Coaching: An International Journal of Theory, Research and Practice, 17(1), 32-49. (Link)	Using AI to provide augmented feedback to coaches and counsellors from videos of client interactions	One of the applications mentioned for AI within coaching and counselling is the opportunity to provide feedback to the practitioner. One way to do this would be to use AI to 'watch' and 'analyse' videos of client interactions. In this paper, such a practice is explored. In this study, n=15 coaches were interviewed who had deployed it. Benefits were reported in terms of the insights it offered, leading to greater self-awareness. Drawbacks included the nervousness around using new technology and on seeing one's own performance. Future research is suggested.
Dascalu, M. I., Brîndușescu, V. A., Stanica, I. C., Uta, B. I., Bratosin, I. A., Mitrea, D. A., & Brezoaie, R. E. (2024). CHATBOTS FOR CAREER GUIDANCE: THE CASE OF CAREPROFSYS	Use of AI chatbots for finding professions	This paper reports on an AI chatbot that is used to find out information about professions in the European classification of professions. Note is made of how it offers differentiated support to two types of users: The first type targets aspiring learners, e.g. high school students or students who want to practice a job related to their field of study. The chatbot provides details about universities found in different

CONVERSATIONAL AGENT. In INTED2024 Proceedings (pp. 6194-6204). IATED. (Link)		cities across the country and admission requirements, helping users make informed choices about their educational path. The second type of users is those who want to make a career change. Technical features of the tool are described and an initial evaluation with n=27 secondary students.
Donald, W. E. & Straby, R. (2024). Supporting clients via narrative storytelling and artificial intelligence: A practitioner guide for career development professionals. Career Development International, 29(4), 415-420. DOI: 10.1108/CDI-02-2024-0085. (Link)	Synthesis of AI and narrative career counselling	An experiment was carried out with a career client to test the effect of using AI in narrative counselling. Three phases of the interaction were: In phase one, the client recounts 7-10 positive narrative stories about engaging in activities they enjoyed. In phase two, the career development professional uses AI with tailored prompts to generate a personalised client report based on these narrative stories. In phase three, the report serves as the basis for further discussion and exploration with the client. The technique shows how career development professionals can adopt AI in their work to increase their capabilities, but also critically highlights limitations.
Gedrimiene, E., Celik, I., Kaasila, A., Mäkitalo, K., & Muukkonen, H. (2024). Artificial intelligence (AI)-enhanced learning analytics (LA) for supporting career decisions: Advantages and challenges from user perspective. Education and Information Technologies, 29(1), 297-322. (Link)	Evaluating AI career decision support tools	This research investigated advantages and challenges of AI-enhanced tool for supporting career decisions from the user perspective. Participants in Finland (n = 106) interacted with the AI-enhanced tool and responded to open-ended questionnaire questions. Two models were used to measure different facets of the user experience, a) the Technology Acceptance Model and b) the Career decision making model. Users perceived five benefits of the tool: 1) provision of career information, 2) research and analysis of the information, 3) diversification of ideas on possible career paths, 4) providing direction and decision support, and 5) self-reflection. However users also found difficulties with the tool.
Herath, G.A.C.A., Kumara, B.T.,	Reviewing the variety of	A systematic literature review was conducted between 2011 through to

Ishanka, U.A.P., & Rathnayaka, R.M.K.T. (2024). Computer-Assisted Career Guidance Tools for Students' Career Path Planning: A Review on Enabling Technologies and Applications. J. Inf. Technol. Educ. Res., 23, 6. (Link)	digital tools and use cases that have been developed to date, as context to AI	2023, producing n=46 applicable studies for investigating how digital technologies suppported student career planning. AI is described as an enabling technology. The key findings of this study revealed experimentation with a wide range of enabling technologies and techniques in the implementation of CACG tools for students' career path planning. Within these tools, a distinct set of parameters associated with students has been considered as input for offering personalized career decision support. Further, it was found that the use of CACG tools in career guidance differs across distinct educational stages. Recommendations are made to career practitioners and researchers.
Monreal, J. B., & Palaoag, T. (2024). Use of Artificial Intelligence in Career Guidance: Perspectives of Secondary Guidance Counselor. Nanotechnology Perceptions, 436-449. (Link)	Understanding the valued features of AI amongst students	This study explores the use of Artificial Intelligence (AI) in career guidance within public secondary schools in Legazpi City, Philippines. Student feedback was positive. Respondents highlighted several benefits of AI, including increased efficiency in their work, the ability to guide students more effectively, opportunities for further research, and enabling students to make informed decisions about their academic paths.
Song, Q. C., Shin, H. J., Tang, C., Hanna, A., & Behrend, T. (2024). Investigating machine learning's capacity to enhance the prediction of career choices. Personnel Psychology, 77(2), 295-319. (Link)	Using machine learning to augment career choices based on interests	Based on a review that found interests are important predictors of career choices, the authors developed and tested a machine learning algorithm to link vocational interests and occupations in the population. A large-scale study of n=81,267 was used to test the model with employed and unemployed members of the population and found a superior occupational fit than the existing method. The implications are suggested as being that machine learning can improve career choices based on occupational interests.

Further illustrations and perspectives

Title	Themes	Brief description
Chamorro-Premuzic, T., Polli, F., & Dattner, B. (2019). Building Ethical AI for Talent Management. Harvard Business Review. (Link)(Paid)	Using AI to create more ethical, fair practices in labour markets	The paper provides the context of AI being deployed widely across the labour market, with the opportunity to create more ethical and fair practices in recruitment. The implications of AI lead to all sorts of organisations needing to pursue several steps, such as obtaining consent for data-use within AI systems, and using third parties to audit systems and maintain accountability
Bakshi, A. J., & Goss, S. (2019). Trends related to ethics, technology, counselling and careers. British Journal of Guidance & Counselling, 47(3), 265-273. (Link)	Trends in ethics in counselling and role of AI and other technology	This article is an introduction to an issue of the journal that has papers covering four themes: ethics in counselling, online counselling, technology in counsellor education and career development.
Graßmann, C., & Schermuly, C. C. (2021). Coaching with artificial intelligence: Concepts and capabilities. Human Resource Development Review, 20(1), 106-126. (Link)	Considering the possibilities and issues related to using AI in coaching	Although covering generic coaching, this paper discusses salient considerations for various forms of coaching practice that deploy AI. The authors challenge the assumption that AI coaching is feasible by challenging its capability to lead through a systematic coaching process and to establish a working alliance. The greatest difficulties are found in clients' problem identification and in delivering individual feedback.. However, AI generally appears capable of guiding clients through many other areas. The framework provided by the authors also provides a useful way to evaluate AI coaching tools in a systematic way.
Wilson, M., Robertson, P., Cruickshank, P., & Gkatzia, D. (2022). Opportunities and risks in the use of AI in career development practice. (Link)	Discussion of pros, cons and policy recommendations	This article explores the potential benefits and challenges of including AI in career practice. It provides an overview of the technology, including current uses, to illustrate ways in which it could enhance existing services, and the attendant practical and ethical challenges posed. It culminates in policy recommendations.
Beretta, E., Brinberg, D.,	Reviewing trends and the	This discussion paper recognises the impact that COVID had on the society, the

Dianova, V., Miniero, G., & Sponchioni, C. (2023). The Post-COVID-19 Job Market: AI in Recruitment and Career Guidance Services. California Management Review (Link)	benefits of AI in a changing labour market	economy and knock-on effects to both recruitment and career guidance. AI is proposed as a beneficial tool and with significant promise, if it can be scaled, to increase the efficiency, equity, and personalization of both recruitment and career guidance.
Brione, P. et al (2023), Potential impact of artificial intelligence on the labour market. House of Commons Library. (Link)	Understanding potential impacts on future labour markets	This paper reviews definitions and some of the key issues with AI (e.g discrimination), and then reviews a series of third party studied that have examined future impacts. These includes ones by PWC/BEIS, the Business, Energy and Industrial Strategy Committee, Office for National Statistics
Department of Education (2023), The impact of AI on jobs and training (Link)	Understanding potential impacts on future jobs and training	The report looks more at the activity-level impact of AI on jobs and training, considering the human activities that AI can or would replace. This micro analysis is then extrapolated to industry level evaluations. Differences are seen in how AI is expected to affect different professions and people at different training levels.
Jackson, C. (2023), The big issue: The brave new world of AI therapy. British Association for Counselling and Psychotherapy (Link)	Discussion of AI in counselling and psychotherapy	Though not focussed on career guidance, this discussion about prospects in the general counselling field. Recent advancements (e.g. NICE has fast tracked none counselling apps) were discussed. Chatbots, virtual reality and avatar therapy were all explored. Concerns of the profession were summarised.

Passmore, J., & Tee, D. (2023). Can Chatbots like GPT-4 replace human coaches: Issues and dilemmas for the coaching profession, coaching clients and for organisations. The Coaching Psychologist, 19(1), 47-54. (Link)	Discussion on the potential evolution of the role of coach as AI also evolves, and the extent of job displacement.	This paper discusses the extent that AI might displace the role of a coach, with the increasing integration into coaching. Benefits and limitations of AI coaching chatbots are discussed. The paper also explores the role of coaching psychology, professional bodies and governments in the development and evolution of AI systems and coaching chatbots. It is concluded that there is an urgent need to protect clients and organisations from unregulated and unethical practices. Note: Passmore et al (2024) also write a book ("The Digital and AI Coaches' Handbook: The Complete Guide to the Use of Online, AI, and Technology in Coaching") with contributions from many authors in this area
Bankins, S., Jooss, S., Restubog, S. L. D., Marrone, M., Ocampo, A. C., & Shoss, M. (2024). Navigating career stages in the age of artificial intelligence: A systematic interdisciplinary review and agenda for future research. Journal of Vocational Behavior, 104011. (Link)	Considering the different sorts of impact of AI on career stages, including career guidance	A systematic literature review of 104 empirical articles synthesises the scholarship on AI in the context of careers, including career guidance. Drawing upon career stage theory, the authors examine the implications of AI on different facets of careers (e.g. education, AI at work etc) and identify key barriers and enablers of AI use in this area. The way that AI is used impacts individuals' career competencies. The sum of these factors shapes individuals' career trajectories both within and across various career stages.
Donald, W. E., Van der Heijden, B. I. J. M. & Baruch, Y. (2024). Introducing a sustainable career ecosystem: Theoretical perspectives, conceptualization, and future research agenda. Journal of Vocational	A conceptual model of a career ecosystem with AI	The paper advances the embryonic interest of combining the theoretical frameworks of sustainable career and career ecosystem into a sustainable career ecosystem theory by introducing Artificial Intelligence (AI) as a new actor, spotlighting the need for liminality of the relationship between an individual and career practitioner, and presenting a new conceptual model. The authors consider various dimensions for analyzing a sustainable career ecosystem to offer a new conceptual model.

Behavior, 151, 103989 (Link)		
Donald, W. E., & Straby, R. (2024). Supporting clients via narrative storytelling and artificial intelligence: a practitioner guide for career development professionals. Career Development International. (Link)	Using AI in conjunction with narrative counselling techniques	This paper provides a methodology of combining narrative counselling with the use of AI to support clients making career choices through a staged process. Ethical consideration and future discussions are also proposed.
Duan, J., & Wu, S. (2024). Beyond Traditional Pathways: Leveraging Generative AI for Dynamic Career Planning in Vocational Education. International Journal of New Developments in Education, 6(2). (Link)	The potential of AI to facilitate adaptive and personalised learning/ career plans for vocational and non traditional career paths	The paper discusses the potential for future AI in helping people to plan their careers, particularly noting the ability to create adaptive and personalised learning and career pathways for vocational students and those taking non traditional routes: This paper investigates the transformative impact of generative artificial intelligence (AI) on vocational education career planning, transitioning from traditional methodologies to personalized, dynamic strategies. By leveraging Natural Language Processing (NLP) and Machine Learning (ML), it delves into how generative AI can provide tailored career guidance, adaptive learning pathways, and labor market insights, underpinned by constructivist learning theory and career development models.
Maree, J. G. (2024). Exploring innovative career counselling strategies for universal relevance and sustainability in the Anthropocene era. Australian Journal of Career Development, 33(1), 15-24. (Link)	Overarching call for career counselling to be tailored to unique contexts based on global impacts	This article reflects on several factors that influence the art and science of career counselling in different contexts. An adapted systematic literature review was implemented to examine developments in the career counselling field and to explore innovative career counselling strategies that have universal relevance and sustainability in the “Anthropocene era” (an era in which mankind has a significant impact on the environment). The author argues for an approach to career counselling that considers the different contexts of people in different parts of the world.

Nayak, A., Khang, A., Satpathy, I., Samanta, S., & Patnaik, B. C. M. Building the Perfect Match Using Artificial Intelligence in Career Development. In AI-Oriented Competency Framework for Talent Management in the Digital Economy (pp. 120-140). CRC Press. (Link)(Paid)	The role of AI inside the career guidance ecosystem	The purpose of this research is to investigate the function of AI in the career development ecosystem, with a particular emphasis on its use within the framework of the Job Demands-Resources (JD-R) Model. The fundamental goal of this study is to analyze how AI works inside the career development ecosystem, with the JD-R Model serving as a theoretical framework. The study begins by examining the changing employment market dynamics and people's job expectations. It then dives into how AI may help with career evaluations and uses powerful algorithms and data analysis to match individuals' abilities and interests with appropriate work prospects. Furthermore, the study investigates how AI promotes personalized skill and development by providing targeted learning experiences and career progression suggestions. The study highlights effective AI applications in career development through the examination of real-life examples and relevant literature from different publications
Pandya, S. S., & Wang, J. (2024). Artificial intelligence in career development: a scoping review. Human Resource Development International, 27(3), 324-344. (Link)(Paid)	Scoping study for AI	This article is a response to acall for expanding AI research to understand its implications for people and their career development. The goal is to provide an updated, holistic understanding of existing research on AI in career development. Through a scoping review of 101 journal publications, this article offered three insights. First, AI has a double-edged sword effect on career development. While AI technology helps streamline career development processes in organisations, it can also disrupt a workplace by causing job insecurity. Secondly, with the unintended consequences, integrating AI into organisational practices can backfire, leading employees to explore alternate careers. Lastly, infusing AI into career development programmes has caused some ethical concerns.
Putri, A. E., Dinata, W. W., & Basri, D. C. (2024). The Influence of Addiction to Using	Consideration of the impact of client addition to AI	This research aims to understand the impact of excessive use of Artificial Intelligence (AI) on generation Z. To find out the influence of AI on the lives of generation Z, emotionally, mentally and

Artificial Intelligence (AI) in Generation Z in Guidance and Counselling. BICC Proceedings, 2, 159-164. (Link)	on career counselling	socially, generation Z. A literature review across different subject areas is used to frame the implications for career guidance.
Zhang, Z., & Wang, J. (2024). Can AI replace psychotherapists? Exploring the future of mental health care. Frontiers in Psychiatry, 15, 1444382. (Link)	Discussion on the future in psychotherapy	Although based on psychotherapy, this discussion is relevant to all therapeutic and counselling based professions: Can AI replace the human counsellor? The conclusion is that in a world with unprecedented demand, AI will change the service model rather than replace human roles outright.

Future research questions

In discussing AI with career academic experts, the CDI found that key areas where more research would be valuable involved:

- Understanding AI adoption and use amongst students at school
- Testing the veracity and value of AI-generated information
- Developing models for blended AI-human careers guidance provision

Further to these areas, a discussion paper by Westman et al (2021) into AI in career guidance suggested that future research topics would include:

- Agency in guidance interaction
- Developing a data ecosystem for career guidance
- Identifying and navigating ethical issues.

A research agenda was proposed for understanding the impact of AI across lifestages by Bankins et al (2024).

In adjacent areas to career guidance, notably education, research agendas have been proposed which potentially have questions that are also relevant to CEIAG. For instance:

- Multidisciplinary topics in AI (Dwivedi, Yogesh K, 2021)
- AI in tertiary education (Lodge et al, 2023)
- Chatbots (Folstad et al, 2023)
- AI-human communication (Guzzman et al, 2020)

Relevant institutions

To understand more about this area, it is worth reviewing the work of the following organisations who are active in commissioning or producing research in the area if AI.

These form two groups: 1) leading established or new technology companies who are developing what is possible to do with AI, 2) the new breed of career/couselling AI based services.

Name	Description
Alan Turing Institute (Link)	The UK's national institute for data science and AI, focusing on research, policy, and collaboration.
Alphabet (Google) (Link)	Alphabet Inc. is a multinational conglomerate and the parent company of Google, founded in 2015 through a restructuring of Google. Alphabet oversees a diverse portfolio of businesses, including internet services, autonomous vehicles (Waymo), life sciences (Verily), and venture capital (GV and CapitalG). Its core revenue driver remains Google, which dominates search, advertising, YouTube, and cloud computing. However, Alphabet has also become a major leader in artificial intelligence (AI) research, primarily through Google DeepMind and Google Research.
BetterUp (Link)	BetterUp combines AI with human coaching to provide personalized coaching for career development, mental fitness, and leadership skills. Their platform uses AI to match users with certified coaches and track progress over time.
Career Flow (Link)	Careerflow uses AI to help job seekers optimize their career paths. It offers tools for resume building, LinkedIn optimization, and interview preparation, acting as a virtual career coach.
Career Village (Link)	US based AI powered career coaching tool: “Personalized career coaching for everyone, from students to job-seekers. Built by CareerVillage and a coalition of experts with decades of experience helping millions of people prepare for and get jobs.”
Coachhub (Link)	CoachHub is a digital coaching platform that uses AI to match employees with professional coaches for career development, leadership training, and personal growth.
Deepmind (Link)	DeepMind is a London-based artificial intelligence company that was acquired by Google in 2014. It is known for its research and development in the field of artificial intelligence and machine learning, and has made significant contributions to the advancement of these technologies. Some of the notable achievements of DeepMind include the development of AlphaGo, the first computer program to defeat a human professional player at the board game Go,

	and the development of AlphaZero, a general-purpose artificial intelligence that can learn to play a wide variety of games and other tasks from scratch, without any prior knowledge or data.
European Centre for Algorithmic Transparency (ECAT) (Link)	Part of the Joint Research Centre, it assesses AI systems for compliance with EU regulations. The European Centre for Algorithmic Transparency (ECAT) contributes with scientific and technical expertise to the European Commission's exclusive supervisory and enforcement role of the systemic obligations on designated systems.
European Commission / AI Office (Link)	Leads AI policy and regulation, including the proposed AI Act, which aims to create a harmonized framework for AI governance across the EU. The EU council represents EU member states and influences AI policy direction. The U Parliament plays a key role in shaping AI legislation, including debates on ethics, accountability, and economic impact.
Global Partnership on Artificial Intelligence (GPAI): (Link)	An international initiative to guide responsible AI development and use. (Currently they are undergoing a merger with the work of the OECD).
IEEE (Institute of Electrical and Electronics Engineers) (Link)	The IEEE Academy on Artificial Intelligence provides basic knowledge on classic AI, modern AI (machine learning), humanized computing, and semantic computing. On top of the basic modules, it introduces the applications of AI in different verticals such as manufacturing, financial, health, education, etc. by defining the problems and identifying possible AI solutions based on existing and newly developed materials.
Inflection (Link)	Inflection AI is a pioneering machine learning startup focused on enhancing human-computer interaction through AI-driven solutions.
MentorCliq (Link)	MentorcliQ provides AI-powered mentoring and career development software. Their platform facilitates mentorship programs, career coaching, and professional growth by matching mentors and mentees based on AI-driven compatibility.
Meta AI (Link)	Meta AI is an artificial intelligence laboratory that belongs to Meta Platforms Inc. (formerly known as Facebook, Inc.). Meta AI intends to develop various forms of artificial intelligence, improving augmented and artificial reality technologies.
Microsoft	Microsoft Corporation is a global technology company founded in 1975, best known for its software products like the Windows operating system, Office suite, and Azure cloud computing platform. Under CEO Satya Nadella, Microsoft has shifted its focus toward cloud services, AI, and enterprise solutions, becoming one of the world's most valuable companies. Microsoft is heavily invested in artificial

	intelligence (AI) research and development, primarily through Microsoft Research (MSR) and its AI divisions. Microsoft provides many tools to help developers around the world to build AI based applications.
MIT Initiative on the Digital Economy (Link)	Focuses on AI's economic implications and policy recommendations. Their work splits into a number of diverse workstreams including “AI, Marketplaces, and Labor Markets”, and “Human-First AI”.
Numenta (Link)	Numenta is a technology company that focuses on developing machine learning algorithms and software based on principles of the brain's neocortex. The company's research centres on Hierarchical Temporal Memory (HTM), a theory of the brain's neocortex that provides a computational framework for understanding how the brain processes and stores information.
NVDIA (Link)	NVIDIA caters to various industries by delivering specialized AI solutions designed to optimize processes and drive innovation.
Neurallink (Link)	Neuralink was founded in 2016 by Elon Musk and a team of scientists and engineers with the goal of developing technology to treat brain diseases and eventually enhance human capabilities. The company is inspired by the science fiction concept of a "neural lace," which is a digital layer implanted in the brain that allows for a symbiotic relationship with artificial intelligence
OECD (Link)	Develops AI principles and guidelines adopted by many countries around the world.
Open AI (Link)	OpenAI is an artificial intelligence (AI) research laboratory dedicated to developing friendly AI that will benefit humanity as a whole. The company was founded in 2015 by a group of notable figures, including Sam Altman, Elon Musk, Greg Brockman, Reid Hoffman, and Peter Thiel, who pledged over $1 billion to the venture. OpenAI is headquartered in San Francisco and is committed to openly collaborating with other institutions and researchers by making its patents and research available to the public.
Partnership on AI (Link)	A multi-stakeholder organization addressing AI's societal impacts, with members from academia, industry, and civil society.
Rezi (Link)	Rezi is an AI-powered resume builder and career coaching tool. It uses AI to create tailored resumes, cover letters, and job application materials, offering guidance for career advancement.
Rocky ai (Link)	A career and personal development app aimed at both publics and coaches.
Talking Points (Link)	TalkingPoints is an AI-powered platform designed to support educators and students, but it also offers career coaching and counseling tools for professional development in the education sector.

Torch (Link)	Torch offers leadership coaching and development programs powered by AI-driven insights. Their platform helps organizations and individuals improve leadership skills, team dynamics, and career growth through data-driven coaching.
UK Government (Link). The UK strategy is found here (Link)	Create research and policies on AI, including profiling the opportunities and risks, such as the study to the left on UK opportunities. The UK now has a Government Office for AI.
University of Cambridge (Leverhulme Centre for the Future of Intelligence) (Link)	The Leverhulme Centre for the Future of Intelligence is a highly interdisciplinary research centre exploring the nature, ethics and impact of artificial intelligence (AI). Funded by the Leverhulme Trust, CFI is based at the University of Cambridge, with spokes at Imperial College London and University of California, Berkeley, as well as close links with industry and policymakers. CFI brings together academics from a variety of disciplines as diverse as machine learning, philosophy, history, literary studies, engineering, media studies and design in order to explore the possibilities of AI in both the short and long term.
World Economic Forum (Link)	Supranational think tank and policy influencing body, with a strong strand of research and thought leadership on AI.
Woebot (Link)	Woebot is an AI-powered mental health chatbot that provides emotional support and counseling. While not exclusively for career coaching, it helps users manage stress, anxiety, and other challenges that may impact their professional lives.

Key publications sources

To explore this topic further, research related to this topic is disseminated below. (These are additional the common journals of CEIAG that routinely cover this topic).

Name	Description
AI in Education (Link)	Publishes original research studies on topics relating to the applications of AI at any stage of education, ranging from primary education to lifelong learning, and from either a disciplinary or interdisciplinary perspective
Computers and Education: Artificial Intelligence (Link)	Computers & Education: Artificial Intelligence aims at affording a world-wide platform for researchers, developers, and educators to present their research studies, exchange new ideas, and demonstrate novel systems and pedagogical innovations on the research topics in relation to applications of artificial intelligence (AI) in education and AI education
Education and Information Technologies (Link)	This is the official journal of the IFIP Technical Committee on Education. It covers the complex relationships between information and communication technologies and education. The journal provides perspectives at all levels, from the micro of specific applications or instances of use in classrooms to macro concerns of national policies and major projects; from classes of five year olds to adults in tertiary institutions
Interactive Learning Environments (Link)	Publishes articles on all aspects of the design and use of interactive learning environments in the broadest sense, encompassing environments that support individual learners through to environments that support collaboration amongst groups of learners or co-workers.
International Journal of AI in Education (Link)	A journal that aims to help the development of principles for the design of computer-based learning systems that use AI.

Data sources

Some contextual data sources are provided below. These are particularly useful for studying the prevalence of different situations, trends over time or comparing situations with different geographies or groups.

Name	Description
ONS, Public awareness and expectations of AI (Link)	A Government tracker in the UK that tracks social attitudes to AI amongst the public.
ONS, Awareness, impact and use of AI (Link)	Survey describing public use of AI in the UK.
ONS, Sentiment and uptake of AI amongst businesses (Link)	Sentiment and use survey amongst UK businesses related to adoption of AI.
State of AI (Link)	Annual report on the overall state of AI across the world