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From Degrees to Responsibilities: How Artificial Intelligence Reshapes Academic Work, Skills, and Educational Credentials

Aileen Behrensmeier[1], Tobias Oberdieck[2], Enrico Moch[3], Peter Schlecht[4]

[1]Researcher, Department of Economics, GrandEdu Research School, Germany
[2]CEO, GrandEdu GmbH, Germany
[3]Academic Director, Department of Economics, GrandEdu Research School, Germany
[4]CEO, GrandEdu GmbH, Germany

Corresponding Author: Aileen Behrensmaier, Email: a.behrensmeier@sk-pharma-logistics.de

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ABSTRACT

The increasing use of artificial intelligence, particularly generative AI, is transforming knowledge-intensive and academically characterised work. While a growing body of research examines the effects of AI on tasks, skills and wages, the role of academic education and formal qualifications under conditions of AI-driven task reconfiguration remains conceptually fragmented. This article addresses this gap by applying a task-based approach to analyse how AI reshapes academic activities and how these changes affect skill requirements, income trajectories and the functional role of academic degrees. The analysis is based on a systematic thematic review of international, peer-reviewed studies from labour economics, education research and institutional analyses, complemented by an analytical case study. Academic activities are differentiated into highly substitutable task bundles, AI-complementary task bundles and responsibility-centred task bundles. The findings indicate that income stability is increasingly associated with tasks involving validation, coordination and decision-making responsibility, while activities centred on standardised knowledge reproduction face declining relative importance. The article shows that academic degrees are not generally devalued by AI diffusion. Instead, their role is functionally reconfigured. Degrees increasingly operate as institutional signals, access mechanisms and markers of formally assigned responsibility rather than as simple indicators of knowledge possession. The case study illustrates how academic education can be structured to remain relevant by systematically preparing graduates for AI-complementary and responsibility-centred activities. The paper contributes to current debates on AI, work and higher education by integrating task-based labour market analysis with an institutional perspective on academic qualifications.

Keywords: Artificial intelligence; academic work; task-based approach; skill-based hiring; academic degrees; higher education; labour market

INTRODUCTION

The use of AI is changing the current structure of knowledge-intensive labour to an unprecedented extent. Empirical studies show that technological innovations are increasingly affecting activities that were previously categorised as academic and knowledge-based (Engberg et al., 2025; OECD, 2023). Past automations were mainly aimed at manual or highly routine tasks.

Current AI applications follow a different pattern. Generative systems in particular deal with cognitive, analytical and knowledge-based activities (Autor et al., 2003; Acemoglu & Restrepo, 2019; ILO, 2023). These tasks include text production, standardised analysis procedures, information processing and selected elements of scientific and advisory work (ILO, 2023).

An important finding in the labour economics literature is that technological change rarely replaces entire occupations. Instead, it transforms specific tasks within existing role structures. The task-based approach shows that substitutability is determined by the characteristics of individual tasks and not by formal job titles (Autor et al., 2003; Acemoglu & Restrepo, 2019). Empirical studies show that academic activities are affected by generative AI to an above-average extent in an international comparison. At the same time, there is considerable heterogeneity within occupational groups (ILO, 2023; Gathmann et al., 2024). Recent studies also point to a differentiation in the income trajectories of highly qualified employees (Engberg et al., 2025; Stephany & Teutloff, 2023).

While activities with a high degree of standardisation tend to lose value, activities remain stable or gain in importance if they use AI-based systems in a complementary manner and are associated with decision-making, coordination or responsibility functions (Engberg et al., 2025; Mäkelä & Stephany, 2024).

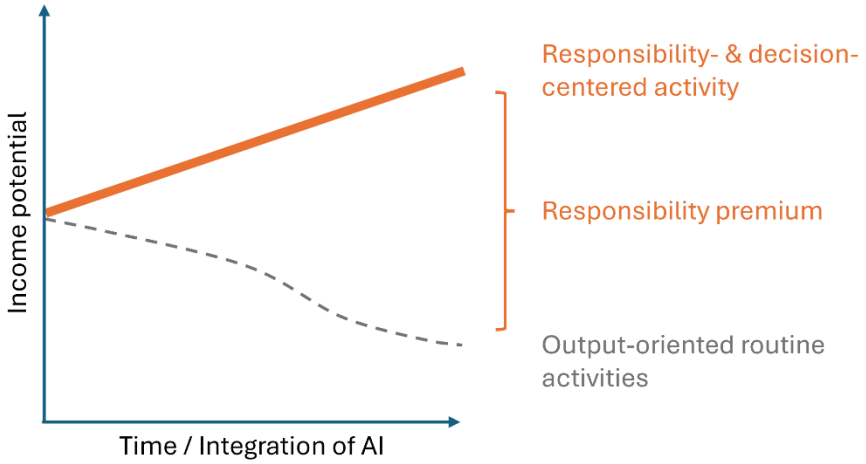

Figure 1 ***Income Potential of Knowledge-Intensive Activities Under Increasing AI Integration***

Note. The figure illustrates divergent income trajectories for routinised, output-oriented activities and responsibility- and decision-centred activities as AI integration increases. The illustration is conceptual and synthesises task-based theoretical arguments and aggregated empirical evidence on AI substitution and complementarity (Engberg et al., 2025; Mäkelä & Stephany, 2024; Winner, 1978).

The resulting income divergences cannot be explained by formal educational qualifications alone, but require consideration of institutional and organisational framework conditions. A purely technologically deterministic understanding that views technology as an autonomous cause of social change and ignores social contexts proves to be analytically insufficient (Winner, 1978).

Against this backdrop, the role of academic education is also coming under pressure to adapt. Empirical studies show that in certain labour market segments, the importance of formal qualifications in the recruitment process is declining, while demonstrable, task-related skills, especially in the field of AI, are gaining in importance (Gonzalez Ehlinger & Stephany, 2023; Portocarrero Ramos et al., 2025). This trend is discussed in the literature under the term skill-based hiring and refers to a stronger focus on observable skills rather than formal qualifications.

At the same time, institutional economic and governance-oriented analyses show that academic degrees do not function exclusively as indicators of competence, but also fulfil access and responsibility functions. Particularly in fields of activity involving legal, scientific or organisational liability, formal degrees remain of central importance, regardless of technological substitution effects (OECD, 2023). However, this functional multidimensionality of academic degrees has so far rarely been systematically linked in the existing literature to AI-related changes in activity structures and income trajectories.

The current state of research is therefore fragmented. Labour market economics studies often analyse AI exposure, task changes and wage effects in isolation from training and qualification structures (Acemoglu & Restrepo, 2019; Engberg et al., 2025). Educational science studies discuss the need to adapt academic curricula in the context of AI, but mostly without explicit reference to income dynamics and job bundles on the labour market (Schmohl et al., 2023; Portocarrero Ramos et al., 2025). An integrated analysis that considers AI substitution, task structure, academic education and the role of formal qualifications together is still lacking.

The aim of this paper is therefore to systematically examine the extent to which academic education needs to adapt in order to continue to secure access to higher-paid jobs in conditions of increasing AI substitution. Particular attention is paid to the functional role of academic qualifications as instruments of competence, access and responsibility in an international comparison. Methodologically, the paper is based on a systematic thematic literature analysis of international, peer-reviewed studies and selected institutional reports (OECD, 2023; ILO, 2023). In addition, an analytical case study is used to illustrate how future-oriented academic education can be designed.

The paper thus makes a theoretically and empirically sound contribution to the debate on the future of academic education in the AI age by showing that academic degrees are not losing their importance per se, but that their value increasingly depends on the extent to which they impart institutionally secured competencies for classifying, validating and responsibly using AI-based systems.

THEORETICAL BACKGROUND

An important theoretical approach to analysing technological change in the labour market is the task-based approach. This approach assumes that work consists of specific activity profiles and that technological innovations have a selective impact on individual tasks, not on occupations as a whole (Autor et al., 2003). Empirical studies consistently show that task profiles within occupations change over time and that technological diffusion is accompanied by a shift away from routine tasks and towards analytical activities (Autor et al., 2003). In task-based models, the substitutability of labour results from the characteristics of activities, in particular their degree of standardisation and repeatability (Autor et al., 2003; Acemoglu & Restrepo, 2019).

Empirical evidence shows that new technologies are preferred in areas where tasks are clearly structured and standardisable, and that technological changes often result in the reallocation of tasks within existing occupations (Acemoglu & Restrepo, 2019; Gathmann et al., 2024). For generative AI, international analyses show that language and information processing activities, which account for a high proportion of tasks in many knowledge-intensive and academic professions, are particularly affected (ILO, 2023). At the same time, the literature emphasises that even with high exposure to AI, complete substitution remains the exception. Rather, substitution and complementarity work together, resulting in new or changed tasks and the partial preservation of labour demand (Acemoglu & Restrepo, 2019).

AI EXPOSURE IN ACADEMIC-BASED ACTIVITIES

International exposure analyses based on activity data show that, on average, employees in highly skilled and knowledge-intensive fields of activity are more affected by generative AI than employees in many manual fields of activity. Exposure is understood here as the potential to influence tasks and not as a prediction of job loss (ILO, 2023). The ILO presents a global index of occupational exposure to generative AI based on activity shares, which enables international comparisons (ILO, 2023).

In an academic context, this exposure logic primarily affects language- and information-centred activities that frequently occur in academic roles. These include, in particular, text production, information processing, standardised analysis, and documentation- and communication-related tasks (ILO, 2023). For knowledge-intensive work as a whole, it is emphasised that activities with a high proportion of standardised text work and formalizable information processing have a particularly high interface with generative AI (ILO, 2023). At the same time, academic work remains heterogeneous, as it includes not only standardisable components but also context-dependent, problem-formulating and responsibility-related activities that are less easily substitutable (Gathmann et al., 2024).

Studies on task changes and wage effects support this heterogeneity. Worker-level analyses show that AI exposure within occupations is associated with changed activity and skill profiles and that income effects are differentiated, which is consistent with both complementary and substitutive mechanisms of action (Engberg et al., 2025). This results in a functional segmentation of knowledge-intensive work, with tasks involving complementary AI use and higher responsibility tending to be more highly remunerated than routine output production (Engberg et al., 2025; Mäkelä & Stephany, 2024).

WAGE EFFECTS, COMPETENCIES AND SKILL-BASED HIRING

Traditional labour economics literature explains income differences among highly skilled workers primarily in terms of human capital accumulation, i.e. productivity-related skills that are built up through education and experience. In addition, signalling logic describes formal qualifications as market signals that can indicate productivity even when skills are not fully observable (Autor et al., 2003; Acemoglu & Restrepo, 2019). However, recent empirical studies suggest a partial shift in recruitment logic. Large-scale analyses of online job advertisements in the United Kingdom show that the explicit mention of formal educational requirements is declining in AI roles and that AI-related skills are associated with independent wage premiums, while degree premiums are lower in these segments (Gonzalez Ehlinger & Stephany, 2023). These findings are discussed as evidence of skill-based hiring, with an emphasis on the fact that this is particularly observable in fast-growing, technology-driven segments (Gonzalez Ehlinger & Stephany, 2023; OECD, 2023).

ACADEMIC DEGREES AS INSTITUTIONAL ARRANGEMENTS

Beyond their role as market and competence signals, academic degrees fulfil institutional functions. Institutional reports on the AI transformation of the labour market emphasise that, in many contexts, formal qualifications structure access to roles, attributions of responsibility and organisational legitimacy and thus cannot be explained solely by short-term skill demand (Organisation for Economic Co-operation and Development [OECD], 2023). These functions are essentially governance-related because they help shape responsibilities, liability and quality assurance in organisations (OECD, 2023).

ADAPTING ACADEMIC EDUCATION TO THE STATE OF RESEARCH

For several years, educational research has addressed the need to adapt academic curricula in the context of digital transformation. Generative AI plays a central role in this debate. Recurring focal points include the development of basic AI-related skills. Further priorities are the strengthening of assessment and reflection skills and the promotion of interdisciplinary integration capacities (Schmohl et al., 2023; OECD, 2023). At the same time, empirical evidence on the labour market outcomes of curricular reforms remains limited. Many contributions rely on normative arguments. Others remain case-based. Systematic links to income and task-related data are often missing (Schmohl et al., 2023; OECD, 2023).

SUMMARY AND RESEARCH GAP

The literature consistently shows that AI does not homogeneously replace knowledge-intensive and academic work. Instead, it transforms bundles of activities. Exposure to AI is therefore not synonymous with replacement (Autor et al., 2003; Acemoglu & Restrepo, 2019; ILO, 2023). Income effects are closely related to whether activities are substituted or complemented. They also depend on how strongly tasks are linked to responsibility and context integration (Engberg et al., 2025; Mäkelä & Stephany, 2024). At the same time, job advertisement analyses point to a shift towards skill-based recruitment in AI-related segments, without institutional completion functions disappearing (Gonzalez Ehlinger & Stephany, 2023; OECD, 2023). An integrated analysis that systematically combines AI substitution, activity bundles, training adaptation, completion functions and wage capacity therefore remains a research gap.

METHODOLOGICAL APPROACH

The aim of this paper is to analyse the adaptation requirements of academic education under conditions of increasing AI substitution of academic activities and to systematically classify the role of academic degrees in terms of earning capacity. To achieve this goal, a qualitative, theory-driven research design is chosen, based on a systematic thematic literature analysis and supplemented by an analytical case study. This approach is suitable for integrating heterogeneous findings from different strands of research and identifying structural relationships without claiming causal effects (Schmohl et al., 2023; OECD, 2023). The work follows an integrative review approach that systematically brings together literature from the fields of labour economics, organisational sociology and educational science. Systematic reviews are particularly appropriate when a field of research is fragmented and empirical results, theoretical models and institutional analyses coexist without having been integrated to date (OECD, 2023; Schmohl et al., 2023). Since the research question is not aimed at measuring effects but rather at structural and functional analysis, meta-analyses and quantitative syntheses have been deliberately omitted. The supplementary case study is not intended for generalisation, but rather for analytical illustration. It is used to concretise abstract requirements for sustainable academic education on the basis of a real existing curriculum. This approach corresponds to a theory-driven, exploratory case study design (Schmohl et al., 2023; OECD, 2023).

The literature search was interdisciplinary and covered the fields of labour economics, sociology of work, education research and science research. Research was conducted in the Web of Science, Scopus, JSTOR and ScienceDirect databases. In addition, working papers from established labour economics series via SSRN were taken into account, provided they made a clear theoretical or empirical contribution. Institutional reports from internationally recognised organisations such as the Organisation for Economic Co-operation and Development and the ILO were specifically included, as these provide key empirical data on AI exposure and labour market structures

(Organisation for Economic Co-operation and Development, 2023; ILO, 2023).

The search strategy was based on the combined use of thematically relevant keywords. These included artificial intelligence AND tasks, generative AI AND labour market, skill-based hiring AND education, academic degrees AND wages, and AI exposure index. The search period was limited to publications from 2015 onwards, with a focus on works from 2020 onwards in order to adequately reflect the phase of generative AI dissemination. Only peer-reviewed journal articles, recognised working papers from the field of labour economics, and institutional research reports with transparent methodologies were included in the analysis. A prerequisite for inclusion was an explicit reference to at least one of the following aspects: AI exposure of activities, changes in task profiles, income effects, the role of skills, or the function of academic degrees. Opinion pieces, essays without empirical or theoretical foundations, purely prognostic future scenarios, and publications without a verifiable data basis were excluded. Contributions on higher education were only considered if they went beyond normative recommendations and addressed structural adjustment logics (Schmohl et al., 2023).

The selected literature was evaluated in a multi-stage coding process. First, statements on job profiles were identified and then classified according to whether they were described as highly substitutable, partially substitutable or complementary to AI. This classification is based on established task-based models of labour economics that analytically distinguish between substitution and complementarity (Autor et al., 2003; Acemoglu & Restrepo, 2019). In a second step, competency requirements were extracted and then differentiated according to whether they primarily address technical, analytical, evaluative or responsibility-related skills. In a third step, statements on the role of academic degrees were functionally coded. A distinction was made between signal function, competence mapping, access rules and attribution of responsibility, as discussed in institutional analyses of the governance of work and qualifications (Organisation for Economic Co-operation and Development, 2023).

Income effects were only included in the analysis if they were explicitly empirically proven or clearly derived theoretically. Implicit assumptions or blanket assessments were not coded. The supplementary case study was evaluated using the same analytical categories as the literature to ensure comparability. The case study was selected on the basis of analytical fit rather than representativeness, in line with the aim of providing a theory-driven illustration (Schmohl et al., 2023; OECD, 2023).

The chosen methodological approach does not allow causal statements to be made about individual employment trajectories or income effects. In addition, the analysis depends on the availability and quality of existing studies, particularly in the field of generative AI, where the empirical literature is still under development. These methodological limitations are explicitly reflected in the discussion section.

ANALYSIS

The analysis of the selected literature consistently shows that the impact of AI-based systems on academic work does not follow formal occupational boundaries, but rather functional clusters of activities. The decisive factor here is the extent to which individual tasks can be standardised, formally described and performed independently of context. These characteristics determine whether AI will primarily have a substitutive, augmentative or only marginal effect (Autor et al., 2003; Acemoglu & Restrepo, 2019).

From the literature review, three analytically distinct types of academic activity bundles can be identified, which differ systematically in terms of AI exposure, income potential and the role of formal qualifications.

The first type comprises highly substitutable activity bundles. These include tasks that are highly standardised, rule-based and

linguistically formalised. In academic contexts, this applies in particular to routine text production, standardised reporting, literature summaries, preparatory research work and the creation of formally structured teaching and administrative documents. Empirical studies on generative AI show that such activities are particularly affected by AI systems, as target criteria can be clearly defined and quality assessment often follows formal criteria (ILO, 2023; Autor et al., 2003; Acemoglu & Restrepo, 2019). For these bundles of activities, the literature points to declining marginal productivity of human labour and a tendency towards declining wage premiums, especially where no additional responsibility or decision-making authority is associated with the task (Engberg et al., 2025). A second type comprises partially substitutable, AI-complementary bundles of activities. These are characterised by the fact that AI systems can be used to increase productivity, but the tasks cannot be fully automated because they require contextual knowledge, judgement or the adaptive application of methods. In academic and knowledge-intensive activities, this applies, among other things, to the interpretation of empirical results, the application of analytical methods under varying conditions, the development of lines of argumentation, and the translation between technical, organisational, and normative requirements. Empirical findings show that employees in such activities often use AI as an assistive and augmentative technology, while the responsibility for evaluation and decision-making remains with humans (Gathmann et al., 2024; Mäkelä & Stephany, 2024). For these bundles of activities, the literature identifies stable or rising income levels, as productivity gains can be linked to higher value creation (Engberg et al., 2025).

A third type comprises low-substitutable, responsibility-centred bundles of activities. These activities are characterised by the fact that they involve independent problem formulation, methodological validation, normative consideration or legally relevant decision-making. In academic contexts, this particularly concerns the development of research questions, the evaluation of evidence under uncertainty, the final interpretation of results, responsibility for scientific quality, and management and governance functions. The literature emphasises that such activities can only be substituted by AI to a very limited extent, as they require implicit knowledge, institutional embedding and liability (OECD, 2023). Accordingly, these clusters of activities are associated with stable and often above-average income levels, even in sectors with high AI exposure (Mäkelä & Stephany, 2024).

The income effects of AI thus do not result from the technology itself, but from the functional position of the respective bundles of activities in the value creation process. Activities that primarily produce output without bearing responsibility come under wage pressure. Activities that evaluate, integrate and take responsibility for AI results retain or increase their income-generating capacity. This differentiation explains why highly skilled labour markets in the AI age are not eroding homogeneously, but are becoming more segmented (Engberg et al., 2025).

For academic education, this analysis implies that earning potential will in future be determined less by the amount of knowledge imparted and more by the ability to critically control AI-supported processes, validate results and take responsibility for decisions. This functional shift forms the basis for the reassessment of the role of academic degrees, which is analysed in the following chapter.

THE ROLE OF ACADEMIC DEGREES IN THE AGE OF AI

The existing literature consistently shows that the role of academic degrees in the AI age is not characterised by a linear decline in importance, but rather by functional differentiation. Academic degrees continue to act as structuring institutions in the labour market, but their relevance is shifting away from a blanket assumption of qualification

towards specific functions that vary depending on the set of activities. These functions can be analytically distinguished as signalling, competence mapping, access rules and attribution of responsibility (OECD, 2023; Schmohl et al., 2023).

From a labour economics perspective, degrees traditionally serve as signals of productivity under conditions of asymmetric information. However, empirical evidence from recent analyses of job advertisements suggests that this signalling function is becoming less important in certain segments of the labour market. In AI-related fields of activity in particular, formal qualifications are less frequently required explicitly, while concrete, observable skills ( ) are becoming more important. This finding mainly concerns job clusters that are either highly substitutable or in which AI is used as a productivity-enhancing tool without the job involving institutional responsibility (Gonzalez Ehlinger & Stephany, 2023; OECD, 2023). At the same time, the same studies show that degrees retain their importance where they serve as credible proxy variables for skills that are difficult to observe. These include, in particular, analytical judgement, methodological rigour and the ability to deal with complex problems under conditions of uncertainty. Although these skills cannot be fully guaranteed by degrees, they continue to be strongly associated with them institutionally, especially at higher qualification levels (Engberg et al., 2025; OECD, 2023). The signalling function of academic degrees thus becomes more selective, not obsolete. In addition to their signalling function, academic degrees also serve to map skills. This function is particularly ambivalent in the context of AI, as some of the cognitive skills taught through formal education can increasingly be replaced or at least supplemented by AI. Studies on AI exposure show that skills such as standardised analysis, formalised text production or rule-based information processing are becoming relatively scarce because they can be replicated technically (ILO, 2023; Autor et al., 2003; Acemoglu & Restrepo, 2019). Accordingly, the value of degrees is declining if they primarily serve as proof of such skills.

In contrast, degrees are becoming more important where they reflect skills that are not easily technicised. These include, in particular, the ability to validate results, critically evaluate evidence, integrate heterogeneous sources of information, and weigh up options for action from a normative perspective (Mäkelä & Stephany, 2024; Schmohl et al., 2023). The literature suggests that these skills do not develop independently of institutional learning and socialisation processes, as anchored in advanced academic education (Schmohl et al., 2023). A third central function of academic degrees is their role as an access rule. In many fields of activity, particularly in science, research, regulated professions and organisational leadership roles, degrees define formal entry barriers. This function is largely independent of short-term technological substitution effects, as it is anchored in law, organisation or norms (OECD, 2023). Empirical analyses show that even in areas highly exposed to AI, formal qualifications remain a prerequisite for certain positions, especially where decisions have legal or reputational consequences (OECD, 2023).

This function is particularly pronounced in doctoral programmes. The literature describes doctoral programmes less as pure educational qualifications and more as institutionally secured legitimation for independent knowledge production and the assumption of epistemic responsibility (OECD, 2023). Even if individual activities in everyday scientific work can be supported or partially replaced by AI, responsibility for research design, methodological decisions and interpretation remains with humans. Accordingly, doctoral degrees continue to be closely linked to job profiles that are difficult to substitute and at the same time offer stable incomes (Engberg et al., 2025).

In comparison, the bachelor's degree occupies a significantly weaker position. Empirical studies increasingly characterise it

as a mass degree with limited differentiation potential in the upper wage segment (Schmohl et al., 2023). Its function lies primarily in formal access authorisation and less in securing specific, income-relevant skills. Master's degrees play an intermediate role, with their value depending heavily on the content of the programme. Master's programmes that primarily accumulate knowledge without addressing responsibility and competence are losing their signal value. Programmes that systematically prepare students for AI-complementary and responsibility-centred activities, on the other hand, retain a high level of relevance in the labour market (Schmohl et al., 2023; OECD, 2023).

Overall, the literature shows that academic degrees in the AI age are not being devalued across the board, but are being functionally repositioned. Their relevance for earning potential depends on whether they serve as credible markers for activities that are not replaced by AI but structurally complemented by it. This reassessment forms the basis for the analysis of the need to adapt academic education, which is the focus of the following chapter.

THE NEED TO ADAPT ACADEMIC EDUCATION IN THE AGE OF AI

The analysis so far makes it clear that the future viability of academic education is not determined by the mere integration of new technologies, but by the functional orientation of the skills taught. The literature consistently shows that training models primarily geared towards knowledge accumulation and reproduction are becoming less relevant to the labour market in the age of AI, because it is precisely these skills that can increasingly be supported or replaced by technology (Autor et al., 2003; Acemoglu & Restrepo, 2019; ILO, 2023). This results in a structural need for academic education to adapt in ways that go beyond additive curriculum elements.

A shift from knowledge-oriented to responsibility-oriented education is central to this. Studies on the AI complementarity of work show that jobs with high income stability and low substitutability are regularly characterised by the fact that they require assessment, validation and decision-making under uncertainty (Engberg et al., 2025; Mäkelä & Stephany, 2024). Academic education must therefore systematically promote skills that enable graduates to critically examine AI-generated results, classify them methodically and integrate them into institutional decision-making processes. These skills cannot be taught through tool competence or technical training alone, but require an in-depth understanding of methods, epistemic boundaries and normative implications (Schmohl et al., 2023).

The literature on higher education in the context of generative AI emphasises that AI literacy is a necessary but not sufficient condition for future viability. Programmes that limit themselves to teaching the application of individual AI systems primarily address short-term market needs and run the risk of quickly becoming obsolete. In contrast, curricular approaches that systematically treat AI as a subject of critical analysis, for example with regard to bias, validity, transparency and attribution of responsibility, are described as future-proof (Schmohl et al., 2023; OECD, 2023; Schulze Heuling et al., 2025). Such approaches strengthen precisely those skills that are anchored in job profiles that are difficult to substitute. Another key area in need of adaptation concerns the structure of academic training formats. The literature suggests that linear, highly modularised curricula with clearly separated knowledge domains are only partially suited to the requirements of complex, AI-supported working environments (Schmohl et al., 2023). Instead, problem-oriented, interdisciplinary and project-based formats are gaining in importance because they promote the ability to integrate heterogeneous knowledge bases. This ability is particularly relevant where AI systems aggregate information, but humans remain

responsible for synthesis and decision-making (OECD, 2023).

The role of examination and performance assessment formats is also critically discussed in the literature. Traditional forms of assessment that focus on reproduction or standardised application are losing functional relevance as AI systems increasingly perform these tasks with high reliability (Schulze Heuling et al., 2025). In response, future-oriented training models shift their emphasis towards assessment formats that foreground independent problem formulation, methodological reflection and responsible decision-making (Schmohl et al., 2023). Within this perspective, competence is less defined by the correct reproduction of knowledge and more by the capacity to justify results, identify uncertainty and evaluate consequences under conditions of limited information. These abilities function as indicators of responsibility-oriented expertise in AI-supported academic contexts (Schmohl et al., 2023). At the same time, the need for adaptation varies across qualification levels. For bachelor's programmes, the literature shows that their function increasingly lies in basic academic socialisation and the teaching of fundamental analytical and reflective skills, while their role as an income signal remains limited (Schmohl et al., 2023). Master's programmes are under greater pressure to develop specific, labour market-relevant competence profiles. Their future viability depends largely on whether they systematically prepare students for AI-complementary activity clusters and explicitly address responsibility competence (OECD, 2023). Finally, doctoral programmes retain their central role where independent knowledge production, methodological responsibility and institutional legitimacy are required. The literature suggests that these programmes in particular are less likely to be devalued by AI and are more likely to gain in importance, provided that they do not undermine their function through excessive standardisation (OECD, 2023).

Overall, the state of research shows that the adaptation of academic education in the AI age should not be understood as technological modernisation, but rather as institutional realignment. Future-proof programmes are characterised by the fact that they do not see AI as a substitute for human competence, but as a touchstone for those skills that only arise under conditions of uncertainty, responsibility and normative embedding (OECD, 2023; Winner, 1978). This insight forms the basis for the following case study, which illustrates how such an orientation can be implemented in practice.

CASE STUDY

The case study is based on publicly available information about the curriculum and programme focus of a part-time MBA programme specialising in entrepreneurship and global business strategy. It serves as an analytical illustration of how academic education can be designed to systematically prepare graduates for AI-complementary and responsibility-centred job profiles (University of Applied Sciences Burgenland, 2026; OECD, 2023). It does not claim to be evaluative or causal, but rather specifies the requirements identified in the literature analysis on the basis of an existing curriculum. The programme examined is used as a case study because such MBA programmes are typically geared towards strategic decision-making, organisational responsibility and the handling of complex problems, and are therefore highly relevant to the research question. The curriculum examined is not primarily designed to teach standardised management tools, but rather to develop skills for analysing, evaluating and managing complex business contexts. Key components include strategic management, entrepreneurship, international business models, governance and risk issues, and the independent handling of practical problems. The programme thus specifically addresses job profiles that have been classified in the present typology as partially substitutable, AI-complementary, or minimally substitutable and responsibility-centred.

The case study shows a deliberate distinction with regard to highly substitutable job profiles. Routine analysis, standardised reporting or pure knowledge reproduction are not pursued as independent training goals, but are merely assumed as a methodological basis. This orientation is consistent with findings in the labour market literature, according to which precisely these activities are subject to particularly strong substitution pressure from generative AI and show only low-income stability in the long term (ILO, 2023; Autor et al., 2003; Acemoglu & Restrepo, 2019). The focus on AI-complementary job profiles is much more pronounced. The curriculum emphasises the application of analytical methods under uncertainty, the interpretation of complex data and decision-making situations, and the integration of technological, economic and institutional perspectives. These skills correspond to the competency profiles that empirical studies associate with stable or rising wage levels in AI-exposed fields of activity (Engberg et al., 2025; Mäkelä & Stephany, 2024). In this context, AI is not understood as a substitute for human analysis, but as a tool whose results must be critically evaluated and accounted for.

The focus on low-substitutable, responsibility-centred job profiles is particularly clear. Content on corporate governance, risk management and strategic leadership explicitly addresses issues of liability, decision-making responsibility and normative orientation. The final master's thesis serves as institutionally validated proof of independent problem formulation and methodological reflection. This structure corresponds to the function of advanced academic degrees described in the literature as legitimisation for assuming responsibility in complex organisational contexts (OECD, 2023). The role of the degree itself can also be classified in light of the previous analysis. The MBA does not primarily serve as a certificate of knowledge, but rather as a signal of the ability to manage complex decision-making processes, take on responsibility and integrate heterogeneous sources of information. It thus fulfils both a signalling function and an access and responsibility function, as is typical for income-stable job profiles (OECD, 2023; Schmohl et al., 2023). The case study thus confirms the finding that academic degrees retain their relevance to the labour market if they are credibly geared towards AI-complementary and responsibility-related activities.

At the same time, the case study highlights the limitations of this model. The success of such training depends largely on curricula not merely digitising existing content or adding AI-related modules, but functionally realigning their target competencies. Without a clear focus on responsibility, validation and decision-making skills, there is a risk that even advanced programmes will lose their signal value, even if they are formally at a higher qualification level (Schmohl et al., 2023).

Overall, the case study shows how the requirements for future-proof academic education identified in the literature analysis can be implemented in concrete terms. It illustrates that programmes that are consistently geared towards AI complementarity and responsibility can provide stable access to higher-paid jobs. These insights form the basis for the concluding discussion, in which the results are brought together and their implications classified.

DISCUSSION

The results of the literature review and the case study can be combined to form a consistent picture of the structural change in academic work in the age of AI. The key insight is that AI does not lead to a general devaluation of academic work or academic degrees, but rather to a functional reorganisation of activities, competence requirements and institutional roles. This reorganisation runs along the boundary between replaceable execution and responsible decision-making (Autor et al., 2003; Acemoglu & Restrepo, 2019; OECD, 2023).

The analysis initially confirms key assumptions of the task-based approach. AI has a selective impact on bundles of activities rather than on professions as a whole, with standardised, formally describable and context-poor tasks coming under particular pressure for substitution (Autor et al., 2003; Acemoglu & Restrepo, 2019). For academic work, this means that precisely those activities that have long been considered core academic expertise, such as routine analysis or text production, are becoming relatively scarce. This development explains why parts of academic work can lose their income-generating potential despite high formal qualifications. At the same time, the synthesis shows that AI is creating new forms of complementarity. Activities focused on interpretation, validation, integration and decision-making are gaining in importance because, although AI systems provide information in these areas, the responsibility for its use remains with humans (Engberg et al., 2025; Mäkelä & Stephany, 2024). This observation puts the widespread substitution thesis into perspective and points to a qualitative shift in academic work towards roles with greater responsibility and stronger institutional embedding. The re-evaluation of academic degrees should also be viewed in this context. The results show that degrees do not lose their relevance in the labour market, but rather change their function. Their classic signalling function for general productivity is relativised in certain segments by skill-based hiring, especially where activities are heavily augmented by AI and skills are directly observable (Gonzalez Ehlinger & Stephany, 2023). At the same time, degrees continue to play a central role where they fulfil access and responsibility functions, for example in science, research, regulated professions or strategic management roles (OECD, 2023).

The discussion of qualification levels illustrates this functional differentiation. Bachelor's degrees are losing their power of differentiation in the upper wage segment and primarily serve as an entry threshold. Master's degrees are becoming a critical selection point, whose value depends heavily on the curricular orientation. Doctorates retain their special status because they are institutionally linked to independent knowledge production and epistemic responsibility. These findings argue against a blanket devaluation of academic education and in favour of a differentiated view based on job profiles and levels of responsibility (Schmohl et al., 2023; OECD, 2023).

The case study underscores this argument by showing how education consistently geared towards AI complementarity and responsibility can be implemented in practice. It illustrates that future-proof academic programmes are characterised not by technological modernisation, but by a clear functional reorientation. Programmes that focus on decision-making skills, governance knowledge and methodological reflection remain relevant to the labour market, even in highly AI-exposed contexts (OECD, 2023; Schmohl et al., 2023).

At the same time, the limitations of the analysis must be emphasised. The work is based on existing empirical literature, whose evidence base for generative AI is still under development. In addition, the chosen methodological design does not allow causal statements to be made about individual employment trajectories. However, these limitations apply to the current state of research as a whole and do not diminish the analytical value of the structural relationships identified (Engberg et al., 2025).

CONCLUSION AND OUTLOOK

This paper shows that the question of the future of academic education in the age of AI cannot be meaningfully framed as a question of the continuation or abolition of academic degrees. Rather, the decisive factor is which set of activities academic education addresses and which institutional functions it fulfils. AI shifts the boundary between replaceable execution and responsible decision-making, and thus also the basis of earning capacity (Autor et al., 2003; Acemoglu & Restrepo, 2019; Engberg et al.,

2025; OECD, 2023). Academic education remains a key pathway to higher-paying jobs, provided that it systematically prepares students for AI-complementary and responsibility-centred tasks. Degrees remain relevant where they not only certify knowledge ( ) but also institutionally ensure the ability to validate, classify and use AI responsibly. Programmes that do not fulfil these functions, on the other hand, lose their signal value, regardless of their formal level (Engberg et al., 2025; Mäkelä & Stephany, 2024; OECD, 2023). For universities, this means that it is necessary not only to update their curricula technologically, but also to redefine their target competencies in functional terms. For labour markets and education policy, this means that the value of academic degrees cannot be secured by their number or formal duration, but rather by their institutional role in an increasingly AI-supported knowledge economy (Schmohl et al., 2023; OECD, 2023).

Further research should supplement these findings with empirical analyses of individual career paths and income developments, as well as examine the long-term stability of new recruitment and qualification logics. In particular, the relationship between curricular design, actual competence development and labour market value creation remains a key desideratum (Engberg et al., 2025; Portocarrero Ramos et al., 2025).

This article thus makes a structuring contribution to the debate on academic education, work and responsibility in the AI age and provides an analytical basis for the evidence-based further development of academic qualification models.

LIMITATIONS

This paper is subject to several conceptual and methodological limitations that must be taken into account when interpreting the results. First, the analysis is based exclusively on a systematic literature review and an analytical case study. This approach allows for a structured and theory-driven classification of the state of research, but does not allow for causal statements about individual employment trajectories, income effects or actual skills development. The identified relationships between AI-related substitution, task profiles, qualifications and earning capacity are derived from aggregated empirical evidence and theoretical reasoning rather than from primary data collection or experimental designs. Accordingly, the analysis relies on the synthesis of existing studies and on established task-based and institutional frameworks rather than on causal identification strategies.

In addition, the empirical literature on generative AI remains comparatively young and highly dynamic. Many of the available studies focus on early phases of diffusion or apply exposure indices that capture the potential influence of AI on activities rather than realised substitution effects or long-term productivity outcomes. As a result, observed associations should be interpreted as indicative patterns rather than as definitive causal estimates. In particular, statements on the income effects of generative AI are therefore subject to uncertainty and may change as technological development progresses (Engberg et al., 2025; ILO, 2023).

Thirdly, the work is subject to a certain selectivity of the available literature. While labour economics studies on tasks, wages and AI exposure are comparatively well developed, the evidence on the effectiveness of specific curricular adjustments is limited. Many educational science contributions argue normatively or exploratively without systematically linking to labour market data. The case study therefore serves only to illustrate structural requirements and cannot make any statements about the actual labour market performance of graduates (Schmohl et al., 2023; Portocarrero Ramos et al., 2025).

Fourthly, a global comparison of the results is only possible to a limited extent. Labour markets, education systems and institutional degree functions vary considerably between countries and regions. Even though international studies were consulted, the analysis necessarily abstracts from national peculiarities such as regulation, collective

bargaining structures or professional access restrictions. The patterns identified should therefore be understood as structural trends rather than universally valid statements (OECD, 2023). Fifthly, the study primarily considers academic, knowledge-intensive activities and deliberately excludes other forms of highly skilled work. Statements about the future of academic education cannot therefore be readily applied to all occupational groups or qualification levels (Autor et al., 2003; OECD, 2023). Finally, it should be noted that the functional reassessment of academic degrees in this study is based on an analytical separation of signal function, competence mapping, access rules and attribution of responsibility. This separation serves theoretical clarity, but only provides a simplified representation of real labour market decisions, as these are often influenced by multiple, sometimes informal criteria (OECD, 2023; Winner, 1978).

These limitations do not detract from the paper's claim to provide a coherent and evidence-based regulatory framework for the analysis of academic education in the AI age. At the same time, however, they highlight key starting points for further empirical research, particularly on the long-term development of competence profiles, income structures and institutional qualification regimes.

Declaration by Authors

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About the Author

Aileen Behrensmeier is a Human Resources professional with a Master of Science in Management and Organization Studies and several years of progressive experience in HR leadership, personnel management, and organizational development within the logistics and financial services sectors. She currently serves as Head of HR, where she is responsible for strategic workforce planning, leadership development, and the design of modern HR structures in a highly regulated and operational environment. In addition, she works as a Research Assistant at the GrandEdu Research School, where she is involved in applied research at the intersection of human resource management, organizational development, and artificial intelligence. Her research focus includes the use of AI-driven tools in HR processes, such as data-supported decision-making, workforce analytics, and the responsible integration of AI into people management and organizational governance. By combining strong academic training with hands-on leadership experience, she contributes both practical and research-based perspectives to the development of future-oriented HR and management practices. https://orcid.org/0009-0009-6864-9133

Dr. Tobias Oberdieck is Managing Director of GrandEdu GmbH, a leading further education institution that specialises in preparing professionals for degrees such as the Bachelor Professional, Master Professional and Master of Business Administration [MBA]. In his role at GrandEdu, he drives innovative educational strategies to actively support the recruitment of skilled labour in Germany. During his doctorate, Dr. Oberdieck worked as a research assistant at the Department of Business Administration and Economics at the Niederrhein University of Applied Sciences in Germany. During this time, he deepened his expertise in the areas of education management, labour market research and economic education models, which he now brings to his work at GrandEdu. His research focuses on the interface between continuing vocational training, academic education and the

challenges of the modern labour market. https://orcid.org/0009-0002-2017-4991

Enrico Moch holds a doctorate in economics and teaches as a lecturer at various universities, including the DHBW Ravensburg and as an assistant professor at the IIC University of Technology. As Academic Director of the GrandEdu Research School in Germany, he combines academic excellence with practice-oriented teaching. His research interests include the Austrian School of Economics, AI governance, technical data protection and the institutional governance of digital platforms. Dr Moch publishes regularly in specialist journals, is involved in interdisciplinary book projects and runs the podcast "GrandEdu Research School - On the trail of the economy". He is also actively involved in academic peer review and is committed to the transfer of knowledge between research and practice in order to provide long-term support for current economic and social issues. https://orcid.org/0009-0005-4722-0961

Dr. Peter Schlecht is Managing Director of GrandEdu GmbH, a leading continuing education institution that specialises in preparing professionals for degrees such as the Bachelor Professional, Master Professional and Master of Business Administration (MBA). In his role at GrandEdu, he is committed to developing innovative educational strategies that bridge the gap between vocational and academic education and contribute to the sustainable qualification of skilled workers in Germany. During his doctorate, Dr. Schlecht worked as a research assistant at the Department of Economics at the Niederrhein University of Applied Sciences. His research focused on the intersection of tax law, financial education and labour market policy, which today shapes his strategic work at GrandEdu. https://orcid.org/0009-0002-5371-750X

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