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Humanism in Chiropractic education and our embrace of AI

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Narrative: Generative artificial intelligence (AI) is reshaping educational practice, presenting opportunities and risks for Chiropractic educators, learners, and researchers. This narrative commentary examines how AI can support Chiropractic education while preserving human authorship, professional judgement, and ethical responsibility. It proposes augmented intelligence as a preferable conceptual framework to technological substitution, positioning AI as a collaborator and learning assistant.

Practical applications include literature summaries, formative quizzes, personalised tutoring, virtual patient encounters, writing refinement, and educational image generation. These applications require verification of factual claims, citations, and clinical interpretations, alongside attention to bias, privacy, copyright, and transparent disclosure. The paper advocates a transition from competency-focused education towards capability development, emphasising disciplinary reasoning, critical thinking, communication, empathy, and ethical decision-making.

Assessment should combine secure demonstrations of individual achievement with opportunities to develop responsible AI-supported workflows. Chiropractic institutions are encouraged to embed AI literacy and explicit boundaries between assistance and substitution.

Effective integration depends on informed educators who retain accountability and exercise human judgement, using AI to strengthen rather than replace meaningful learning and patient-centred care.

Indexing Terms: Chiropractic; education; Gen AI; curriculum; assessment.

Introduction

'*Artificial Intelligence, deep learning, machine learning, whatever you're doing if you don't understand it, learn it. Because otherwise, you're going to be a dinosaur within 3 years*' (1)

Mark Cuban, 2017

American businessman

Entrepreneur, Television personality

The biggest danger with AI is not what it produces; the danger lies in the user who accepts it and thinks that what it produces is gospel, worse, they never bother to check. I write from the perspective of an educator where our main interest lies in what is written, either for us by learners or by us for educative purposes.

> *... Your judgement 'engine' is what AI will amplify. If your judgement is poor it will amplify you into mediocrity; should your judgement be astute, AI will amplify you into excellence ...'*

If you take nothing else from this paper, it must be that:



> You are responsible for every statement or inference made by an AI agent and used by you in your name. You must always edit, proof, and verify every sentence you have AI construct on your behalf. Where data is cited you must read and verify the source and the authors. AI agents are known to hallucinate.

This paper addresses a topic which is far bigger than me, and as with most readers I am still wrestling with this new beast we erroneously call Artificial Intelligence. My preferred term is Augmented Intelligence, notwithstanding President Trump deciding to rename AI as Superior Intelligence. My hope it that by the time we reach my conclusion you too will agree that AI is best considered as Augmented Intelligence. I will hopefully reach a destination where AI is seen as a companion and assistant for you, not as a replacement of you.

> It has been said that AI replaces tasks, not people, so you would be wise to look now at the tasks you are doing, appreciating that AI will do most of them better than you; then ask, how can you move more towards validating your role in your organisation?

Be selective in how you use AI

I have seen too many colleagues embarrass themselves publishing phrases they have generated with an AI agent but failed to check for truth, accuracy, and common sense. It is disappointing for someone who is not an academic and with no years of 'classroom' experience to use AI to 'write a book' on education for them. This is not meant to be funny as it is my real-world experience which cost me a friendship. I found it intolerable as the output was blatantly imaginative with no substance, an insult to those of us who have built an experience with stories to tell and anecdotes to enrich.

Rather than jumping onto a smart phone and speaking your input into an AI agent, you really should start with the bare minimum of some tutorials on YouTube and hopefully work up to taking a short course of some classes on how to structure your prompts and refine the outputs.

This paper has been written by me in my capacity as a human author with scant use of any AI agent. I did use Manus, my AI agent of choice and below I asked Manus to '*explain why people are afraid of AI and how you think AI can best be used by writers*'. This use seems reasonable given I have declared it. I think it is somewhat ironic to ask an AI agent to explain itself. Here is the response from Manus, lightly edited for reasons of presentation and formatting.

> ME - PROMPT: please explain why people are afraid of AI and how you think AI can best be used by writers.
>
> MANUS - 'People are afraid of AI for several understandable reasons:
>
> i) *Loss of work and status*: Writers, artists, and other professionals worry that organisations will use AI to replace paid human labor or reduce creative work to a cheap commodity;
>
> ii) *Loss of control*: AI systems can behave unpredictably, while decisions about how they are developed and deployed are often made by a small number of powerful companies;

iii) *Misinformation*: AI can produce convincing but false material at enormous scale, making it harder to know what, and whom, to trust;

iv) *Copyright and consent*: Many writers object to their work being used to train commercial systems without clear permission, credit, or compensation;

v) *Cultural sameness*: Because AI predicts patterns from existing material, careless use can produce generic writing and reinforce clichés, biases, or dominant viewpoints;

vi) *Devaluation of human creativity*: People fear that readers and publishers may stop valuing the lived experience, judgment, and the deliberate craft behind a piece of writing; and

vii) *Broader uncertainty*: Rapid technological change naturally creates anxiety, particularly when regulation and social norms have not caught up'.

Numbers iii) and v) are worth considering and are the reasons for my insistence that a creator verifies the output before accepting it as useful. Number v) in particular is actually a reason for us to use AI to generate summaries of our professional papers. This is, in effect, training the Large Language Models (LLMs) in our discipline. And in the bigger picture, it underscores the importance of publishing subluxation-centric papers in our professional, peer-reviewed and indexed literature. Every paper that is reviewed by an AI Agent adds to the knowledge base of that agent and the LLMs which feed it. The more subluxation-centric publications we can feed into the 'machine' the greater the chance we have of shaping the evolving idea of Chiropractic in the AI world.

I then asked Manus how a writer could make good use of AI:

> MANUS - 'I think AI is most useful as a collaborator, not a substitute for authorship. It can help writers:
>
> 1. *Explore possibilities*: Generate alternative premises, titles, character motivations, counterarguments, or ways to structure a difficult section;
> 2. *Interrogate a draft*: Ask where the logic becomes unclear, which scenes feel repetitive, what objections a skeptical reader might raise, or whether a character's actions remain consistent;
> 3. *Overcome mechanical obstacles*: Create outlines, summarise notes, organise research, format citations, transcribe interviews, or identify grammatical problems;
> 4. *Revise deliberately*: Compare several versions of a sentence, test different tones, reduce jargon, or adapt material for a different audience, while leaving the final decisions to the writer;
> 5. *Improve accessibility*: Produce plain-language versions, descriptions, translations, or reading-level adaptations that the writer can then review; and
> 6. *Support learning*: Explain unfamiliar forms, offer exercises, analyse rhetorical techniques, or act as a patient practice partner.

These 6 points are each good advice and guidance. Number 4 is expanded below as I hold that this is where AI brings empowerment to a student's learning journey:

> MANUS - 'The central principle is "let AI reduce friction, but do not let it replace intention". Writers should verify factual claims, protect confidential material, understand the copyright implications of the tools they use, and preserve records of their own drafts where authorship matters. Most important, they should resist accepting AI-generated prose simply because it sounds polished. A writer's real value lies not merely in producing sentences, but in deciding

what deserves to be said, why it matters, and how a particular human consciousness should say it'.

Remember, the output from an AI agent does not make you a guru, it makes you a target.

> AI exposes your ignorance when you fail to validate it. The credibility of what you accept and promulgate tells the truth of your human intellectual capacity.

You must proactively and deliberately revise. If a sentence or 2 do not sit comfortably with you then ask for them to be revised. Try asking for a different voice, perhaps one using 'professional language' or one 'explaining to a mother's group', then review again and edit where needed. Where AI is giving you facts and figures, ensure it also gives you the citation of the source but be aware, citations can be hallucinated. How?

A website for academic writing, editage, (2) says:

> '*AI language models predict statistically likely word patterns rather than retrieve verified facts, so they can invent authors, titles, and journals that sound real but do not exist. LLMs are trained to produce fluent, plausible text. When asked for a citation, the model generates a reference that fits the expected format of author names, publication year, journal title, and page numbers, even if no such source was ever indexed in its training data.*
>
> *'This happens because the model has no built-in mechanism to check facts against a live database at the moment of writing. It is working from patterns learned during training, not from a verified index of published work.*
>
> *'Fabricated references often blend details from 2 or more real sources. A genuine author name may be paired with a fake title, or a real journal may be credited with a study it never published. This makes hallucinated citations especially hard to spot at a glance*'. (2)

The blog gives the following types of hallucinated citations:

- A fabricated citation where the entire source, including author, title, and journal, is invented and does not exist anywhere;
- A misattributed citation which is a real finding or quote credited to the wrong author, journal, or publication year;
- A mixed citation where details from 2 genuine sources are merged into 1 reference that does not actually exist; and
- Incorrect details in which the source is real, but the volume, issue, page range, or DOI is wrong.

These are the things you must check for every citation AI brings to you. Remember, AI can serve you a lot of possibilities, but the final decisions are left to you, the writer, and it is your reputation which is on the line. Citations are very easy to check, simply enter the title into your browser and see if it returns the paper. I work in the Apple ecosystem and this functionality is built-in to Safari. If the paper is not returned you need to dig a little deeper to satisfy yourself whether it is real or not. When

the paper is returned it is a simple matter to cross-check authors, journal, year, volume, issue, and pages. Of course, you must also cross-check any link AI has given you.

As a side-note, I am aware of one citation for a work by me, floating on the web, where I have no recollection of ever writing said paper. It looks plausible yet I can not locate the actual item.

How to know if you can trust an AI's answer to your question

This is the question addressed in a delightful paper by librarian Leo S Lo (3) is which he gives a 4-tier framework to assess an AI-generated answer to a question. He calls it the CARE approach, which is Classify, Assess, Review, and Enhance the answer.

Lo explains that he '*finds it useful to sort AI answers into an "answer typography" of four broad types: factual, interpretive, constructive and strategic. A factual claim can often be checked against a source. An interpretation can be accurate and still reflect choices about which evidence matters. A construction can be well reasoned and still be wrong for the person receiving it. A beautifully written strategic document may not be true. Yet AI presents all four types of answers in much the same fluent, authoritative form; the differences are easy to miss*'. (3)

Thus some answers are factual, responding to prompts like 'What is open access'? or 'When was the Meiji Restoration'? with concise statements that resemble dictionary or encyclopaedic entries. Others are interpretive. They answer 'why' and 'how' questions, weaving together explanations or comparisons, as in 'Why did the Roman Empire fall'? or 'How does constructivism differ from behaviourism in education'? A third pattern is constructive, seen when users ask for paragraphs, outlines, or sample responses such as 'Write a paragraph introducing climate justice' or 'Outline an essay on data literacy in libraries'. These answers provide scaffolding for the users' own writing and products. The fourth pattern is strategic. These are plans and procedures in response to prompts like 'How should I study for an exam'? or 'What steps should I follow to conduct a literature review'? (3)

> 'Constructive and strategic answers can look similar, since both produce text. One practical way to keep them distinct is to focus on their role. Constructive answers concentrate on what to say or produce in a piece of writing. Strategic answers concentrate on how to act, the process or workflow a user might follow. A single response can mix these elements, but asking whether an answer is shaping content, process, or both helps clarify what kind of support a user may need next'. (3)

Remember, AI agents are pattern machines, predicting what should come next based on the patterns of text on which they have been trained.

Lo is a university librarian and Dean of Libraries at the University of Virginia and leads national efforts to develop AI competencies for library professionals. He consults widely on AI literacy and says that librarians need an 'answer first' mindset that recognises AI responses as texts that require interpretation' and proposed two related constructs to support that stance, a brief 'answer typography' that helps user notice what kind of work AI answers are doing, and the CARE approach (Classify, Assess, Review, Enhance), which articulates a critical way of engaging those answers with users. (3)

When a Chiropractor generates an AI-output there is a strong likelihood they are producing content with which they are broadly familiar. This can be a blessing or a curse. It is a blessing when the AI response is well written, more so than anything the person providing the prompt could write, and the prompt is actually saying what the prompter wants said. In this sense AI is amplifying and perhaps gentrifying the prompter's half-formed sentences and ideas. It is a curse when AI returns something the prompter gets excited about but does not bother to proof-read and cross-check, and it turns out to be a load of rubbish.

AI in eduction

This section draws on a piece in the Mercury newspaper published at the time of writing, September 2026, by UTAS Professor and Vice-Chancellor Learning and Teaching Performance, Luke Bereznicki. (4) His position is that the future of education won't be defined by machines replacing people, but by institutions strengthening the human capabilities technology can't replicate. I strongly agree and note this guidance from the New York Times for those wanting to better secure their working future. Ask:

> Which classes will give me the skills that machines will not replicate, making me more distinctly human?

Bereznicki argues that universities are under growing pressure to prepare students not just for today's jobs, but for workplaces that may look radically different in just 10 years from now. He says the focus of the curriculum has to set-up today's students well for 2035 or 2050. The gravity is no less for today's Chiropractic students where all who commence their studies now will be graduates from 2031 onwards.

He urges us to rethink higher education around the skills and judgment that remain essential in an AI-enabled world. Where does this put us as educators of Chiropractors? Where is the research around what Chiropractic will look like in 2035? Will corporations own most clinics in North American suggesting we need to teach how to be an employee rather than a principal and owner? I will come back to these questions, but for now, Bereznicki says rather than asking whether AI will replace people, universities should be asking what role humans will play in future professional workflows, and how students should be prepared for that.

> 'It's not really about whether AI is going to replace me or replace a certain role', Bereznicki said. 'It's about what humans bring that remains essential'.

This shows us our greatest strength: Chiropractic is a low-tech, high-touch health discipline. While I would be a fool to suggest an AI Robot would never be able to replace us to deliver a finely-tuned spinal adjustment with intent, I think we should be aware that this just might happen and prepare our students accordingly.

I said Chiropractic is low-tech, however the future according to a 2025 report in Chiropractic News (5) will have emerging technologies including AI-powered diagnostics, Virtual Care, and AI powered diagnostics. The report says Chiropractic care is evolving rapidly and wearable technology has emerged as a game-changer for monitoring patient progress between office visits. Chiropractors

are integrating devices like posture sensors, spinal load monitors, and movement trackers into treatment plans. These wearables provide real-time feedback to the patient when they are slouching or moving improperly, helping reinforce proper biomechanics throughout the day. Advanced models can track sleep positions, measure range of motion improvements, and even detect muscle tension patterns. Are syllabus constructors considering these developments? We know wearables are ubiquitous and becoming smarter, so how do we incorporate these into our teaching? And especially into our teaching clinics? Is this more an 'American' thing or is it valid for countries such as India, Ethiopia, Sri Lanka and Vietnam?

> Bereznicki comes back to the human qualities needed as technology intrudes more into our patient's lives. He says we need capabilities such as systems thinking, disciplinary reasoning, ethical judgment, communication, collaboration, creativity and decision-making, qualities he believes are becoming more valuable as generative AI becomes more powerful and more widespread.

A direct expression of Bereznicki's work at UTAS is a new Graduate Capability Framework, designed to shape how courses are developed and reviewed across the university. The framework sets out five broad capability areas:

- Systems Thinking and Analysis;
- Adaptive Professional Excellence;
- Transformative Change Agency for Holistic Sustainability;
- Creative Innovation and Cultural Expression; and
- Relational Intelligence and Personal Agency.

To me, these are right on-song with how I see Chiropractic education needing to develop. It is a framework created for a period of major change in higher education and in workforce expectations. In my view, every student now enrolling into a Chiropractic program deserves to graduate, as Bereznicki says, '*with the capabilities the workforce genuinely needs, including the disciplinary depth and technical fluency to direct generative AI rather than be displaced by it*'.

For over 20 years I have argued the imperative for Chiropractic education to shift from competence to capability, (6) and now the Transnational Curriculum is capability driven where the learning objectives are tied to specific capabilities, thus forging Outcomes-Based Education (OBE).

Bereznicki also thinks in terms of capabilities, saying '*The capabilities this framework develops - analytical thinking, disciplinary reasoning, ethical and creative thinking, relational intelligence - are precisely those that recent workforce research identifies as least substitutable by AI and most in demand by employers*'.

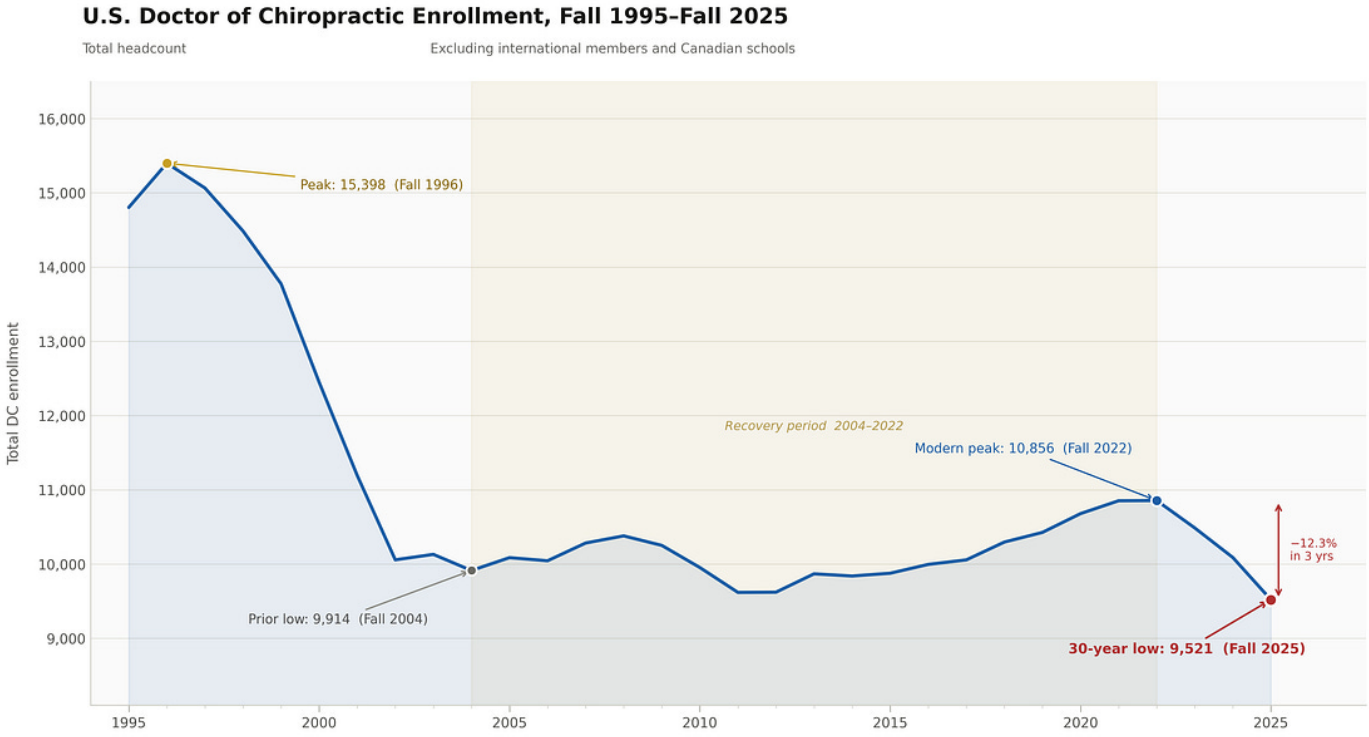
Bereznicki's position is sector-leading in several ways and we should take close note, in particular that rather than applying capabilities as a generic overlay, his approach expresses them through the reasoning traditions of each discipline. Each domain is paired with structured progression descriptors so capabilities can be developed and assessed at the right educational level.

In Chiropractic we must embed our discipline's knowledge systems throughout the framework as a foundational way of knowing, alongside our traditions. This runs into direct confrontation with those trying to re-make our discipline in their own pseudo-scientific form where subluxation is cast aside in the name of appeasing the gods of political medicine.

Danger ahead

Chiropractic institutions not already on-board with integrating AI with guardrails into their curriculum are well behind the state-of-play in education. In North America the institutions are facing mounting debt and falling enrolment (Figure 1)(7, 8) and I am confident several colleges will close before 2030.

Figure 1: DC enrolments, USA, 1995-2025



Source: The Profession Is Running Out of Room for This Nonsense. The Chiropractic Chronicle. McCoy Substack. At https://drmatthewmccoy.substack.com/p/stephanie-libs-message-to-life-west

Those institutions yet to embrace AI will remain the weakest. Among the wise moves for institutions to take right now is the introduction of a suite of AI literacy modules for staff and students, along with a shift in focus from competence to capability. Competencies are no longer the currency they were held to be in the 1980s. The rush of AI across all educational institutions in the discipline is making this glaringly obvious.

> Prof Bereznicki says 'The only constant is going to be change, and what changes is the pace of change'. Consider this a warning.

AI is now pervasive, with Generative AI embedded in many software systems which has implications not just for teaching content, but for assessment, academic standards and graduate preparedness, the tasks which make or break a Chiropractic institution.

How AI impacts our assessment strategies

In 2011 I implemented a 'two-lane' approach to assessment, an early attempt at what UTAS is now introducing. One lane consists of secure assessment, such as invigilated exams, interviews and observed practical tasks, which allowed verification that students had personally met learning outcomes, while the second lane allowed more flexibility, including the use of on-line resources where appropriate, helping students develop contemporary workflows while preparing for higher-stakes assessment.

Today my approach is light on invigilated exams given their cost and limitations which include testing memory more than clinical thinking, and big on face-to-face viva voce on two conditions:

- There is equality across all students in task or question difficulty; and
- Transparent grading rubrics are in place and adhered to.

At the end of the day I agree with Bereznicki that we need to make sure we can verify students have met the objective learning outcomes and have demonstrated the capabilities we announce. We can not remove the human judgement from learner assessment which in turn carries the imputation we must also train our learners how to perform. Does this mean that assessment is an act? To a degree, yes, but then the pragmatist will tell us that all human performance is an act. I don't think it matters as long as there is equality of opportunity, overall fairness, and transparent decision-making.

In Professor Bereznicki's's view, the future of education lies in preparing students to use powerful tools fluently, critically and ethically while keeping the humanistic dimension in shaping vision, exercising judgment and making decisions.

> In a world of abundant information and machine-generated content, the real task is helping students learn how to question, interpret, connect and act responsibly in complex systems. (Bereznicki, 3)

Valuing human engagement

Reporter Matt Michael (9) wrote: '*The idea is straightforward. As artificial intelligence and robotics become capable of doing more, there will be some activities we consciously choose to keep human. Not because machines are incapable of doing them, but because we decide there is value in humans continuing to do them*'.

AI is a prediction engine trained on the past. It can produce high quality, average outputs at scale. All it can do is replicate patterns, styles, and strategies than have gone before. If you ask AI to do what everybody else asks it then all you will get is an average output. Average becomes cheap, and cheap becomes worthless. To do better you must give AI better direction, better constraints, better taste, better data, better feedback loops, better goals. You need to build a system that improves itself. You

are building a personalised tutor at scale. A tutor that adapts to your pace, your blind spots, your motivation patterns. It can explain to you the same concept in 10 different ways until it clicks with you, and then create practice problems tuned to your exact weaknesses. Your AI tutor will plot your learning journey across months and shape your learning plan with ruthless efficiency.

Chiropractic learning is now a private competitive sport where the winners are those with the most consistent systems. AI is a force multiplier for Chiropractic clinical learning where the learner's treatment plan for a patient can be tested against what are in effect real-time meta-analyses and outcomes predictions. Gone are the '3 times a week' patient scheduling formulas used simply to boost a learner's number of patient visits. Instead, total 'patient-visits' under a lessening regime of supervision will be meticulously plotted by patient case-mix and demographic data. Students will complete with 'x number of cases of uncomplicated low-back pain is adult males, y number of cervicogenic headaches in teenage females' and so on.

Do I recommend any AI platform or agent?

No, and you do not need to select a particular AI platform. You must become a problem engineer, not a prompt engineer. This means you can define a real problem, translate that problem into constraints and objectives, then judge the output with taste, context, ethics, and strategic clarity. Remember AI can propose a plan for you but it can not care for you. Strategic caring becomes your advantage, the ability to choose a direction and commit, the ability to say '*this matters, this doesn't*'.

> You have to continually cleanse and strengthen your filters because the Chiropractic world is about to drown in cheap content, cheap ideas, and cheaper shortcuts.

You have to constantly work on your judgement and the way to do this is to read more deeply into the literature. This is where the Index to Chiropractic Literature becomes your best friend. You can enter your search terms and retrieve a treasure trove of human intelligence published over the past 60 years or so. You must selectively read what others before you have thought on a particular topic so you develop your human sense of judgement as to what AI output is bullshit and which may be useful, with true meaning. You can not ask AI to make that human judgement. You can not trust AI outputs without knowing the foundations.

Remember, you must use AI to build your clinical skills so that you can produce measurable outcomes faster and more effectively.

> AI is a platform shift. The biggest mistake is to use AI to help you do the same things faster. AI is infrastructure that produces intelligence. Think of the introduction of electricity as underpinning the functioning world, thus think of AI as underpinning all that we do today. (10)

Move on from being a tool user ('*help me study*') to become a power user: '*Build me a personalised tutor that learns how I think, tracks my weaknesses, designs quizzes, and turns my learning into a compounding advantage*'. You could also prompt to *'Build me a pipeline that generates 30 learning concepts drawn from [for example Week 4 content] to build my identity as a Chiropractor and output ready to use clinical assets every week*'. A good clinical learner will be one who is able to interpret,

challenge, and apply AI-supported insights while maintaining human empathy and ethical judgement.

Perhaps the best way to think of AI from now on is that it compresses the curriculum and increases the speed of attainment. AI is a collaborator and the learners who understand this will excel. AI is a critical asset for those who lead learning who must understand that they need to become a master within the domain of Chiropractic in the first instance, and then a master in sub-domains of relevance to them, such as paediatric care, sports Chiropractic, and vitalistic-centred care. AI will provide multiple care plans but you have to decide which one is best suited to a particular patient. You need an anchor of what 'good care' looks like, and can defend it with clarity. AI will not replace clinical-decision making but it will provide many alternative pathways.

> Your judgement 'engine' is what AI will amplify. If your judgement is poor it will amplify you into mediocrity; should your judgement be astute, AI will amplify you into excellence.

The correct use of AI is cyclical. Use it to generate, test, measure, refine. Repeat. Be aware that AI will hallucinate and produce nonsense, and it is up to you to filter for this and correct the cycle.

Is Chiropractic ready for the AI avalanche?

Chiropractic Future is an advocacy group with some of the profession's most influential volunteers focused on increasing access to Chiropractic care and fighting for better reimbursement. They claim to leverage technology, research, and the profession's collective expertise to strive to create a sustainable future for Chiropractors. (11) They claim '*there has never been an effort of this magnitude that brings all Chiropractors together for a common cause … together, we can overcome the challenges the current healthcare system poses and secure a brighter future for Chiropractors*'.

However their 2025 Annual Report (10) makes no mention of AI under Technology. Rather, they hold that:

> '*Chiropractic's future depends on the ability to collect, interpret, and leverage high-quality data. CFSP's technology initiatives, including the national data lake and state-level reimbursement dashboards, create the infrastructure needed to capture insights that have never before been available to the profession. These tools generate real-time visibility into utilisation, payer behaviour, reimbursement trends, payment disparities, and patient outcomes. Together, they form the foundation that enables evidence-based decision-making, strengthens advocacy, and ensures chiropractic has a credible, data-driven seat at the healthcare table*'. (10)

In a similar vein the magazine Chiropractic Economics (12) in its 2020 feature which reported the views of various Chiropractic dignitaries, generally felt the profession was peddling furiously to stay in place. Karlos Boghosian DC, president of the Federation of Chiropractic Licensing Boards (FCLB), was reported as saying '*we have an obligation to advance the profession through research, clinical studies, education, regulation and consistent introduction of emerging technologies*'. Admittedly this was in 2020, before AI surged as it has today. However I do note that the quote at the head of this

paper, from Mark Cuban, was reported in 2017, 3 years earlier than that report which at least gave recognition that emerging technologies warranted attention.

This prescience is not evident in the World Federation of Chiropractic's (WFC) Strategic plan and vision 2024-29. (13) While humanistic in focus, the WFC does say '*Advancing technology means that access to health care is expanding globally. At the same time, access to health resources has reinforced personal autonomy and promoted shared decision-making. As a global federation, we will encourage our members to use technology to promote quality health services for all, access emerging evidence and collaborate with colleagues*'. (12, p 9)

In 2024 the Journal of Future Studies (14) published 'Advancing Chiropractic Care: Opportunities and Challenges for the Future'. It presented findings using the dated SWOT technique and identified an opportunity as:

> Technological advancements such as computer-assisted manipulation, telehealth, and wearable technologies have the potential to significantly impact the profession.

However, among the threats they identified, embracing technological advancements was not mentioned, only the same tired trope of '*Failure to develop a scientifically based definition of subluxation*' along with '*lack of cultural authority*'. (13)

The profession still receives the benefit of the periodic Practice Analysis of Chiropractic, the latest being for 2025, from the National Board of Chiropractic Examiners (NBCE). (15) This is the 7th instalment in a series of surveys of US chiropractors, with the inaugural survey having been conducted in 1991 and subsequently reported in the 1993 Job Analysis of Chiropractic. (16)

These reports carry valuable information for improving the management of the profession in the US, especially the report of patient conditions (14, p 98) which can largely be extrapolated to other countries where Chiropractic is established under legislation. It is an interesting guide as to what may be expected in the countries where the discipline is emerging and which has been reported. (17, 18) While there is a small section on continuing education, it is rather odd to find no report on the status of pre-professional education in America. This is something I would have thought a national board of examiners should have a vested interest in reporting.

It is a report on 'what Chiropractic is' in the year examined and as such does not need to look into the future, let alone make any predictions about technology and AI, however …

> … I am left with the feeling that the profession is largely oblivious to the AI tsunami which reinforces my view that AI is catching a lot of institutions and associations unaware. I fear the resultant carnage.

AI and research in Chiropractic

I discuss this from dual perspectives; that of the research generator, and then of the research consumer. Each is impacted significantly by AI and in a very positive manner.

Research generation

My view is that Chiropractic researchers will become redundant unless they initiate new lines of inquiry. This is due to the 'easy' options of doing a meta-analysis or a literature review are now done faster by AI. A project such as a systematic analysis was once the crucible for researchers seeking a doctorate. I don't deny this work was beneficial for training the academic rigour needed to earn a PhD, however now the training is about how to become far more critical of what AI returns to one's prompts.

> For doctoral candidates it is now more important to practice critical reading and undertake a deeper source analysis to ensure the veracity of external data. At the same time, statistical analysis of one's own data is simplified yet still demanding that we maintain checks for true inference.

By creating and testing various prompts an AI Agent should be able to produce a literature review for you and go a long way towards gathering papers for a systematic review. Even Co-Pilot, a basic agent, can provide a user-friendly summation of a paper. A colleague entered the following prompt and retrieved the response given verbatim in Box 1

> List key points from Influence of sympathetic nervous system on sensorimotor function - whiplash associated disorders (WAD) as a model (19)

Should this response proceed to being reproduced somewhere, even in a patient brochure, it must be fully referenced. I give the most acceptable format for this citation as reference 19.

Box 1: From M365 Copilot 12/3/25, 7:02 AM

Here are the key points from the review article 'Influence of sympathetic nervous system on sensorimotor function: whiplash associated disorders (WAD) as a model' by Magda Passatore and Silvestro Roatta (Eur J Appl Physiol, 2006).

1. Background and Context: Whiplash Associated Disorders (WAD) result from acceleration-deceleration forces on the neck, commonly in car accidents. Symptoms include neck pain, stiffness, sensory and motor dysfunction, dizziness, headache, autonomic disturbances, and psychological distress. Chronic WAD affects 10–42% of patients; 6–18% develop severe long-term disability. Pathophysiology is complex and often lacks clear anatomical lesions; CNS dysfunction and psychosocial factors play roles.

2. Sympathetic Nervous System (SNS) and Chronic Pain: SNS activation is linked to stress and chronic musculoskeletal pain syndromes. Stressors (physical, psychological, psychosocial) increase sympathetic outflow, which can persist without motor activity, leading to imbalance. Pain itself is a strong stressor, further enhancing SNS activity.

Continued …

Box 1 concluded:

3. Sensorimotor Disturbances in WAD Pain: Often widespread, intermittent, and disproportionate to tissue damage; involves peripheral and central sensitisation (hyperalgesia, allodynia).
Motor Control: Reduced cervical range of motion, altered movement patterns, increased co-contraction of antagonist muscles, delayed activation of deep cervical muscles.
Proprioception: Impaired position sense and postural control; linked to dizziness and sensory mismatch.
Systemic Dysfunctions: Cardiovascular instability, temperature regulation issues, suggesting autonomic involvement.

4. SNS Actions at Muscle Level Vascular Control: SNS causes vasoconstriction; excessive activation may reduce muscle blood flow → hypoxia, oxidative stress, and chronic pain.
Contractility Modulation: Catecholamines increase twitch force in fast fibres but decrease and shorten twitch in slow fibres (antigravity muscles). This may lead to muscle weakness and altered motor strategies.
Proprioceptive Modulation: SNS depresses muscle spindle sensitivity to stretch, reducing quality of proprioceptive feedback. Impaired feedback affects movement accuracy and postural control.
Nociceptive Modulation: Under pathological conditions (nerve injury, inflammation), SNS can sensitise nociceptors, contributing to sympathetically maintained pain (SMP).

5. Positive Feedback Loops: SNS activation → vasoconstriction, impaired proprioception, altered motor strategies → increased metabolite accumulation → activation of group III & IV muscle afferents → further SNS activation. Pain itself amplifies SNS activity, creating vicious cycles that sustain chronic pain and dysfunction.

6. Clinical Implications: Stress and SNS activation may facilitate transition from acute to chronic pain. Early management of WAD patients at risk could prevent chronicisation. Breaking feedback loops (e.g., sympathetic blockade) can provide long-lasting pain relief.

Edited only for presentation style

AI for educators

A power user could build on the above prompt, perhaps as: '*Build me 4 quizzes each with answers as multi-choice, true-false, one of the following, and choice of one from 5 stems on this paper each going deeply into a concept relevant to building my practice as a Chiropractor*'. This approach is more beneficial for academics and learners. Let me show you how this works, it is the approach I use in the Asia-Pacific Chiropractic Journal (20) where my AI Agent is Manus. I was using Grok however they seem to lack any customer service and my operational and billing questions remain unanswered, thus I now use Manus, (21) supposedly an independent agent lab.

First, select your source paper and have it as a PDF to drag into Manus when you open it on your desktop. Reading a PDF is a good ability in Manus and not so good, if at all, with Grok in my experience.

The reference article for this exercise is:

Jagadeesh A, Mohanty P, Ghosh T. Assessment of ergonomic risk factors in the occurrence of work-related musculoskeletal discomfort & pain among cashew workers. Asia-Pac Chiropr J. 2026;7-2.https://www.apcj.site/JagadeeshErgonomicRiskFactors.pdf

ME PROMPT: Provide a 2 paragraph summary of this paper by Jagadeesh and colleagues using professional clinical language including key statistical findings and provide 3 multi-choice quiz questions and 3 true/false question with answers

MANUS - Jagadeesh and colleagues conducted a quantitative cross-sectional study to characterise postural ergonomic risk and pain among 40 cashew-processing workers, 20 men and 20 women, aged 35-55 years, in Kasaragod district, Kerala. Participants engaged in either shelling or peeling were recruited by convenience sampling and assessed using the Rapid Entire Body Assessment (REBA) and Visual Analogue Scale (VAS). Mean REBA scores were similar for shelling and peeling workers (7.10 ± 2.36 and 7.15 ± 3.31, respectively), corresponding to the upper boundary of the medium-risk category; mean VAS pain scores were likewise similar (4.55 ± 1.87 and 4.50 ± 2.01, respectively), consistent with moderate pain. In the task-stratified analysis, 60% of shelling workers and 40% of peeling workers were classified as medium ergonomic risk, while very high risk was more frequent in peeling than shelling (25% versus 15%). Moderate pain was the most common pain category in both groups, affecting 50% of shelling workers and 55% of peeling workers; no participant was classified as pain-free.

Pain intensity was significantly and positively associated with ergonomic risk in both sexes. Among men, the relationship between REBA and VAS scores was strong ($r = 0.725$, $df = 18$, $p = 0.0001$); among women, it was moderate ($r = 0.538$, $df = 18$, $p = 0.014$). Moderate pain was reported by 60% of men and 45% of women, while women showed a wider distribution across mild, moderate, and severe pain categories. These findings support targeted occupational interventions, including workstation redesign, postural training, scheduled rest breaks, task rotation, joint-protection education, and energy-conservation strategies. Clinical interpretation should remain cautious because the study's cross-sectional design cannot establish causality, and its small convenience sample limits generalisability; psychosocial and organisational determinants were also not assessed. In addition, the article contains a minor internal inconsistency: the task-stratified REBA table records one peeling worker at negligible risk, whereas the sex-stratified table reports no participants at negligible risk.

I find this to be a good summary of a well-detailed paper. I like that it spotted an inconsistency in reporting, something not identified in peer review.Next, the quizzes:

MANUS QUIZ 1:

1. Which instruments were used to assess ergonomic risk and pain intensity?
   A. RULA and Numeric Rating Scale
   B. REBA and Visual Analogue Scale
   C. Oswestry Disability Index and DASH
   D. Nordic Musculoskeletal Questionnaire and Borg Scale

   Answer: B. REBA and Visual Analogue Scale. The Rapid Entire Body Assessment (REBA) evaluated posture-related ergonomic risk, while the Visual Analogue Scale (VAS) measured subjective pain intensity.

2. Which task group had the greater proportion of workers classified as being at very high ergonomic risk?

A. Shelling workers

B. Peeling workers

C. Both groups had equal proportions

D. The study did not report this outcome

Answer: B. Peeling workers. Very high REBA risk was reported among 25% of peeling workers, compared with 15% of shelling workers.

3. Which statement best describes the association between REBA and VAS scores among male workers?

A. Strong, positive, and statistically significant

B. Moderate, negative, and statistically significant

C. Weak, positive, and not statistically significant

D. No association

Answer: A. Strong, positive, and statistically significant. The correlation was r = 0.725, p = 0.0001, indicating that greater ergonomic risk was associated with higher pain intensity among male workers.

MANUS QUIZ 2, True - False:

1. Moderate pain was the most frequently reported VAS category among both shelling and peeling workers.

Answer: True. Moderate pain was reported by 50% of shelling workers and 55% of peeling workers.

2. The reported correlations demonstrate that ergonomic exposure caused the workers' pain.

Answer: False. The cross-sectional study identified an association between ergonomic risk and pain, but its design cannot establish causality.

3. The association between REBA and VAS scores was statistically significant among both male and female workers.

Answer: True. The association was significant among men (r = 0.725, p = 0.0001) and women (r = 0.538, p = 0.014).

You can design the quizzes to any existing specification your institution prefers, and if you are presenting the quizzes in an on-line format you can include an instant Translation widget, I use the

Website Translator widget from Elfsight. (22) This allows learners to take your quiz in their own natural language, however I am yet to fully test its robustness.

This exercise is the most basic starting point for Chiropractor Educators as it now so easy to generate content for the classroom; you can even ask AI to generate a slideshow from a paper to strengthen your in-class presentations. As shown here, you can form quizzes and in lieu of a peer-reviewed paper, you can submit your own teaching materials so that the tedious and repetitive 'hit and miss' chore of creating a quiz on your own teaching material is automated.

Each learner's personal tutor

It is in this role that AI Agents excel. Each of us now has a process we can train to become a personal tutor for us. The applications for educators are endless and we can quickly be brought up to speed in a topic about which we presently know little. But the real buzz comes once you have introduced the idea to your class and shown them how powerfully well-written AI prompts can boost their learning.

Again the possibilities are endless but as a starting point the learner can be shown how to use AI to summarise a paper you require them to read, and then have a quiz test them so they can, in private, reinforce their understanding.

The most exciting part is that once you give your approval for the use of AI in this way, your learners will quickly become experts and share their discoveries and tips across the group. In fact, it is a good idea to set aside a few minutes once a week with the class to catch-up and share what various members are doing. If nothing else it will get the message to those who are slow adopters and eventually bring them on board.

Where do you set the boundaries?

Once you define AI as a learning assistant or personal tutor and explain where support ends and substitution begins you should reduce academic integrity risks and student anxiety. A useful starting point is practical AI literacy for students. This goes beyond warning students not to cheat. Students need to understand how to ask useful questions of AI tools, how to check outputs for errors or bias, and how to take responsibility for the work they submit. Treating AI as a thinking partner, rather than an answer machine, helps students see how effort, judgement, and learning can best sit with them. (23)

AI in Chiropractic institutions

While Macquarie university is surveying Chiropractors 'to investigate the factors influencing healthcare professionals' behavioural intention to use LLM-based chatbots, (24) the New Zealand College of Chiropractic have already launched an AI-powered interface to support student learning with patient history-taking in the clinical setting. (25) An intern joins a virtual environment through a Meta Quest, or other available similar VR headset, and interacts with an AI-driven virtual patient. This virtual patient is trained in Chiropractic case studies with the aim of enhancing communication

skills and cognitive learning through diverse case histories. The core components of this patient history-taking are:

- Chief Complaint, linked to spinal regions;
- Symptoms, Numbness, tingling, pain;
- Duration and Frequency, Time and severity scaling;
- Triggers, Identifying motion-based pain influencers; and
- Radiation, Tracking referring pain patterns.

The NZCC prototype mimics real world clinical note-taking and supports interactive, repeatable training sessions. While there may be limitations with this approach it is a significant institutional advancement with potential for direct student benefit.

I guess our educators fall into one of two groups, those as we see at NZCC who are pioneering roles for AI in the clinical education of Chiropractic learners, and those who will wait for others to do the work. But make no mistake, the work is getting done and is progressing rapidly. (26) Some research teams are now testing whether Large Language Model-Based chatbots are effective in providing reliable medical advice for presentations such as Achilles Tendinopathy. (27) New Zealand is a country at the leading edge of examining AI-use in Chiropractic and musculoskeletal clinical practice, and even with providing training in AI for practitioners and, presumably, educators. (28)

AI in content generation

My general position statement for AI use is:

> All use of AI beyond grammar and spell check must be declared. Generative AI is not to be used to create new content in an author's name. The correct approach is for you to write your paper using your human intellect and selecting your references, then run spelling and grammar-checks in your writing App for augmentation. You may also use an AI tool to review and critique your paper.

I consider a learner to be an author when creating work to be submitted for assessment. Subtle, but it gives a greater 'air' of reality beyond it being 'just an assignment'. And to be included in all work submitted, even to the point of declaring AI was not used, is a variation of this statement:

> During the preparation of this work the author used [name of agent including version #] in order to assist with copyediting and to generate alternative sentence structures. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the published work.

Image generation

As an educator and a writer my focus on AI has been around its abilities with gathering data, phrasing ideas, and creating learning reinforcement. However others are active with another rather clever function, that of Image Generation.

My colleague Dr Scott Cuthbert, of the Philippines, is having success with writing prompts which can create what I think are marvellous informative and educational posters. I give one such image, an infographic on manual muscle testing for Gluteus Maximus, as Figure 2.

Figure 2: Infographic - MMT Gluteus Maximus. Courtesy of Scott cuthbert, 2026



The most important point to note is the inclusion of 5 citations in short form. It is easy to get carried away and churn out a few posters of this nature and it is another thing to take the time to do it in a way that is defensible.

This type of work must, in my view, be of sufficient standard to be accepted as a poster at a research or clinical meeting. This means it must be professional. Facts that are given must be checked and referenced. The depiction of the MMT must be of educational classroom standard, meaning it should go from this page into the class-room as an exemplar, which this does.

The anatomical pic is a good ¾ right posterior view which gives a depth to the muscle, and the clinical tips are a speed-read for the clinician. Purists may quibble over the abbreviated correlation data but quibbling is what they do best. To me, that box simply says the manual muscle testing correlates well with dynamometry and that is, to me, all the takeaway I need. I specifically like the 3 figures in action which graphically conveys 3 main functions, any of which may form the basis of a complaint from the patient sitting in front of me. This is good, useful information.

It is important to note Scott has avoided a common fault in AI Image generation, which is the tell-tale dark and heavy background where the page is crowded and the image is indistinguishable from any other you saw earlier. Here we have a pleasing turtle on a light-coloured background.

It really is amazing that a task which would previously have taken an academic a month to prepare, perhaps even with the aid of a graphic designer, can now be produced in under an hour, with time to fine-tune the prompt and tweak it here and there.

Who owns the image in Figure 2?

By now you will be wanting me to reproduce the prompt used by Scott. I have chosen to not publish this on the basis that in the case of image generation, it is very much the intellectual property of the person writing the prompt which will best create the image they envisage. This is different from writing where I have been offering guidance in general terms; images are specific creations and in the ideal world would be copyrighted.

And here is not the time to even start to consider the huge copyright implications where the work of artists and creators is taken, some say stolen, by the global corporations without any credit or payment for use to continue training their LLMs. This is a hot button issue in Australia and there is a significant movement happening to protect the IP of creators from theft by anonymous parties.

Former Australian prime minister Julia Gillard has entered the debate on regulating AI, urging governments to build their 'muscle' on intervention because the challenges of the new technology would continue to come in waves of change. (29) Ms Gillard who is chair of the Wellcome Trust, which funds health and scientific research, is reported as saying: '*The AI challenge is going to mean all of that (regulation) has got to be done again and again and again. That's going to be a big part of the debate going forward*'.

As a writer and an educator I have conflicting views. The writer in me wants to say 'hold my copyright tight for my IP' while the pragmatist says '*as a Chiropractor it is important to me for my*

writing to be sucked into every LLM there is' in the expectation it may eventually change how AI sees Chiropractic and especially, what it says about our discipline. There is no income from any journal paper, in fact, some Chiropractic journals once reached a new low in demanding authors pay the journal to be published, but that very bad practice seems to have passed.

Conclusion

I can't deny the thrilling outcomes we can now achieve for strengthening our learning objects, tutoring ourselves and our students to new heights and gaining strength in our writing. Image creation is icing on the cake, and having your AI Agent create a slide show for you really lifts to another level. Just remember to check and verify.

But as with all cakes, we have to stay away from temptations which can quickly become toxic and destroy our reputations overnight.

I see value in an educator becoming an informed advocate of the right and proper use of AI in the classroom. I would like to think I have offered some little guidance towards you achieving this.

Final word

I defer to His holiness Pope Leo XIV and his encyclical *Magnifica Humanitas* of 15 May 2026:

> It is necessary to establish adequate regulatory tools capable of upholding justice and curbing the distorting effects of technological power. Nevertheless, the issue is not limited to regulation. As Pope Francis warned, we must realistically ask ourselves who holds this power today and how they use it.
>
> In the past, it was largely up to the State to guide and direct innovation. Today, however, the main drivers of development are private, often transnational, parties that are endowed with resources and the capacity to intervene that surpass those of many Governments. Technological power thus takes on an unprecedented, predominantly 'private' aspect, which makes it even more challenging to discern, govern and direct such power toward the common good.
>
> We must lovingly safeguard the grandeur of humanity bestowed upon us and revealed in its fullness in Christ, the splendour of which no machine can ever replace. True progress always stems from a heart open to others, an intelligence willing to listen and a will that seeks what unites rather than what separates. (30)

Let us retain our humanity as Chiropractors and be the master of AI, harnessing its power for the good of our students, our patients, and society which needs Chiropractic care more, now than ever.

Disclaimer

This paper is a Chapter from my forthcoming textbook, The Chiropractor Educator's Handbook, and is already outdated. The AI tsunami to which I earlier alluded, is here and right now you will be interacting with AI agents in ways I have not yet imagined.

Of particular interest is the position of Apple which is to undertake the majority of AI-processing on-device, in contrast to agents which process requests and interactions off-device and in AI Data Centres. Leaving aside the negative press being generated by the imposition of this massive infrastructure on regular communities, there is as Apple exhorts, a real risk to one's privacy.

I am not advocating one way or the other but simply wish to point out that at my time of writing, October 2026, I am yet to 'play with' Apple AI in any meaningful manner. I can't imagine it achieving output significantly different to the matters I have discussed here, however I am always up for a surprise.

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