HANOVER RESEARCH

ACADEMIC PROGRAM ASSESSMENT

Master's in Digital Health

Prepared for Iowa State University Center for Excellence in Learning and Teaching (ISU CELT)

July 2023

In the following report, Hanover Research (Hanover) assesses demand for master's degree programs in digital health. This report includes an examination of student and labor market demand, and an analysis of potential competitor programs.

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EXECUTIVE SUMMARY

RECOMMENDATIONS

Based on its analysis, Hanover recommends that Iowa State University Center for Excellence in Learning and Teaching (ISU CELT):

Move forward with the proposed Master's in Digital Health.

Student interest in the digital health field is growing based on trends in online searches for digital health topics and graduate publications using the keyword "digital health." Additionally, a review of national job postings and secondary literature suggests a positive employment outlook for graduates of digital health programs. Should ISU CELT move forward with developing the program, it may wish to align with competitor trends by offering traditional, semester-based courses (rather than modules) and require around 34 credits to complete the degree. Further, as flexible delivery formats are popular among profiled programs, which largely target working professionals, an online and/or hybrid program is likely to be attractive to prospective students.

Expect to hire around four full-time faculty members to support the program.

Typically, benchmarked programs have less than 15 faculty members, most of whom fill part-time or adjunct positions. While overall faculty headcounts (including part-time faculty) vary significantly among programs, on average, institutions have four full-time faculty to support the program. ISU CELT may anticipate the same number of full-time faculty hires and should also look into hiring additional adjunct and/or part-time faculty members.

Equip program graduates with high-demand skills in the labor market.

A review of national job postings for digital health-related positions indicates that employers seeking candidates with master's degrees are often filling management positions and desire skills related to project management, computer programming, and data science.

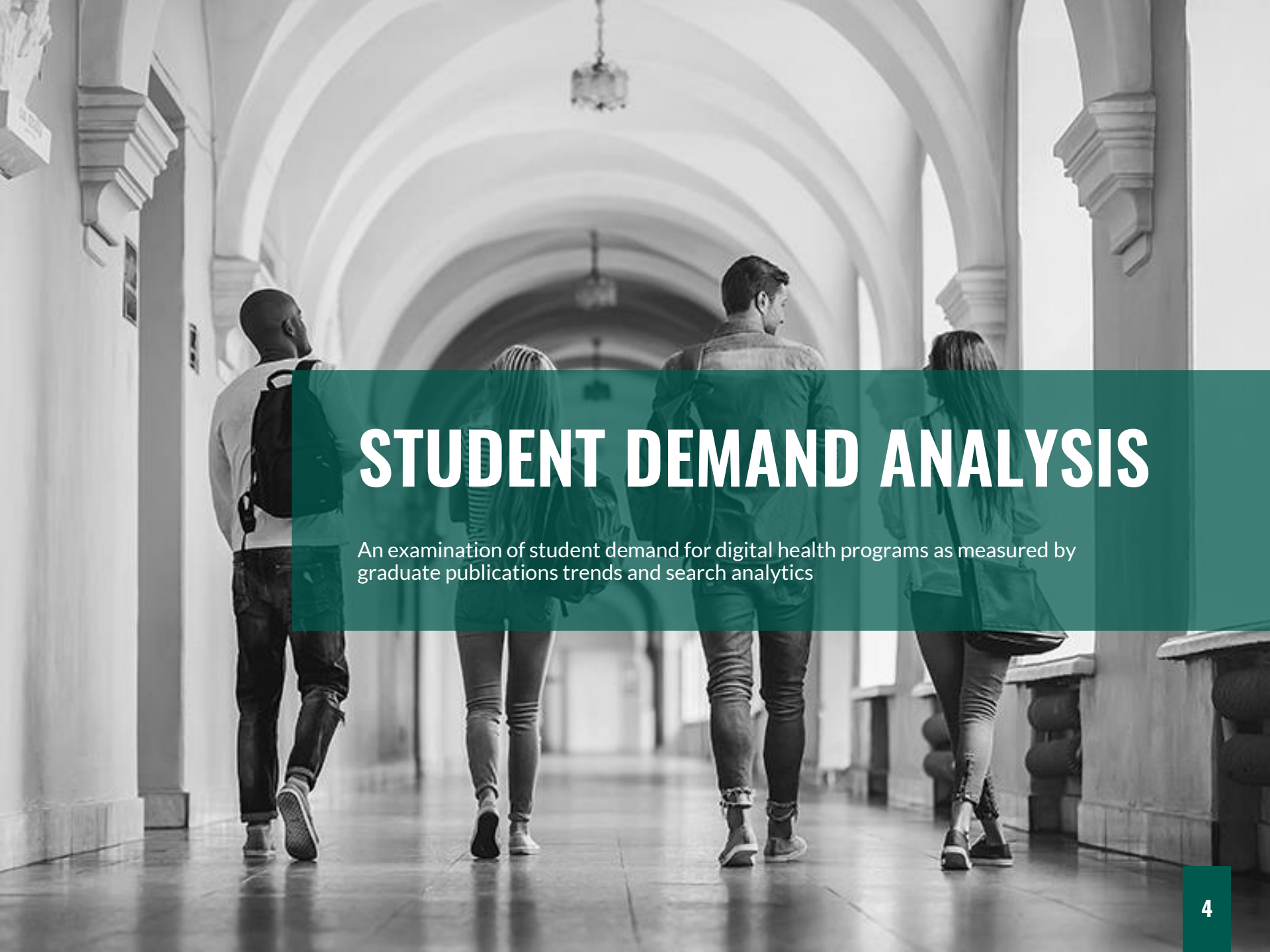
KEY FINDINGS

Student demand indicators point to interest in digital health-related graduate programming. A review of Google search trends from 2018 to 2023 demonstrates a significant increase in online searches for digital health topics, especially from early 2021 until now. Further, published theses and dissertations using the keyword "digital health" grew at a subtle but stable pace from 2010 to 2022, with a substantial volume of publications each year. Overall, these findings suggest that student demand exists and is growing for this novel field.

Graduates of the proposed program should encounter a favorable labor market. A review of secondary literature highlights the rapid expansion of the digital health market in the wake of the COVID-19 pandemic. As demand for health technologies such as health apps, wearable devices, and telemedicine increases, digital health-related occupations are expected to experience faster than average growth in employment. Further, a review of national job ads for digital health positions indicates that programs graduates will be in particularly high demand for leadership positions. As such, **ISU CELT may wish to target working professionals seeking career advancement.**

Flexible delivery options and capstone projects are common among reviewed programs. Most institutions provide multiple delivery formats including hybrid or online modalities and require students to complete a capstone project. However, no profiled programs offer rapid admissions or enrollment and only two provide concentrations.

Benchmarked competitors typically have less than 15 faculty with an average of four full-time members. While total faculty numbers range from three to 30 among reviewed programs, most feature less than 15 members. Most of these faculty positions are held by part-time or adjunct members.



STUDENT DEMAND ANALYSIS

An examination of student demand for digital health programs as measured by graduate publications trends and search analytics

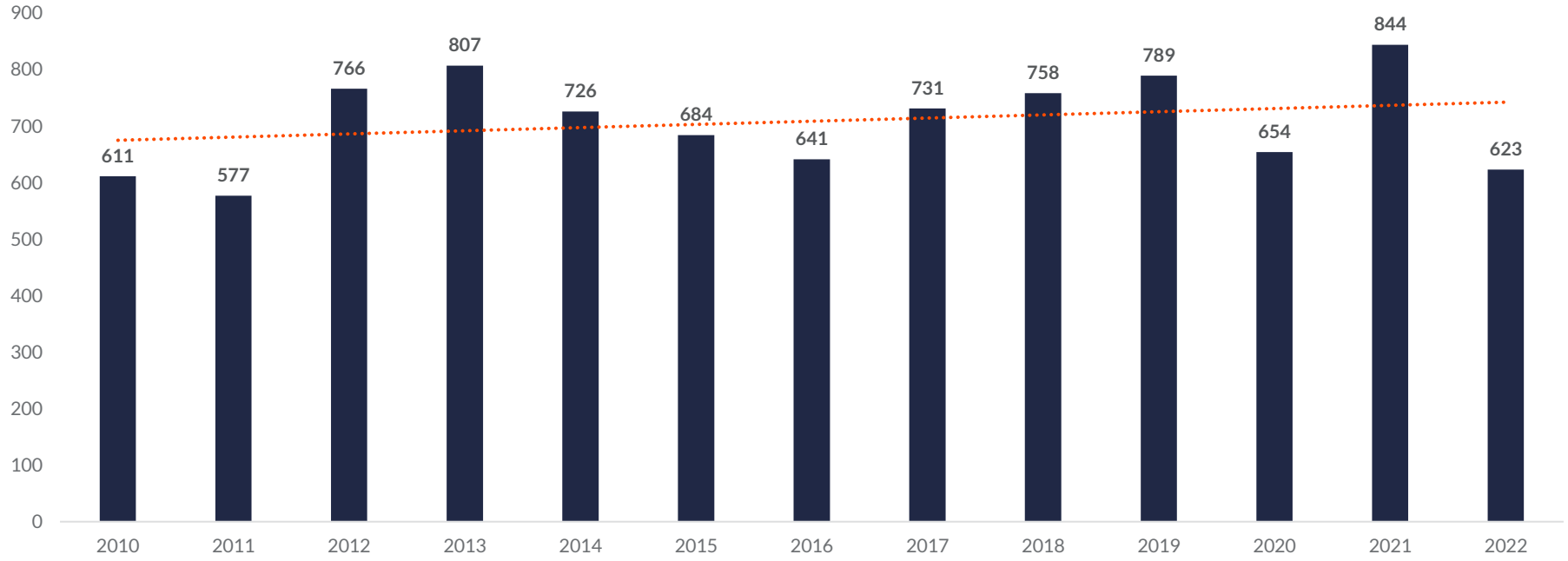
TRENDS IN GRADUATE PUBLICATIONS

ANALYSIS

Thesis and dissertation publications have modestly increased over the past 12 years. As student demand is difficult to discern with emerging or niche fields that are not connected to a Classification of Instruction (CIP) code, Hanover analyzed thesis and dissertation publications related to "digital health", to provide better context for graduate student interest in this subject. Although few digital health programs exist across the nation that emulate the master's degree proposed by ISU CELT, thesis and dissertation publications using the keyword "digital health" experienced a subtle but steady increase over the past 12 years. Publications peaked in 2021 at 844. As of July 2023, there were 95 published theses and dissertations on this topic for the 2023 publication year.

PUBLISHED THESES AND DISSERTATIONS IN DIGITAL HEALTH, 2010-2022

Number of published theses and dissertations on WorldCat using the keyword "digital health" from 2010 to 2022.



Source: WorldCat

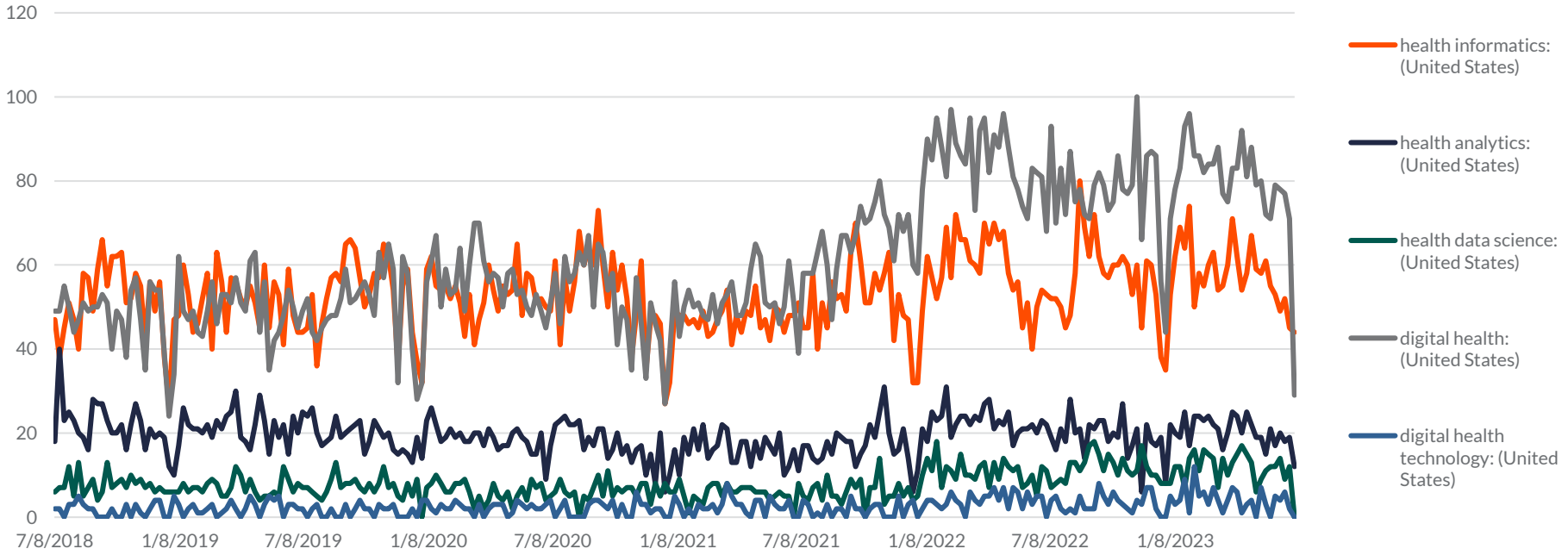
TRENDS IN SEARCH INTEREST – DIGITAL HEALTH TOPICS

ANALYSIS

Google search trends reveal a significant increase in interest in "digital health" topics since 2018. Over the past five years, search interest in digital health topics increased extensively, particularly from early 2021 until now. Further, search interest in other related topics, including health informatics, health analytics, health data science, and digital health technology have remained stable over the past five years, with the largest rise in searches for health informatics. Overall, search trends findings suggest growing interest in the field.

DIGITAL HEALTH TOPICS GOOGLE SEARCH INTEREST INDEX, 2018-2023

Digital health-related search interest volume by keyword/phrase over the past five years



Note: For this analysis, Hanover retrieved search trends data from Google Trends' "Interest over time" metric, whereby "numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term." Note that Google search trends use a "rounded" average and should be considered with caution.

SEARCH INTEREST TRENDS – PROGRAM NAME COMPARISON

ANALYSIS

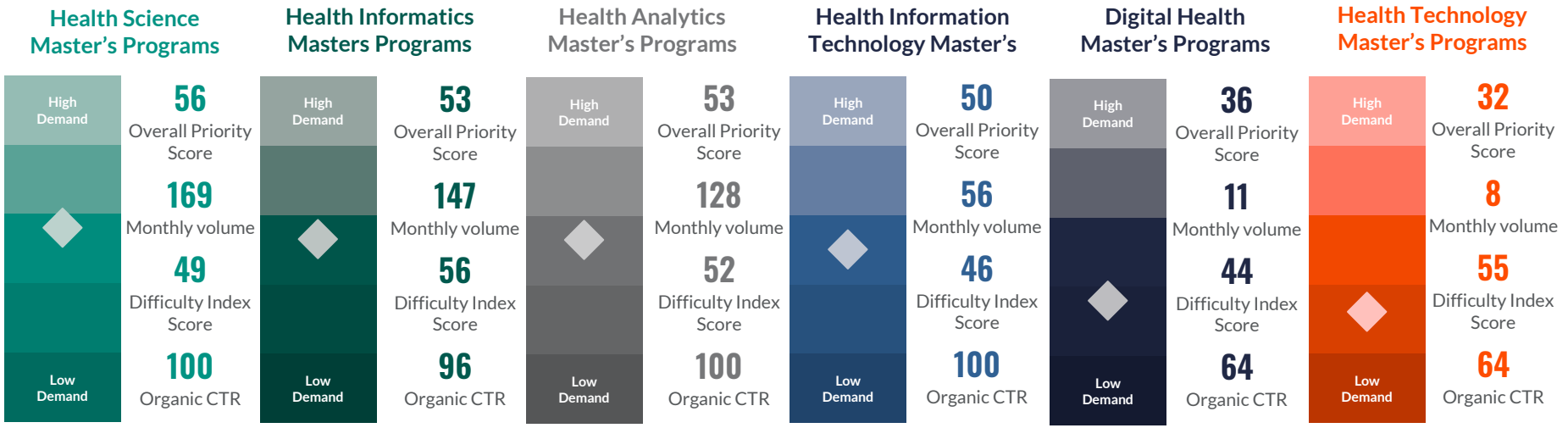
An examination of Moz search analytics demonstrates strong search demand for digital health-related master's degrees, though limited demand for digital health master's programs specifically. However, search interest for emerging and niche fields typically garner less searches and may speak more to awareness levels of the field as opposed to a lack of demand. Data from pages five and six suggest an increase in interest in this field over time, but the below comparison of search analytics shows programs in related areas like health sciences, health informatics, and health analytics are still far more popular than programs in digital health. With this in mind, **it may be advantageous for ISU CELT to include keywords in the program nomenclature or website that garner more organic search interest.**

SEARCH ANALYTICS METRICS DEFINITIONS

Overall Priority Score	Average demand score based on search engine volume, difficulty score, and organic CTR; the higher the priority score, the higher the demand
Monthly Volume	Average monthly volume of Google searches
Difficulty Index Score	Average keyword difficulty index, an estimation of how easy (0) to difficult (100) it is to rank more highly than competitors on the first page of search results
Organic CTR	Average organic click-through-rate (CTR), an estimation of the percentage of clicks available to traditional, organic links on the search engine results page

PROGRAM SEARCH INTEREST TRENDS

Analytics metrics across benchmarked digital health program names over the past 12 months.



Note: For this analysis, Hanover retrieved search engine analytics data from MOZ.com, a proprietary search engine optimization (SEO) firm. These data reflect the "actual" average keyword search volume in the United States over the past 12 months as of July 2023.

LABOR MARKET ANALYSIS

A review of labor market demand as measured by industry reporting and job postings for related positions

ANALYSIS

The digital health field is projected to experience significant growth worldwide over the next several years. Experts across a variety of industries point to the growing role of technology in medicine and digital health as a significant contributor to financial growth. Further, the COVID-19 pandemic has accelerated the expansion of the digital health market.

Digital health-related occupations are also likely to increase. Growing demand for digital technology for personal use, such as mobile health apps, wearable devices, telehealth, and personalized medicine all take part in the increased need for more advanced and accurate tools. Opportunities for new jobs within healthcare technologies and digital health, especially in the United States, should increase. The Bureau of Labor Statistics (BLS) reports that "computer occupations" that "develop, test, and support the hardware and software needed for [digital health] services" should experience rapid growth through 2030. For example, jobs for *software developers and software quality assurance analysts and testers* and *web developers and digital interface designers* nationwide should rise by 22.2 percent and 12.8 percent, respectively, compared to the average of all occupations at 7.7 percent. **Overall, these findings suggest that the employment outlook for graduates of digital health programs is strong.**

According to Statista, **the pandemic made "healthcare and self-monitoring of health conditions more accessible to the public" thus the use of digital health technologies such as health apps, wearable devices, and telemedicine has grown**. Expert projections predict that revenue for the digital health sector will reach $42.22 billion by 2027 growing from $32.15 billion in 2023 in the United States. Globally, revenue for the industry will likely rise from $170.20 billion in 2023 to $256.30 billion in 2027 increasing at an annualized rate of 10.8 percent.

DIGITAL HEALTH NATIONAL MARKET – FAST FACTS

Revenue in the digital health market is projected to reach US$32.15 billion in 2023

Revenue is expected to increase at an annualized growth rate of 7.1 percent from 2023 to 2027, resulting in a projected market volume of US$42.22 billion by 2027

The average revenue per user (ARPU) is expected to amount to US$100

By global comparison, most revenue will be generated in China

The market's largest segment will be Digital Fitness & Well-Being with a total revenue value of US$19.30 billion in 2023

Sources: Statista (at times quoted verbatim or near verbatim; Bureau of Labor Statistics; and HealthTech Zone

REAL-TIME JOB POSTINGS INTELLIGENCE

TOP SKILLS


Product Management


Agile


Data Science


Visual Design


Business Strategy


Python


Customer Relationship Management

TOP OCCUPATIONS

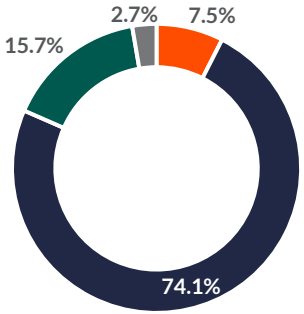
- Associate VP, Digital Health Services (151 job ads)
- Manager, Digital Health Programs (62)
- Human Health Digital, Data & Analytics: Oncology Data Domain (31)
- Digital Health Biostatistician II (29)
- Principal Architect – Advisory Services – Digital Health (25)
- Digital Health Principal Biostatistician (23)

ANALYSIS

In the past six months, nearly 1,000 jobs were posted for digital health-related positions nationwide. Demand appears strongest for occupations such as Management Analysts (171 ads), Medical and Health Services Managers (164 ads), and Marketing Managers (159 ads). These fields include job titles such as Digital Health Services Associate VPs and Digital Health Program Managers. Employers often seek skills related to product management, data science, and programming languages like Python. ISU CELT may wish to include training in these skill areas in the proposed curriculum to ensure graduates are competitive in the labor market.

Applicants with a bachelor's degree are most frequently sought by employers. Nearly 75 percent of job postings indicate that a bachelor's degree is preferred or required for applicants of digital health-related positions, while about 16 percent of postings prefer or require a master's degree. While seemingly not required for most jobs, a master's degree may give digital health professionals a competitive advantage over bachelor's-level applicants.

EDUCATION REQUIREMENTS



Note: 186 listings do not specify educational attainment requirements.

Note: For this analysis, Hanover retrieved job postings data for digital health-related job titles across the nation from JobsEQ, a proprietary database providing real-time job postings aggregated from thousands of websites. All data reflect the 180-day period as of July 2023.

REAL-TIME JOB POSTINGS INTELLIGENCE

EXAMPLE JOB POSTINGS

Digital health job postings that prefer or require a master's degree are typically within the medical, insurance, and pharmaceutical industries. Master's-level job ads are often for senior positions that require several years of experience and advanced skillsets in digital health, digital technologies, and leadership. Specifically, job titles within this field requiring graduate-level education include directors, expert consultants, data science and digital health scientists, and associate directors. **Considering this trend, ISU CELT may wish to target prospective students who seek leadership roles in digital health**. Please see the table below for exemplary job postings.

Position	Employer	Skills and Requirements
Associate VP of Digital Health Services *Naples, FL*	Humana	▪ MBA, or MS in Computer Sciences/Data Engineering or BS in a technology field and 15+ years of experience ▪ strong understanding of digital platform ecosystems, health care digital landscapes, and passion and awareness of new innovations ▪ Extensive professional experience (10+ years) in product management, customer experience, strategic planning, and data management
Digital Health Expert Consultant *Remote*	Population Services International	▪ Master's of doctoral-level degree in public health, information technology, digital health, digital marketing, or related ▪ 6-8 years of experience working in digital health interventions
Scientist, Data Science & Digital Health *New York, NY/ Titusville, NJ*	Johnson & Johnson	▪ A Ph.D. degree, or a master's degree (with at least 3 years of proven experience within a start-up, technology, or healthcare industry) in a quantitative discipline (e.g., artificial intelligence, computer science, statistics, biostatistics, health economics, biomedical informatics, epidemiology, applied mathematics, or similar) ▪ Experience with machine learning, deep learning, statistical modeling, causal inference, multivariate regression and classification, and natural language processing ▪ Proficiency with one or more programming languages such as Python, R, SQL
ViiV Healthcare Director, Digital Health Innovation Strategy *Durham, NC*	GSK	▪ 5 plus years working in digital health innovation strategy role(s) in life sciences ▪ 5 plus years leading innovation strategies / new program development in life sciences ▪ 5 plus years of project management experience including negotiations skills, internal stakeholder management, consumer engagement/growth hacking skills
Director, Global Regulatory Science, Precision Medicine & Digital Health *Cranford, NJ/ Meadows, NJ*	Bristol Myers Squibb	▪ Solid scientific background, Ph.D., M.D., PharmD, MS, or BS ▪ Significant experience in regulation of diagnostic/digital health devices (e.g. > 5 years)

Note: For this analysis, Hanover retrieved job postings data for digital health-related job titles across the nation from JobsEQ, a proprietary database providing real-time job postings aggregated from thousands of websites. All data reflect the 180-day period as of July 2023.

PROGRAM BENCHMARKING TRENDS

Trends identified among master's programs in digital health

PROGRAM TRENDS SUMMARY

PROGRAM DURATION

Most benchmarked digital health-related programs report that students can complete the degree in approximately one year. The University of San Francisco's program can be completed in as little as three semesters while the University of Denver and the University of Washington 's programs both take 18 months. ISU CELT should consider offering a degree program that can be completed within 18 months.

CREDIT REQUIREMENTS

Benchmarked digital health-related master's degree programs require an average of 34 credits. Both Northwestern University and the University of Denver require 32 credits while the University of San Francisco and the University of Washington require 36.

DEGREE REQUIREMENTS

Benchmarked digital health-related degree programs typically require students to complete a capstone project. However, Northwestern University allows students to choose between a capstone project or a thesis. If ISU CELT continues with the proposed program, a capstone project would meet standard competitor practices.

SPECIALIZATIONS

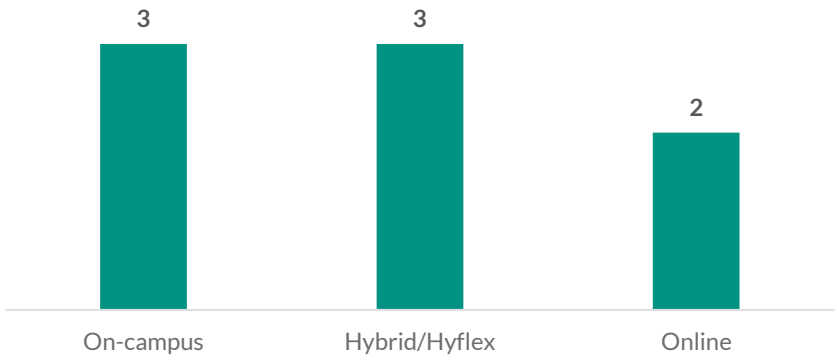
Few profiled programs offer concentrations. Northwestern University and the University of Denver both provide specialization options: *Health Technology Informatics* and *Digital Health*, respectively.

RAPID ADMISSIONS/RAPID ENROLLMENT

Profiled programs do not offer rapid admissions or rapid enrollment offerings. Of the seven benchmarked competitors, none mention rapid admissions or enrollment opportunities. Typically, applicants for digital health-related master's programs are required to have any bachelor's degree from an accredited university and a GPA above 2.5.

DELIVERY FORMAT

Flexible distance learning formats are popular among reviewed programs as five institutions offer either online or hybrid options. Further, several institutions offer multiple delivery options. For instance, the University of Denver allows students to study on-campus, online, or in a hybrid format. The University of Washington describes its program delivery as Hyflex meaning students can choose whether to attend classes in-person or virtually at any time. Flexible delivery options are likely to be attractive to working professionals that these programs often target.



PROGRAM TRENDS: FACULTY AND LEARNING OBJECTIVES

FACULTY

On average, reviewed programs have four full-time faculty members, but the total number of faculty per program varies widely. The University of San Francisco has the fewest faculty for its MS in Digital Health Informatics: one program director, one full-time faculty, and four part-time faculty. The University of Denver has the most faculty for its MS in Health Informatics with 30 faculty, most of whom appear to be part-time.

UNIVERSITY OF SAN FRANCISCO FACULTY EXPERTISE AREAS

EEG and Signal Analysis (2)	Machine Learning (2)	Natural Language Processing (2)	Autism and Epilepsy (1)
Clinical Neurophysiology and Neuroscience (1)	Data Analytics (1)	Data Analytics of Genomics Data (1)	Digital Health (1)
Digital Transformation (1)	FinTech/Big Tech (1)	Global Ecosystems (1)	New Business Models (1)
Nonlinear Dynamics (1)	Statistical Computing (1)	Statistics and Econometrics (1)	Software Development and Release Methodologies (1)
Software Quality (1)	Startups (1)	Technology Innovation (1)	Technical Program Management (1)

LEARNING OBJECTIVES

Digital health-related program objectives or program outcomes focus on the development of students' abilities to assess and analyze current technology. Students gain knowledge of advanced technology to better help patients and the organization, and to understand data to anticipate new intelligence/ technological advancement needs.

SAMPLE LEARNING OBJECTIVES

Northwestern University

- Anticipate and assess evolving health informatics needs from clinical, technical, operational and financial perspectives.
- Create a vision for the use of information to improve the quality, safety, and efficiency of patient-centered care and public health.
- Nurture the development of leadership skills to navigate the privacy, security, legal, regulatory, ethical and social challenges inherent to health informatics.

University of Denver

- Assess how technology impacts each part of healthcare delivery
- Analyze how technology can help improve quality of care and reduce costs
- Recommend different ways to facilitate communication between clinical providers and their counterparts

University of Washington

- Use current and emerging technology to enhance an organization's ability to deliver the clinical and administrative information necessary for patient care
- Leverage an organization's data to anticipate and provide clinical, research, and business intelligence requirements
- Assess, design, and lead enterprise-wide programs to protect and enhance the health care organization's information assets
- Proactively advocate for appropriate enterprise safeguards that meet industry standards
- Collaborate, transform, and manage health information systems

PROGRAM BENCHMARKING SUMMARY

Institution	Program *(Concentration)*	Program Delivery	Program Duration	Credit Requirements	Degree Requirement(s)	Number of Faculty
Imperial College – London *South Kensington, London*	MSc in Health Data Analytics and Machine Learning	**On-campus** (*Utilizes modules; students pursue full-time study*)	**One year**	Program webpages do not provide credits; however, student must complete **nine modules**	**Research Project** (*Students must complete one research project during the third term that consists of 4 months of full-time research*)	*The School of Public Health does not list faculty by specific program*
Northwestern University *Evanston, IL*	Masters in Health Informatics *(Offers specializations in Clinical Informatics, Health Technology Informatics, and Health Administration Informatics)*	**Online** (*Courses are delivered within a quarter semester system*)	Not specified	**Total: 32 credits** ^ Core: 13 credits Specialization: 19 credits	**Capstone Project** (*Students develop and implement a Health Informatics project with an industry or university partner or in their workplace*) OR **Thesis**	**Total: 9** Full-time: 3 Adjunct: 6
University of Denver *Denver, CO*	MS in Health Informatics *(Digital Health)*	**On-campus, Online, or Hybrid** (*Utilizes courses delivered within a quarter semester systems: on-campus courses are offered in the evening*)	18 months	**Total: 32 credits*** Core: 16 credits Concentration:11 credits Elective: 5 credits	**Capstone Project** (Students research a topic, problem, or issue within their field of study and work individually with a capstone advisor)	Total: 30 Full-time: 4 Adjunct: 11 Unknown: 14

^Note: Northwestern University uses a "unit" system in which one unit is the equivalent to four quarter credits; units were multiplied by four and divided by 1.5 to convert to semester credits
*Note: Quarter credits have been converted to semester credits by dividing the total quarter credits by 1.5
Sources: Institutional websites (see embedded hyperlinks)

PROGRAM BENCHMARKING SUMMARY

Institution	Program *(Concentration)*	Program Delivery	Program Duration	Credit Requirements	Degree Requirement(s)	Number of Faculty
University of Oxford	MSc in Applied Digital Health	**On-campus** (*Utilizes consecutive two-week modules; students pursue full-time study*)	**One year** (*The academic year is split into three terms of eight weeks*)	Program credits are not provided; however, students complete **eight compulsory modules** - not including the dissertation	**Dissertation** (*Students undertake an original research project in the third term which culminates in a research dissertation and short presentation*)	**Total: 3** Professor: 2 Senior Research Fellow: 1
University of San Francisco *San Francisco, CA*	MS in Digital Health Informatics	**Hybrid** (*Courses are delivered within a semester system; offers evening and online courses*)	**Three to Six semesters**	**Total: 36 credits** Core: 32 credits Elective: 4 credits	**Capstone Project** (*Students create and implement a project to solve an existing problem or challenge in healthcare*)	**Total: 6** Full-time: 2 Part-time: 4
University of Washington *Seattle, WA*	Master of Health Informatics and Health Information Management	**Hyflex** (*Courses are taught in a flexible hybrid format in which students can attend online or in-person while learning from the same instructor; students choose whether to attend classes in person or remotely; courses are delivered within a quarter semester system; students pursue part-time study*)	**18 months** (*Six consecutive quarters*)	**Total: 36 credits** (*18 courses offered in a set sequence*)	**Capstone Project** (*Students apply technical and management skills and industry knowledge to a real-life health informatics and health information management problem at a health care organization or related organization in the community*)	**Total: 11*** Full-time: 10 Adjunct: 1

^Note: Quarter credits were converted to semester credits by dividing the total quarter credits by 1.5
*Note: Emeritus faculty are not included in this count
Sources: Institutional websites (see embedded hyperlinks)

PROGRAM BENCHMARKING SUMMARY: LEARNING OBJECTIVES

Institution	Program	Learning Objectives/Program Outcomes
Imperial College – London *South Kensington, London*	MSc in Health Data Analytics and Machine Learning	• You will gain expertise in developing, applying and interpreting results from cutting-edge statistical and machine learning approaches for analysing and integrating complex sets of data that are emerging in the health field. • You will address real and yet unresolved scientific questions through a variety of individual and group projects and you will produce work that adheres to international publication quality standards.
Northwestern University *Evanston, IL*	Masters in Health Informatics	• Anticipate and assess evolving health informatics needs from clinical, technical, operational and financial perspectives. • Create a vision for the use of information to improve the quality, safety, and efficiency of patient-centered care and public health. • Nurture the development of leadership skills to navigate the privacy, security, legal, regulatory, ethical and social challenges inherent to health informatics.
University of Denver *Denver, CO*	MS in Health Informatics	• Assess how technology impacts each part of healthcare delivery • Analyze how technology can help improve quality of care and reduce costs • Recommend different ways to facilitate communication between clinical providers and their counterparts
University of Oxford	MSc in Applied Digital Health	• Discuss the drivers, enablers, barriers and challenges to digital health innovation, using real-world examples • Summarise the state-of-the-art in digital health tools – including digital therapeutics, digital diagnostics, artificial intelligence, learning health systems and those that facilitate automated care pathways or improved patient (self)management – and both explain and critically evaluate the theories and techniques that underline them • Identify and formulate a response to the ethical, policy, regulatory and practice challenges facing digital health • Explain in detail the need for user-focused development, meaningful evaluation and successful implementation of digital health tools, and propose appropriate methods, actions and processes to meet these requirements • Describe and apply key qualitative and quantitative research methods used study of digital health care, as well as identify the strengths and weaknesses of those research methods
University of San Francisco *San Francisco, CA*	MS in Digital Health Informatics	• Lead the development and application of emerging information technologies to improve all aspects of health care delivery • Master the "language" of health care, navigate the rules around using medical data, and utilize relevant information to assess changes in the health care system • Utilize health information technology for decision support, knowledge management, strategic planning, and outcomes assessment • Effectively interface between the technology developers and the clinical user community • Assure that healthcare information technology advances patient information security and confidentiality and promote ethical health care decisions
University of Washington *Seattle, WA*	Master of Health Informatics and Health Information Management	• Use current and emerging technology to enhance an organization's ability to deliver the clinical and administrative information necessary for patient care • Leverage an organization's data to anticipate and provide clinical, research, and business intelligence requirements • Assess, design, and lead enterprise-wide programs to protect and enhance the health care organization's information assets • Proactively advocate for appropriate enterprise safeguards that meet industry standards • Collaborate, transform, and manage health information systems

Sources: Institutional websites (see embedded hyperlinks)

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