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Digitalisation in legal science and education: Merits, challenges, prospects

Digitalizācija tiesību zinātnē un juridiskajā izglītībā: ieguvumi, izaicinājumi, perspektīvas

KEYWORDS:

digitalisation in legal science and legal education, the impact of word processing, e-mail, internet, videoconferencing and social media on legal science and education, clouds, deficiencies of e-learning platforms, general and specific software in legal research and writing, the potential of smartphone use in legal education, artificial intelligence in legal research and writing (AI hallucinating, political AI manipulation, AI use by students to improve, not replace their own academic work, AI training)

ATSLĒGVĀRDI:

digitalizācija tiesību zinātnē un juridiskajā izglītībā, teksta apstrādes, e-pasta, interneta, videokonferenču un sociālo mediju ietekme uz tiesību zinātni un juridisko izglītību, mākoņdatošana, e-mācību platformu trūkumi, vispārīgā un specializētā programmatūra juridiskajos pētījumos un juridisko tekstu sagatavošanā, viedtālruņu izmantošanas potenciāls juridiskajā izglītībā, mākslīgais intelekts juridiskajos pētījumos un juridisko tekstu sagatavošanā (MI halucinācijas, MI politiskā manipulācija, MI izmantošana studentu darbā pašu akadēmiskā darba uzlabošanai, nevis aizstāšanai, MI apmācība)

Digitalisation has influenced legal science and legal education, as most other scientific disciplines, since the middle of the 1980s. Since then, personal computers and information technology have been used broadly. They have continuously and profoundly changed the way of academic research, writing and teaching. Professor Jānis Lazdiņš, whom we honour today with this Liber Amicorum, has witnessed this process throughout his career.

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Most – but not all – changes brought by digitalisation were for the better. Today, we are facing new prospects but also challenges, caused by the emergence of artificial intelligence (AI). Reason enough to take a critical look on what has and has not been achieved and which "achievements" may not be so beneficial. The following comments are written from the perspective of a law lecturer who looks back at almost four decades of legal research and teaching (and still remembers that there was life on this planet before the rise of social media). Comments from the perspective of students, young lecturers or the university management may be different.

1. 40 years of digitalisation in legal science and education: Have expectations been met?

1.1. Revolutionary progress, but mainly in the 1980s and 1990s

In the early days of digitalisation, when the term was still uncommon but personal computers were already broadly used, expectations were high, since this new high-tech device, with its great flexibility and openness to software applications of all kinds, opened up virtually unlimited possibilities. With regard to the many innovations actually brought over time, there can be no doubt that these expectations have been met – not completely but largely. However, the most profound revolution was not caused by the rise of social media or artificial intelligence, as the younger generation of "digital natives" may imagine, but already in the 1980s and 1990s.

a) Enhancing quality: The broad introduction of word processing, searchable databases and spreadsheets in the 1980s

The first revolutionary step was the broad introduction of word processing, searchable databases and spreadsheets in the 1980s. It opened options until then unavailable for students and even for the average university lecturer or researcher. Spreadsheets with computer-generated graphics that illustrated quantitative relations quickly became part of economists' daily work but remained less common in the field of law. Searchable databases, however, became an important tool for all scientific disciplines. Doctoral students in law often created large searchable *databases of court decisions and legal literature* for their doctoral theses, which enabled them to work faster and more thoroughly with a large number of sources than previously with index cards.

Word processing brought the greatest progress. It allowed *to correct and update texts again and again*, without retyping whole pages, enabling average authors to achieve a far higher quality of their papers. Older colleagues who still typed their student papers on typewriters appreciate this great convenience to this day. Lecturers also appreciated that course materials for large classes no longer needed to be retyped on a typewriter onto a printing matrix every year but could be updated and reprinted with little technical

effort. Word processing software developed quickly. *Essential functions for academic work*, such as footnote management, internal referencing and automatic generation of indexes and tables of contents, were already available from the second half of the 1980s.[2]

Making use of these new possibilities was not only an option but soon expected from every author. This led to a higher quality of academic publications, course materials and student papers: Publishers soon required perfected texts and students expected more, more elaborated and always up-to-date course materials of their lecturers. No way of using the materials from the last year again without revision! Lecturers in turn expected a more perfect finish of student papers. These developments demonstrated from the beginning that *digitalisation would not lead to less work but different work of the researcher, lecturer, or student*. Legal science and education benefitted from this.

b) Facilitating international academic cooperation: the broad introduction of e-mail in the 1990s

The broad introduction of electronic communication by e-mail in the second half of the 1990s marked another important step forward. It allowed for the first time an easy and free, fast, reliable and easily archivable communication over long distances and an easy transfer of large documents. While this also supported collaboration within the country, it particularly facilitated international academic cooperation, which had been slow, expensive and complicated before. Without the support by this means of communication, the Europeanisation and now also globalisation in the field of legal science would not have been possible.

c) Providing the infrastructure for a modern information society: The development of a browsable public internet in the 1990s

Another revolutionary step was the further development of the already existing internet into a browsable public internet by Tim Berners-Lee (who invented the World Wide Web), Netscape (who developed the first internet browser for a mass audience) and others in 1989 and the 1990s. The internet forms the technical infrastructure for a modern information society with an almost unlimited potential. It just must be used correctly. Legal researchers profited in particular from the easy access to information about the law and jurisprudence in other countries, which was previously difficult to obtain. The comparison of landmark decisions of supreme or constitutional courts on questions that arose

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2 Footnote management was introduced with Microsoft Word for DOS 2.0 in 1985, automatic index generation with Word for DOS 4.0 in 1987 and fully automatic generation of tables of contents with Word for DOS 5.0 in 1989. See on the history of Microsoft Word *Kurse, O., Rapp, C.* Word Processing Software: The Rise of MS Word. In: *Kruse, O., Rapp, C., Ansom, C. M.* et al. (eds.). Digital Writing Technologies in Higher Education, 2023. Available at: https://link.springer.com/content/pdf/10.1007/978-3-031-36033-6.pdf, p. 15 ff.

similarly in several countries became more common.[3] A crucial innovation was the introduction of *hyperlinks* that allowed to navigate quickly from one source to another source with related content and thus to combine various sources functionally to one block of information. Lecturers soon made extensive use of this option in their course materials.

At the end of the 1990s, an extensive range of sophisticated legal information became available on the internet, reaching its peak in the first half of the 2000s. It included professional, informative websites, often of scientific nature, of public institutions, governments, law courts, international organisations, professional organisations, civil society organisations, university institutes and individual legal experts. The most advanced example was for a long time the very comprehensive, factual and informative, multilingual website of the European Union. The offerings on the internet took many forms, ranging from legal texts, court decisions and explanations by public institutions to online books, journals and conference proceedings to a broad variety of online course materials and web projects of law lecturers. Constantly updated, edited link collections ensured easy access to the various sites. At that time, almost all content was still handmade, edited by humans, not machines.

With the rise of social media, e-learning platforms and bots, the *decline of the free internet* began. Official bodies still offer extensive public information. In some fields of law, e.g. international human rights law, there is still a wide range of high-quality materials available for free on the internet.[4] Nowadays there are also web repositories, such as JStOR[5], ResearchGate[6] or SSRN,[7] who offer free online access to a variety of articles in law journals. However, the scientific content of university institute websites has shrinked dramatically, the ecosystem of expert websites of legal scholars has largely disappeared,

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3 See, for example, the three symposia "Konstitucionālo tiesu prakse. Ceļā no suverenitātes uz integrāciju" [Constitutional Jurisprudence between Sovereignty and Integration] at the University of Latvia on 16.11.2007, 28.11.2008 and 11.12.2009, which examined and compared the positions of the constitutional courts of various EU member states on the constitutional problems raised by EU membership and later the Treaty of Lisbon. Available at: http://home.lu.lv/~tschmit1/Veranstaltungen/Simpozijs_16.11.2007.htm, /Simpozijs_28.11.2008.htm and /Simpozijs_11.12.2009.htm. Scientific work at such conferences has been facilitated considerably by the internet.

4 See the links at *Schmitz*, *T.* International Human Rights Law (course website), Semester 1, 2022/23. Available at: www.thomas-schmitz-yogyakarta.id/Courses/International_Human_Rights_Law.htm. See in particular the abundance of materials at the website of the Office of the UNHCHR. Available at: www.ohchr.org/en/instruments-and-mechanisms/international-human-rights-law.

5 www.jstor.org.

6 www.researchgate.net.

7 www.ssrn.com/index.cfm/en.

course materials of lecturers are now buried in e-learning platforms with restricted access, online journals hide behind paywalls and legal information by civil society organisations is increasingly taking on the character of political campaigns. Moreover, today's internet is flooded with disinformation. Fake news, propaganda media and large-scale disinformation campaigns by state actors (esp. Russia) and private stakeholders (e.g. corona sceptics, fossil fuel lobby) undermine the trust in public information.[8] Besides, much content is nowadays generated automatically by bots or artificial intelligence and therefore cannot be trusted.[9] In 2025, the internet is a *mere shadow of its former self*. Meanwhile, the technical infrastructure is still there. The internet could be restored at any time as the backbone of a modern information society, and the remarkable progress achieved 25 years ago but since lost could be regained.

d) Allowing a new kind of legal interpretation: The broad appearance of searchable large legal documents in the 1990s

Digitalisation also brought the electronic dissemination of legal texts. In the late 1990s it became common practice to publish laws and court rulings as pdf or html files on the internet. The Portable Document Format made it easy to combine even texts of several hundred pages, such as the national civil code or the EU Treaties, into one single, electronically searchable file. This did not only allow to quickly find the relevant text passage via keywords, but also to examine which terms and formulations were *not* used *anywhere* in the text. If the wording of the entire law avoids certain terms and phrases, this may be decisive for its interpretation. So the function to search the text of the law electronically allowed a new kind of legal interpretation that before was practically impossible for extensive legal texts: a *negative grammatical (literal) interpretation* of the law.

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8 Climate disinformation has become such a threat that the United Nations, UNESCO, UNDP and the European Union counter with anti-disinformation campaigns, see *United Nations*. Global Initiative for Information Integrity on Climate Change, last updated 2025. Available at: www.un.org/en/climatechange/information-integrity; *UNESCO.* Global Initiative for Information Integrity on Climate Change, last updated 2025. Available at: www.unesco.org/en/information-integrity-climate-change; *UNDP.* What are climate misinformation and disinformation and how can we tackle them? 01.05.2025. Available at: https://climatepromise.undp.org/news-and-stories/what-are-climate-misinformation-and-disinformation-and-how-can-we-tackle-them; *European Commission*. Climate disinformation, last updated 2025. Available at: https://climate.ec.europa.eu/eu-action/climate-disinformation_en.

9 Conspiracy theorists whisper about a "dead internet", because much of it is not made anymore by living beings. According to *Altman, A.*, chief executive of OpenAI, who created ChatGPT, there is some truth in this, cf. *Griffin, A.*, ChatGPT boss suggests the "dead internet theory" might be correct, Independent 05.09.2025. Available at: www.independent.co.uk/tech/dead-internet-theory-sam-altman-chatgpt-openai-llm-reddit-b2820617.html.

Example: During the debate about a European Constitution in the 1990s, the author of this article wanted to determine whether the EU Treaties themselves classified themselves as a constitution. They did not bear the title "constitution", but this also applied to some national constitutions, such as the German "Basic Law". A thorough search of the texts of all EU Treaties and Protocols revealed that their wording contained no indication whatsoever that they understood themselves as a constitution. Fomulations such as "constitutional" were only used with regard to the constitutions of the member states but never for the Treaties themselves. In contrast, the German Basic Law provides for a "Federal Constitutional Court", talks about the "constitutional order" and uses the formulation "constitutional" 73 times. The result of this negative grammatical (literal) interpretation was that the EU Treaties themselves did not want to be seen as a constitution.[10] This clear statement would not have been possible if the hundreds of pages of text had not been electronically searchable.

e) Enabling synchronous teaching and debate from a distance: The broad introduction of video conferencing in 2019

The last major advance occured in the wake of the COVID-19 pandemic: the broad introduction of video conferences with large groups of participants. Video conferences had already existed for a while, but in the early days of the pandemic, the software was once more refined, simplified, better prepared for a large number of participants with mostly simple hardware, and opened to everyone. The tools allowed easy multidirectional communication, sharing of presentations and exchange of files. Some only required a simple internet connection via smartphone from the countryside. The most widely used, reliable and easiest to use tool to date is *Zoom*.

The benefits of these tools to legal science and education cannot be overestimated. Universities heavily relied on them. In a worldwide emergency situation, they allowed to continue synchronous academic teaching and even scientific conferences with live presentations and discussions without physical meetings. Had the pandemic broken out 20 years earlier, academic life would have collapsed.

However, video meetings remain *a stopgap solution* that cannot completely replace physical encounters. They are like food from the microwave: You can eat it but it tastes boring. During video lectures, most students switch off their cameras, often due to a weak internet connection. The lecturer receives little feedback and feels like talking to a brick wall. This is certainly less effective than classroom teaching. At online conferences, he may well present his lecture, but the discussion afterwards will be less vivid than at a physical conference. Many participants will be more reserved because the online

10 See on the missing self-identifying as a constitution *Schmitz, T.* Integration in der Supranationalen Union [Integration in the Supranational Union], 2001, p. 468 f.

meeting is recorded. Moreover, there is no networking, because the shared meals and coffee breaks are missing. The most interesting discussions at a conference often occur during the breaks because some participants are too shy to speak in the plenary or there was not enough time. Conferences do not only have a scientific but also a social dimension, which serves their scientific function but cannot be generated or replaced by a virtual meeting. For this reason, *online lectures should be limited to exceptional cases* where traveling to the venue is out of question. They are not appropriate to extend the range of busy speakers but welcome to enrich a course with a guest lecture from another continent.

1.2. Progress or challenge? The rise of social media

The rise of social media in the 2000s and 2010s has had a profound impact on the academic world, even though social media never became an important scientific source or forum. It has altered the common ways of communication and information and marginalised the print media and the classical internet. Today, most students rarely read books or journals or visit traditional websites but obtain their information primarily from social media. This affects their studies, as they become too accustomed to a convenient but primitive, easy-to-consume medium and are less willing to engage with demanding scientific texts.

Posting on social media follows – not always but usually – the opposite approach of scientific writing: Spontaneous posts of short and superficial but attention-grabbing texts instead of sound preparation of comprehensive and profound but soberly written articles. Emotion instead of reflection, opinions instead of arguments, assumptions instead of facts, simplification instead of differentiation, self-promotion and propaganda instead of search for truth. Moreover, for the last ten years, social media have been dominated even more than other parts of the internet by fake news, disinformation campaigns, hate posts, cyberbullying and -intimidation, the covert use of social bots that feign personal communication and other destructive phenomena that undermine trust, polarise society and obstruct a rational, fact-based and differentiated public discourse, as it is necessary not only for science but also for democracy.[11] In 2025, democracy is in most countries in imminent danger: If it does not soon put an end to social media misuse, social media misuse will soon end democracy.[12] Science and academic education are endangered too

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11 *Schmitz, T.* New Threats for Democracy in the Era of Digitalisation, conference lecture at the 2nd International Conference for Democracy and National Resilience, Surakarta 2022. Available at: www.thomas-schmitz-yogyakarta.id/Downloads/Schmitz_Democracy-in-Era-of-Digitalisation_Indonesia2022-23.pdf, p. 1 f.

12 *Schmitz, T.* Restoring and Preserving an Undistorted, Open and Rational Broad Public Discourse as a Precondition for Reclaiming Democratic Lawmaking, conference lecture at the 5th International Conference for Democracy and National Resilience, Surakarta 2025. Available at: www.thomas-schmitz-yogyakarta.id/Downloads/

by the *high degree of disinformation, emotionalisation and irrationalisation* brought into the public debate. Social media stand for a *shift from the early expert internet* as a reliable source of information *to the bullshit internet* of the 21st century that makes it more and more difficult for students and young researchers to extract reliable information and to find truly scientific forums with genuinely scientific debates.

1.3. Progress or abuse of power by providers? The forced use of clouds

The common practice of software and platform providers to push or even force academic users to store their data in their clouds must also be viewed critically. Cloud usage was originally just an option but is nowadays usually preconfigured as default setting. Opting out is made difficult and often overridden by software updates, even in standard software such as Microsoft Office, where there is little reason to use a cloud.

Cloud usage makes working with different devices slightly easier, but there are significant disadvantages: inadequate data protection, especially if the cloud servers are located in the USA (a problem for legal practitioners), a waste of energy and internet traffic that contributes to climate change, the risk of being hacked (in the cloud or on the way there), the dependence on an external company (who may follow orders of Donald Trump) and frequent slowdowns in the daily work process, due to cloud server overload or insufficient internet connections. A lecturer needs to be patient at the end of the semester when he enters the exam results of his course participants and uploads his exam assessment reports to his cloud-based e-learning platform, since many lecturers worldwide are doing the same at the same time and the e-learning platform's cloud servers or their internet connections are not designed to handle so many processes simultaneously. Is this really progress? The European Union should pass a regulation that obliges providers to allow users to use their product offline as preconfigured standard configuration.

1.4. Progress or annoyance? The rise of half-baked e-learning platforms at universities

The rise of half-baked e-learning platforms and the way they are used at universities are also questionable. After decades of development, most e-learning platforms are still user-unfriendly: *ugly, complicated, confusing, unergonomic and slow* in operation. Why? Are the needs of lecturers and students in the higher education process less important than those of the administration?

A more serious problem lies in the *tendency* to use e-learning platforms *to patronise the students like school kids* instead of boosting their self-initiative, self-responsibility

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Schmitz_Restoring-Undistorted-Discourse_ICDNR2025.pdf, p. 4. Measures need to include in particular legally binding standards for social media algorythms and the introduction of strict liability (liability without fault) for social media providers.

and intellectual autonomy. Apparently, the platforms tempt lecturers into exercising excessive control and assigning too much homework and assignments. Some functions give rise to the suspicion that they were originally designed for schools, not universities.

The platforms sometimes cause unnecessary bureaucracy or fuel the *tendency to shift administrative tasks* that should be performed by the administrative staff *onto the lecturers*, who, consequently, have less time for the academic preparation of the course and the individual support of the students. For example, *lecture attendance must be monitored by the administration, not the lecturers!* The author of this article has worked at universities where this was the case and where it was not, and has observed a significant impact on the quality of the academic teaching. Requiring lecturers to enter manually the data of all students who were present and absent in each lecture, is a waste of the precious working time of highly qualified academics, which should be used for sophisticated scientific education, not simple administrative work.

The rise of e-learning platforms has caused a regrettable side-effect: the *loss of the many substantial expert websites* of committed law lecturers that were common in the early 2000s. These freely accessible websites were precious academic resources, with course materials, practical case-studies, links and other valuable information. Most lecturers closed them when the e-learning platforms developed. Nowadays they upload their course material to their university's platform where access is reserved to their course participants. Why? Has the quality of course materials become so bad that students from other courses or universities must not see them? The practice of the early 2000s, when students browsed the internet for materials of other lecturers and confronted their own lecturer with the perspectives of his colleagues for an interesting discourse, was more academic. Students should encourage their lecturers to resume the lost practice of operating own websites in the classical internet.

2. The need for better training of students, lecturers and researchers in the advanced use of the digital tools

2.1. More important than new digital tools and functions are better skills to master the existing ones

The software industry is constantly releasing new software or software versions with new features, to keep the business running. Users are tempted to chase after the latest developments, but for the average law student, law lecturer or researcher it is more important to master perfectly a range of advanced functions of classical software, especially Microsoft Office (or equivalent programs), which are crucial for academic writing. Most of them have already been introduced decades ago.

The present discussion about challenges and prospects of digitalisation in higher education focuses narrowly on the students' use of artificial intelligence, although *many*

students (in some countries even the majority) even *lack basic digital knowledge for academic work*, such as how to use the advanced functions of word processors for academic papers. Inconsistent formatting, e.g. differently formatted headlines of the same level or isolated headlines at the bottom of the page, proves that students do not know how to work with *templates*. *Tables of contents* that differ from the wording of the headlines in the main text or show wrong page numbers, as well as missing *indexes* and tables of jurisprudence or legislation, indicate that students are not familiar with the function to generate and update these important elements of academic papers automatically. Automatic *internal referencing* is also rare in student papers. Finally, most students never heard of the *outline view* in Microsoft Word and how to use it to design a larger paper or thesis. So much for the software expertise of the "digital natives". For a long time to come, these classical advanced software functions will be more important for legal writing than what ChatGPT has to offer. Are you sure that your students are familiar with them?

2.2. The need for two compulsory courses on the use of digital tools in legal research and writing

To ensure that future lawyers are familiar with the use of digital tools in academic work, two courses should be included as compulsory courses in the undergraduate program and as optional courses in the master study program. Both courses need to be updated frequently to keep up with the rapid developments in the sector.

a) Advanced use of general digital tools (including artificial intelligence)

Students need to learn the professional use of word processing, presentation, spreadsheet, database and pdf software, with a focus on their special functions for academic work, especially for the preparation and publication of large scientific papers and theses. This includes the word processor functions mentioned above but also guidelines how to design a complex scientific powerpoint presentation and how to avoid common flaws in such presentations. Students also need to learn the professional use of internet resources for scientific research, including the smart use of search machines, the management of large bookmark collections and tools and precautions to detect fakes. This must include a *special training in identifying reliable sources, disinformation and AI-generated contents* on the internet and distinguishing journalistic from scientific content. A big part or a separate course should be reserved to the *correct use of artificial intelligence in legal research and writing*, including the art of AI prompting – not to replace but to improve the student's own work.[13]

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13 See on this topic *Noack, S.* Artificial Intelligence in Science and Research – Leveraging Generative AI Tools, guest lecture at Universitas Gadjah Mada, 25.09.2025, presentation, materials and exercises. Available at: www.thomas-schmitz-yogyakarta.id/Events/Guest-lecture_Artificial-Intelligence-in-Science-and-Research.htm.

b) Introduction to legal software, databases, online resources and online forums

A second course needs to introduce to the special digital tools in the field of law. The overview of specific legal software may be brief because most legal software is targeted at legal practitioners and less important at university. Commercial legal databases, such as Beck-Online[14] or Westlaw[15], require more attention, since they allow easy access to jurisprudence and numerous legal publications and therefore are an important aid for any lawyer. Above all, the course must provide *orientation in the broad spectrum of public online resources*. This includes government platforms, court websites, websites of other public institutions and authorities, international organisations, research institutes, libraries and professional organisations, as well as online journals, working paper series, online book series, web repositories, blogs and individual expert websites. The course should also introduce moderated online forums where, unlike on social media, scientific discussions actually take place. All these online resources have become relevant for legal research in the era of digitalisation. Focusing lopsidedly on print resources, as in the past, is not appropriate anymore. On the other hand, online resources may even help to identify relevant print resources.[16] However, the course must teach a careful, critical approach, raising awareness of the fact that not all online resources that pretend to be scientific actually meet scientific standards. Dealing with internet content demands a better judgement regarding the quality of sources than consulting textbooks in the law library.

2.3. The need for continued IT education for all

Students in higher semesters, lecturers and researchers may be experienced in the use digital tools, but their knowledge and skills quickly become outdated. Therefore, law faculties should offer courses of continued IT education that are open to all. They need to introduce to new software features and new developments in the fields of commercial legal databases and public legal online resources, giving everyone the chance to keep up. In the coming years, new AI applications and AI features in established software and possibly new developments in video conferencing will be at the forefront. A repeat of the degrading developments seen in the early days of digitalisation, when older professors without computer skills depended heavily on the support of their staff, should be avoided.

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14 https://beck-online.de.

15 https://legal.thomsonreuters.com/en/westlaw.

16 See the list of helpful online resources at *Schmitz*, *T.* Information on legal literature in the internet, course material, Semester 1, 2025/26. Available at: www.thomas-schmitz-yogyakarta.id/Downloads/Schmitz_ScientStandards_diagram2.pdf. See in particular the Karlsruhe Virtual Catalogue, https://kvk.bibliothek.kit.edu, which allows an integrated search for law books in important national library catalogues throughout the world.

3. The limited range and low standard of legal software and databases

Although specific software, databases and online resources exist, the overall situation is unsatisfying, in law as in other disciplines. Digitalisation in higher education focuses too much on general software functions, even playful functions, but neglects the deeper connection to the scientific knowledge and methods in the respective discipline. The range of legal software is limited and the level of development is rather low; this may only change with the new tools based on artificial intelligence (see below, 4.). Most software is designed for legal practitioners in law firms, courts or public administration but not for the university. Legal databases frequently are not user-friendly or lack editorial support. They can be so expensive that only the Faculty but not the individuum can afford them and access is limited to certain computers in the law library and the departments.

In most countries, a complete and smart (annotated and interconnected) digital database of all laws and regulations at all levels that includes previous versions of the law, related international and European texts, jurisprudence and publications, is still missing. The existing government platforms provide the text of the prevailing law but little additional information or convenience. The same applies to the jurisprudence databases of many courts. This could be better! However, substantial progress will require *more work in terms of legal science and content* than in IT technology and a closer cooperation with highly qualified legal experts. This will make it expensive.

The ***potential of smartphone use*** is still waiting to be utilised in practice. With their large and brilliant displays, handy size and independent internet connection, smartphones are ideal for looking up brief information in daily life, even for students in the lectures. Smartphone apps designed for this function operate more smoothly and are more practical than looking up websites with an internet browser. Smartphones can also be used as a supplementary information tool alongside laptops or paper on the desk or in the classroom. Therefore, reference works, including compendiums of laws, law reports[17] and casebooks, legal glossaries and dictionaries, collections of examination schemes for legal case-solving[18] and didactic materials for students should not be offered on print media or as computer software only but also as smartphone apps. So far, this happens rarely. The market is there, it just needs to be exploited. It is remarkable that, even in 2025, most countries still lack comprehensive annotated compendiums of laws available for Android.

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17 See, for example, the Android app *Curia* of the European Court of Justice.

18 See, for example, the examination schemes allocated to individual legal provisions at the Android compendium of German laws *Gesetze.io*.

4. The premature and exaggerated hype about artificial intelligence

The launch of the AI chatbot ChatGPT in November 2022 has generated a great deal of hype. AI is on everyone's lips, also in legal science and education. Many students use it to write their course papers, lecturers to prepare their course materials and young researchers to facilitate their legal research and writing. In legal practice, attorneys use AI to prepare their submissions to the court, legal databases integrate AI modules[19] and there have already been signs that court rulings were written with support of AI.[20] This development contrasts with that of conventional legal software, but is not without its problems.

4.1. The question of AI legitimacy in legal science and education

Is it legitimate to use artificial intelligence in academic research, teaching and writing, and how? Most universities have not yet found a clear answer. They generally refrain from prohibiting what cannot be effectively prohibited; nevertheless, clear guidelines have not yet been adopted, or the existing guidelines remain unstable or focus only on student papers.

Using artificial intelligence in the academic world is not per se illegitimate. The scientific standard of thoroughness can even demand it for literature and jurisprudence research, to ensure that no relevant court ruling or publication is overlooked. However, if longer passages of *AI-generated text* are incorporated into one's own work, this *must be disclosed and properly documented*. This is a matter of scientific honesty and transparency and applies to lecture materials and articles no less than to student papers. It takes more than an abstract note at the end of the text stating that it was created with AI support: A *specific reference* in a footnote is required *for each text passage* taken from AI – no different than if it originates from another source. The reference must specify the AI tool and may in complex cases also report the used prompts. Copying AI-generated text without disclosing it would be plagiarism. For the classification as plagiarism it only matters whether the text is originally the work of the author or someone else; it is irrelevant whether this "someone else" is a human being or a machine.

Even legitimate AI use *diminishes the value of the work*, as anything retrieved from AI cannot be credited to the author. This will influence the grading of an exam paper

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19 See, for example, the AI modules *beck-chat* (chatbot), *beck-abstract* (summaries of court rulings) and *Frag den Schmidt* and *Frag den Küttner* (chat books) in Beck Online (Germany), *GenIA-L* of Lefebvre Dalloz (France), *AI-Assisted Research* at Westlaw Edge and Westlaw Advantage (USA) and *Allex* at Hukum Online (Indonesia).

20 First cases were already reported from Columbia in January 2023, see *Gutiérrez, J. D.* ChatGPT in Colombian Courts. Why we need to have a conversation about the digital literacy of the judiciary, Verfassungsblog 23.02.2023. Available at: https://verfassungsblog.de/colombian-chatgpt.

or the peer review of an article. The author must therefore ensure a sufficient amount of original own input. Furthermore, using AI does not release him from his *duty to verify carefully any information*, since he, not the AI, is responsible for any false facts stated in his paper.

4.2. The question of AI significance for legal science and education

What will be the general significance of artificial intelligence for legal science and education? Will it be a game changer? The experience of the last three years indicates that the hype is premature and exaggerated. With its almost immeasurable potential, AI will of course play one day a significant role in all fields of science and academic work. However, this will take time and require much more efforts than just a little bit of IT programming (see below, 4.7.). Scientific work, especially in the field of law, requires absolute reliability, accuracy, consistency and precision. Current AI solutions, in particular the dominating large language models (LLMs), which are primarily based on probability calculation but do not understand anything themselves, struggle with logical-analytical thinking and are unable to deeper reflection, cannot offer this. We need to wait for new kinds of AI models that have yet to be developed. It can therefore currently be assumed that AI will *not (yet) play a significant role* in legal science and education *in the close future*.

4.3. The problem of AI hallucination

The biggest obstacle to a significant role in science is AI "hallucination". AI chatbots often present false facts that they have invented.[21] The user can reduce the risk slightly through sophisticated prompting,[22] but cannot eliminate it.[23]

The hallucination can be difficult to detect, because the presented facts are plausible in the given context, and the confident manner and perfect elegance, with which

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21 See on this problem in the field of law *Magesh, V., Surani, F., Dahl, M.* et al. Hallucination-Free? Assessing the Reliability of Leading AI Legal Research Tools. Journal of Empirical Legal Studies, 22, 2025, p. 216 ff. https://doi.org/10.1111/jels.12413. In a study of the *European Broadcasting Union* (ed.). News Integrity in AI Assistants. An international PSMstudy, 10.2025. Available at: www.ebu.ch/Report/MIS-BBC/NI_AI_2025.pdf, p. 9, 45 per cent of the examined AI responses claimed false facts or had other significant issues of misleading the user.

22 Especially Chain-of-Thought prompting, see the presentation of *Noack, S.* (note 13), p. 20.

23 Apparently, all attempts to reduce the phenomenon significantly have so far not been successful, cf. *Magesh, V., Surani, F., Dahl, M.* et al. (note 21), p. 216 (224 ff.).

the language-skilled AI chatbots express themselves, make them appear credible.[24] The story they present has never happened but could well have happened. The Supreme Court judgement they cite does not exist, but its citation is formally perfect and a judgement like this could well exist. Large language models are good at presenting plausible fake facts, as it is in their very nature to calculate, based on probabilities, what the facts would likely look like if they existed. It is therefore not surprising that the problem is particularly acute in the field of law: Chatbots apparently love to *invent fake court decisions*.[25] Experience shows that they may even present several fake court rulings in one single response. In addition, they may cite real court decisions that are vaguely related to the topic but do not make the alleged statement.

As long as AI risks to hallucinate, even if only exceptionally, its benefits for legal science and education are very limited. The lawyer can still use it for research, but not as a genuine instrument for serious scientific research but rather as a *practical tool for a quick and inspiring initial browsing*. This is still useful. However, the *user must never rely on AI* but personally check conscientiously every single piece of information it provides. He saves time on conventional research but loses time on the tedious and often confusing task of filtering out false information.

A student will inevitably fail the exam if in his course paper a single reference is hallucinated. A lecturer may damage, a researcher even destroy his career. An attorney could face investigation for attempted fraud in obtaining a judgement, a judge for perversion of justice. Any tolerance of this phenomenon would quickly undermine the basis for science and trustful cooperation and in the long term the trust in the rule of law. Damage has already occurred: In spring 2023, there has been a *spectacular case of a lawyer in trouble* in the USA after presenting court filings prepared with the help of ChatGTP that cited 6 fake precedent cases.[26] In spring 2025, the High Court of Justice in the United Kingdom urged senior lawyers to take urgent action to prevent AI misuse

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24 A simple prima facie check can help: Assign the same task to several AI chatbots or several times but differently formulated to the same chatbot and compare the answers. If the information is inconsistent, caution is advised.

25 See, instead of many, *Merken, S.* AI 'hallucinations' in court papers spell trouble for lawyers, Reuters 19.02.2025. Available at: www.reuters.com/technology/artificial-intelligence/ai-hallucinations-court-papers-spell-trouble-lawyers-2025-02-18; *Munir, B., Zubair Abbasi, M., Blake Wilson, W., Colombo, A.* Hallucinations in Legal Practice: A Comparative Case Law Analysis. International Journal of Law, Ethics, and Technology, 5, 2025, p. 85 (91 ff.). Available at: https://ijlet.org/wp-content/uploads/2025/07/Vol-2025-No-2-Final-f.pdf.

26 Cf. *Brodkin, J.* Lawyer cited 6 fake cases made up by ChatGPT; judge calls it "unprecedented". Judge weighs punishment for lawyer who didn't bother to verify ChatGPT output. Ars Technica 30.05.2023. Available at: https://arstechnica.com/tech-policy/2023/05/lawyer-cited-6-fake-cases-made-up-by-chatgpt-judge-calls-it-unprecedented.

after dozens of fake case-law citations were put before the courts that were either completely fictitious or contained made-up passages.[27] In autumn 2025, AI-generated fake citations in the court orders of two US federal judges prompted inquiries by the US Senate Judiciary Committee.[28] Meanwhile, an American researcher has created a database of 494 cases worldwide.[29] Will legal science and practice soon be at the brink of decline due to naive use of AI?

4.4. The problem of political AI manipulation

Another reliability problem lies in the risk of political manipulation. AI chatbots can be deliberately programmed or trained to present sensitive facts and the spectrum of theories and positions in public debates in a distorted manner. In January 2025, the new Chinese chatbot *Deepseek* failed to inform about the Tiananmen Square massacre 1989 and declared indisputable Chinese sovereignty over the disputed islands in the South China Sea.[30] In summer 2025, chatbot *Grok* was repeatedly "revised", until its research results were in line with the political opinions of Elon Musk.[31] Since several tech oligarchs working in the field of AI are driven by the anti-democratic ideology of right-wing-libertarianism, more cases, also of chatbots trying to "direct" the user in a more subtle way, may follow.

General AI chatbots that are trained on the entire internet can also be manipulated by the materials found there. Some actors, especially Russia, have established media portals that are likely designed to manipulate AI models rather than to generate human traffic. This strategy works. In March 2025, an audit revealed that Western AI chatbots

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27 Cf. The Guardian. High court tells UK lawyers to stop misuse of AI after fake case-law citations, 06.06.2025. Available at: www.theguardian.com/technology/2025/jun/06/high-court-tells-uk-lawyers-to-urgently-stop-misuse-of-ai-in-legal-work.

28 *Wu, D.* Federal judges using AI filed court orders with false quotes, fake names, in: *The Washington Post* 29.10.2025. Available at: www.washingtonpost.com/nation/2025/10/29/federal-judges-ai-court-orders.

29 *Charlotin, D.* AI Hallucination Cases. Available at: www.damiencharlotin.com/hallucinations, last updated 01.11.2025.

30 See the report: *Lu, D.* We tried out DeepSeek. It worked well, until we asked it about Tiananmen Square and Taiwan. The Guardian 28.01.2025. Available at: www.theguardian.com/technology/2025/jan/28/we-tried-out-deepseek-it-works-well-until-we-asked-it-about-tiananmen-square-and-taiwan.

31 Cf. *Thompson, S. A., Mondría Terol, T., Conger, K., Freedman, D.* How Elon Musk Is Remaking Grok in His Image. New York Times, 02.09.2025. Available at: www.nytimes.com/2025/09/02/technology/elon-musk-grok-conservative-chatbot.html.

were already repeating Russian propaganda at scale.[32] Pseudo-scientific disinformation portals will probably follow. It is only a question of time until AI will present research results based on fake scientific publications by allegedly Western authors that propagate that Finland and the Baltic states legally always remained a part of Russia and a military reoccupation would not be a violation of public international law but just an internal Russian affair. However, this problem can be avoided by only using specific legal AI tools that have been trained on carefully selected, reliable training materials.

4.5. AI's impact on students' work

Some fears – or hopes – associated with the rise of artificial intelligence have quickly proven unrealistic. AI will in the long term *rather increase than ease the burden on the students*, since they must learn to *master both, working with and without AI*. They must learn to work with it because they will need to use it in the future in their daily work. Employers will expect them to cope with a heavier workload in a shorter period of time, since they may use AI tools to facilitate their work. But they must also learn to work without it, because *AI can only assist but not replace* their own performance and they must still be the master of the process, able to plan, direct, verify and, where necessary, correct each step of the AI's work. For many years to come, in some areas forever, AI will not be able to do the lawyer's work without thorough human supervision. This is good news because it means that even in the era of artificial intelligence qualified lawyers will still find a decent job.

Students still need to *learn to write academic papers without AI*, so that they are able to perform all research and reading, designing and structuring, scientific formulating and citing themselves. This will allow them to take on responsibilities and ensure that they still will be needed later in their career. The present tendency that many students do not want to use the law library anymore but prefer to retrieve fast information from the internet, cannot be the future of legal education. Universities must find a way to test the classical skills in the exams.

Universities face the challenge of students misusing the new technology to have their entire exam papers written for them.[33] A serious challenge, but not necessarily in

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32 *Sadeghi, M., Blachez, U.* A well-funded Moscow-based global "news" network has infected Western artificial intelligence tools worldwide with Russian propaganda. NewsGuard's Reality Check 06.03.2025. Available at: www.newsguardrealitycheck.com/p/a-well-funded-moscow-based-global. See also (more recently) Institute for Strategic Dialogue. Talking Points: When chatbots surface Russian state media, digital dispatches. Blog. 27.10.2025. Available at: www.isdglobal.org/digital_dispatches/talking-points-when-chatbots-surface-russian-state-media.

33 See on this topic *Ajevski, M., Barker, K., Gilbert, A.* et al. ChatGPT and the future of legal education and practice. The Law Teacher, 57 2023. https://doi.org/10.1080/03069400.2023.2207426, p. 352 (360 ff.): "Cheating tool or teaching tool?"

legal education: In the near future, *artificial intelligence will not be able to write legal papers without an attentive lecturer being able to notice it*. AI-written texts do not provide accurate and precise, correctly and uniformly formulated references to the source of every single information given in the paper, as it is required by the standards of scientific citing.[34] Without a considerable own input of the student, they will suffer from serious deficits in the referencing. Moreover, AI-written texts are usually not strictly logical but rather associative in structure, more like journalistic than scientific articles, not meeting the standards of scientific structuring.[35] AI also formulates in a style too vague and flowery for legal writing. An experienced user may instruct it in a way that these problems are reduced,[36] but this requires so much work with the AI that the workload is not much different from writing the paper himself. Besides, he cannot avoid the serious problem of AI hallucination.[37]

Nevertheless, AI can still be a *valuable tool in the writing process*.[38] Besides its role in the research process, it can provide *helpful inspiration* to the students on how to design, formulate or optimise their paper. Students may ask AI to critically analyse their paper and *propose improvements*. In this way, they may attain a more scholarly style of writing, correct citations in their footnotes, or identify the most appropriate formulations in a foreign language. They can even ask AI to perform a complete *linguistic review* of their text. Using AI for this purpose is legitimate. However, as with all new IT technologies, the arrival of this new option has two sides: The lecturer must take into account in the grading that it exists. So, in the future, students *must* make use of AI, not to write but to improve the quality of their paper, and those who do not do so will face the risk of a lower grade.

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34 See on these standards *Schmitz, T.* A quick guide how to avoid common shortcomings in legal publications, course material, Yogyakarta, Semester 1, 2025/26. Available at: www.thomas-schmitz-yogyakarta.id/Downloads/Schmitz_ScientStandards_quickguide-avoid-shortcomings.pdf, p. 6 ff.

35 See on these standards *Schmitz, T.* (note 34), p. 2 f.

36 See on such ways the presentation of *Noack, S.* (note 13), parts 2 and 3.

37 For this reason, the phenomenon of AI-generated *fake research papers*, which is haunting other scientific disciplines, will not become a serious challenge in legal science: They are too easy to detect. See on this phenomenon *Hilgendorf, E.* Künstliche Intelligenz, Papiermühlen und "fake research papers". Neue Formen der Wissenschaftskriminalität in strafrechtlicher Perspektive [Artificial intelligence, paper mills and fake research papers. New forms of scientific crime from a criminal law perspective]. In: *Löwisch, M., Würtenberger, T., Geis, M.-E., Heckmann, D.* (eds.). Künstliche Intelligenz in Forschung, Lehre und Hochschule [Artificial Intelligence in Research, Teaching and Higher Education], 2025, p. 259 ff.

38 Emphasised by *Ajevski, M., Barker, K., Gilbert, A.* et al. (note 33), p. 352 (360).

4.6. AI's impact on the lecturer's work

Concerning the law lecturer's workload, AI will provide helpful assistance but not take over his work. It may carry out administrative work (entering grades in the e-learning platform, filling in forms, drafting reports etc.), preparatory work (browsing the law, searching databases for relevant legal literature or jurisprudence, compiling and structuring information etc.) and some supporting finishing work (formatting text, translating materials, drafting summaries etc.), but it cannot perform the genuine work of the lecturer. AI cannot create autonomously course materials in the field of law, since the risk of "hallucinated" or politically manipulated information would be too high. AI will also *not* be *able to design or correct academic exams*, at least not if this task is taken seriously. AI could of course be employed to automatically draft and correct multiple-choice tests, but the use of such tests in a legal examination would be poor academic practice and cast doubt on the quality of the university.

4.7. The dependence of the AI's quality on the quality of its training

Based on the experience of the last three years, it appears that the future of artificial intelligence in science will not lie in the presently dominant general AI solutions, such as the Large Language Models (LLM), but in specialised AI solutions tailored to specific tasks in the individual scientific disciplines. *General AI chatbots* trained on the quasi-entirety of the internet may be *unsuitable* for academic work or education: How can you expect an unbiased, scientific outcome if you train your AI on the present bullshit internet full of propaganda, fake news, conspiracy theories, hate speech, lobbyism, racism and sexism? Moreover, who would want to trust an AI chatbot controlled by Elon Musk or Mark Zuckerberg?

The quality of AI solutions in science will depend less on high-tech hardware and software than on the quality of the AI's training and the used training material. It is *decisive that* this *training material is of untainted scientific quality, credible, comprehensive and* always *up-to-date*, since artificial intelligence can only be as good as the information it is based on. This may be a bigger problem for legal science than for other scientific disciplines, given that the digital media are full of distortions, misunderstandings, propaganda and disinformation about the law. Moreover, a continuous, close and organised, maybe even institutionalised cooperation between IT experts and legal scholars and practitioners will be necessary.

In most areas of law, only a small number of highly specialised legal scholars and experienced legal practitioners are qualified to compile the training material appropriately. They need to be recruted for a longer mission and pooled in large think tanks. A major challenge will be to *filter out disinformative, manipulative and other misleading resources without falling into censorship*. In some areas of law, the question will arise as to what extent the jurisprudence of the middle and lower courts should be included in the training material. It may also be considered to accompany the process by a broad

public scientific discourse, to ensure quality, completeness and transparency. All this will make specialised legal AI solutions valuable but their development lengthy and costly. For this reason as well, artificial intelligence is unlikely to revolutionise legal science and education in the coming years. However, the process has already started and the first genuine legal AI solutions are on the market. Understandably, access is expensive and they are primarily aimed at legal practitioners, especially law firms, than scholars and students as target group.

KOPSAVILKUMS

Rakstā sniegtas tiesību docētāja, kurš jau no paša sākuma piedalījies digitalizācijas procesos tiesību zinātnē un juridiskajā izglītībā, kritiskas pārdomas par to, kas ir un kas nav sasniegts četros digitalizācijas gadu desmitos, kā arī par tiem "sasniegumiem", kuru ieguvums var būt apšaubāms. Vai augstās cerības ir piepildītas, un, ja tā, – kad un kur? Vai sociālo mediju uzplaukums ir bijis progress vai izaicinājums, un kādēļ tas mūsdienās ir kļuvis par apdraudējumu? Kā vērtējama bieži vien piespiedu mākoņdatošanas un e-mācību platformu izmantošana?

Runājot par studentu prasmēm informācijas tehnoloģiju izmantošanā, svarīgāk par pastāvīgu jaunu digitālo rīku un funkciju ieviešanu ir jau esošo rīku pilnvērtīga apgūšana, jo īpaši teksta apstrādes programmu paplašināto funkciju pārzināšana. Juridiskajām fakultātēm studiju programmās būtu jāiekļauj divi obligāti kursi par digitālo rīku vispārīgu un specializētu izmantošanu juridiskajos pētījumos un juridisko tekstu sagatavošanā. Rakstā arī norādīts uz joprojām pastāvošajiem trūkumiem specializētajā juridiskajā programmatūrā, datubāzēs un tiešsaistes resursos. Piemēram, viedtālruņu potenciāls nopietnam zinātniskam darbam, nevis vienkāršai izklaidei, joprojām gaida savu īstenošanu.

Netrūkst arī kritiska skatījuma uz mākslīgā intelekta ažiotāžu. Mākslīgajam intelektam neapšaubāmi būs nozīmīga loma juridiskajos pētījumos un juridisko tekstu sagatavošanā, taču ne tuvākajā nākotnē un citādā veidā, nekā tas bieži tiek gaidīts. Tā izmantošanu apgrūtina mākslīgā intelekta "halucināciju" un politiskās manipulācijas problēmas. Mākslīgā intelekta izplatība drīzāk palielinās, nevis samazinās studentu slodzi, kā arī tas palīdzēs, tomēr neaizstās docētāja darbu. Izšķiroša nozīme mākslīgā intelekta izmantošanā tiesību zinātnē un juridiskajā izglītībā ir tā apmācības integritātei, neitralitātei un kvalitātei.